Criterion III:
Research, Innovation and Extension

3.3: Research Publications and Awards

3.3.1 Number of research papers per teachers in the Journals notified on UGC website during the year.

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21.	Mr. Surendra Arjun Shirsat	Review of Research	Feb-19	21
22.	Dr. Bharat Bhujbal	Research Journy	Jan-19	22
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6	Dr. S K Shinde	Journal of Electroanalytical Chemistry	Oct-19	6.
7	Mr. Pawar Namdeo	Research Journey	Feb-20	7.
8	Dr. S K Shinde	Journal of Materials Science: Materials in Electronics	Aug-19	8.
9	Dr. Bhore J.B	IOSR Journal of Applied Chemistry (IOSR-JAC)	Apr-20	9.
10	Dr. S K Shinde	Colloids and Surfaces B: Bio interfaces	Nov-19	10.
11	Dr. S K Shinde	SN Applied Sciences	Oct-19	11.
12	Dr. S K Shinde	Colloids and Surfaces B: Bio interfaces	Dec-19	12.
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3.	**Dr. Bhosale R.R**	Journal of the Maharaja Sayajirao University of Baroda	2021	3.
4.	Dr. Kadam G.G	Scholarly Research Journal For Interdisciplinary Studies (SRJIS)	2020	4.
5.	Dr. Phalphale A. K.	Journal of Research and Development	Feb. 2021	5.
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7.	Dr. S K Shinde	Ceramics International	44348	7.
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11.	Dr. S K Shinde	Journal of Alloys and Compounds	May-24	11.
12.	Dr. S K Shinde	Journal of Cleaner Production	21-May	12.
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22.	Dr. JP Sarwade+ Dr. RM More	Journal of Aquatic Biology & Fisheries	2020	22.
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8.	Dr. S.K Shinde	Chemosensors	Dec. 2021	8.
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10.	Dr. S.K Shinde	Journal of personalized medicine	Feb-22	10.
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The Kinetic Study for the Fast Bromination Reaction of the Regioisomers of Cresol in Aqueous Medium by Competition Techniques

Dr J.B.Bhore*,Shubham Nimbalkar,Dr.B.I.Gatkul,Dr.M.P.Shinde
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Corresponding Address : Dr J.B.Bhore,Panchwati Hous.soc.,Opposite-M.S.E.B.,IndapurTa-Indapur,Dist-Pune

Abstracts: *The kinetic study for the bromination of the regioisomers of cresol in aqueous medium by molecular bromine has been carried out using the competition technique. These reactions are rapid and are found to be of the second order. The specific reaction rates determined at 27.0° C are 0.8 x 10^4, 1.78 x 10^4 and 4.4 x 10^4 M^{-1} s^{-1} for the ortho, para and meta isomers respectively. These values quantitatively justify the relative reactivity of these regioisomers in aqueous medium which has been qualitatively speculated hitherto for these rapid bromination reactions.*

Date of Submission: 06-05-2019 Date of acceptance: 20-05-2019

I. Introduction

The competition technique is used to study the fast bromination of the regioisomers of Cresol. A chemical reaction has kinetic and thermodynamic aspects. Chemical kinetics furnishes information regarding reactivity of the reactants from the determination of the rate constant which is in turn associated with the height of the energy barrier between the reactants and products.The mechanism of a reaction in one sense is the sequence of several elementary steps involved in the conversion of the reactants into products. Reaction mechanism gives the analytical information about the make and break of the chemical bonds involved in the reaction. and identification of products. These are electrophilic substitution reactions generally and are rapid in aqueous solutions. Of these, Brominations are the fastest and Iodinations the slowest. Various brominating reagents are used such as molecular bromine.[1]

The significant equilibrium in aqueous solutions is

$$X_2 + H_2O \rightleftharpoons HOX + HX$$

Table 1: The formation of H_2OX^+ as the probable electrophile in these aqueous solutions is easily ruled out as the following table

Halogen	$[X^+]\ [X^-] / [X]$	$[H_2OX^+]\ [X^-] / [X]_2$
Cl_2	10^{-60}	10^{-30}
Br_2	10^{-50}	10^{-20}
I_2	10^{-40}	10^{-10}

Table 2: The relative reactivities of some brominating reagents was estimated by Shilov and Kaniaev as

Br^+	BrCl	Br_2	HOBr
110000	43000	80	0.12

However, Raoet.al.have convincingly ruled out the formation of positive protonated cations in aqueous brominations and has proposed a catalytic route to explain the increased rates of these reactions in acidified solutions. The bromination of aromatic compound by N-bromoSuccinimide and bromine molecule as a brominating reagent

A rapid reaction may proceed slowly enough for conventional measurements provided the low concentrations of the reactants reached are measurable.

B] The Competition Technique

When A and B do not react with each other but C reacts with both A and B then a competition can be arranged between A and B to react with C wherein C is in insufficient quantity and A and B are in large excess. If the rate constant for one of the competing reactions is known, the other can be found out. Taft and Cook have determined the rate constant by the competition technique.[2]

Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman

Research article

Photocatalytic activity of $CuO/Cu(OH)_2$ nanostructures in the degradation of Reactive Green 19A and textile effluent, phytotoxicity studies and their biogenic properties (antibacterial and anticancer)

Rijuta Ganesh Saratale [a], Gajanan S. Ghodake [b], Surendra K. Shinde [b], Si-Kyung Cho [b], Ganesh Dattatraya Saratale [c, *], Arivalagan Pugazhendhi [d], Ram Naresh Bharagava [e]

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[d] Innovative Green Product Synthesis and Renewable Environment Development Research Group, Faculty of Environment and Labour Safety, Ton Duc Thang University, Ho Chi Minh City, Viet Nam
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Tumor rat C6 cell line
TOC and COD
Antimicrobial activity
Textile effluent

ABSTRACT

In this study, $CuO/Cu(OH)_2$ (denoted as CuONs) nanostructures were synthesized relying to a cheap and rapid chemical co-precipitation method using copper sulfate and liquid ammonia as precursors. Results obtained from X-ray diffraction, and field emission scanning electron microscopy analysis revealed the crystalline nature of synthesized CuONs. Fourier transform infrared spectroscopy and energy dispersive spectroscopy studies showed interactions between copper and oxygen atoms. Synthesized CuONs showed the size in the range of 20–30 nm using high resolution transmission electron microscopy analysis. The photocatalytic degradation performance of Reactive Green 19A (RG19A) dye using CuONs was evaluated. The results showed that CuONs exhibited 98% degradation efficiency after 12 h and also complete mineralization in form of reducing chemical oxygen demand (COD) (84%) and total organic carbon (TOC) (80%). The nanocatalyst was recovered from the dye containing solution and its catalytic activity can be reused up to four times efficiently. CuONs was also able to decolorize actual textile effluent (80% in terms of the American Dye Manufacturers' Institute (ADMI) value) with significant reductions in COD (72%) and TOC (69%). Phytotoxicity studies revealed that the degradation products of RG19A and textile effluent were scarcely toxic in nature, thereby increasing the applicability of CuONs for the treatment of textile wastewater. Additionally, the CuONs showed a maximum antibacterial effect against human pathogens which also displayed synergistic antibacterial potential related to commercial antibiotics. Moreover, CuONs displayed strong antioxidant activity in terms of ABTS (2,2′-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) (IC_{50}: 51 μg/mL) and DPPH (1,1-diphenyl-2-picrylhydrazyl) (IC_{50}: 60 μg/mL) radical scavenging. The CuONs exhibited dose dependent response against tumor rat C6 cell line (IC_{50}: 60 μg/mL) and may serve as anticancer agents.

1. Introduction

Extensive research in the area of nanotechnology has grown to a higher extent attention and plays a ground-breaking role in modifying the molecular and atomic stages of materials. Materials reduced at nanometric scale display significantly different and exclusive characteristics and are extensively applied with variations in scientific fields (Saratale et al., 2017, 2018). Nanoscale metal oxide materials are considered as vital constituents in micro/nanoscale devices due to its certain specific size and size oriented physico-chemical characteristics. Cupric oxide (CuO) has become a widely accepted metal oxide because of a large surface area,

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0301-4797/

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Ceramics International 44 (2018) 23102–23108

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Ceramics International

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Effect of Mn doping on the chemical synthesis of interconnected nanoflakes-like CoS thin films for high performance supercapacitor applications

S.K. Shinde[a], M.B. Jalak[a], S.Y. Kim[a], H.M. Yadav[b], G.S. Ghodake[a], A.A. Kadam[c], D.-Y. Kim[a,*]

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ABSTRACT

Herein, supercapacitor developed using Mn-doped CoS thin films (1–5% Mn) were prepared using the successive ionic layer adsorption and reaction (SILAR) method. The effect of the Mn-doped CoS thin films on the structural, morphological, and supercapacitor properties were studied using X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), field emission scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM), and electrochemical evaluation. Doping up to 3% Mn lead to improvements in peak intensity. Also, the morphological results indicated that doping of Mn affected the CoS nanostructures. The 3% Mn-doped CoS electrodes had an interconnected nanoflakes-like nanostructure, with a high porosity compared to the other electrodes. XPS data strongly supported the XRD results. The Mn-doped CoS electrodes showed a higher capacitance (621 F g^{-1}) than the other electrodes, and electrochemical impedance spectroscopy indicated that the 3% Mn-doped CoS electrode was highly conductive. The characteristics of the 3% Mn-doped CoS electrode proved its applicability in supercapacitors.

1. Introduction

Recent years have experienced a substantial movement toward more, clean, environmental pollutant-free, low-cost, and sustainable energy sources. Several sustainable energy sources are available, like solar cells [1], batteries [2], fuel cells [3], oil, supercapacitors [4], and natural gas. Of these energy sources, solar cells, batteries, and supercapacitors are most favorable applicants for the energy conversion and storage [5–9], and all represent main energy sources for practical applications at the industry level in the portable electronic device industry [5,10–13]. Among these devices, supercapacitors are more beneficial, due to a high power density, long time charging-discharging [6–9], and long-term cyclic stability relative to conventional batteries [14–19]. Supercapacitors usually classified into different types: electrochemical double layer capacitors and pseudocapacitors [20].

Many researchers are currently working on the development of new nanostructures, such as hierarchical, hybrid, and hetero-structured nanomaterials, for improving the specific energy, power, and cycling stability [5,21]. Previously, different binary and ternary phases of cobalt sulfide/oxides, including several binary compounds, were investigated [22–26]. Recently, supercapacitors of ternary metal sulfides revealed as an exciting electrode material, due to its high redox reaction and high conductivity of $NiCo_2S_4$ electrodes [27].

Among the binary and ternary metal sulfide/semiconductors, binary CoS electrodes are the most capable electrode nanomaterials for supercapacitor application because of their high redox reaction, multiple and changeable valence states, as well as higher electrical conductivity. Hu et al. [3] successfully synthesized a hierarchical hollow nanostructure-like CoS electrode for electrochemical application, assembled from nanocubes, nanosheets (NSs), and nanoparticles (NPs) that resulted in double-shelled CoS-NP/CoS-NS constructs with exceptional capacitance (980 F g^{-1}) at current densities of 1 A g^{-1}. Faber et al. [24] prepared CoS_2 thin films by a thermal method on a glass substrate for solar cell applications and demonstrated that CoS_2 displayed high electrocatalytic activity in the electrolyte. Liu et al. [25] established a facile hydrothermal method to prepare a porous nanocoral-like Co_3S_4 thin film directly on a Ni foam. Both, the crystal growth mechanism and the development of the coral-like Co_3S_4 on Ni foam, were explained. Subsequent electrochemical testing revealed the Co_3S_4 electrode for supercapacitor has a large specific capacitance in KOH electrolyte. Xie et al. [28] used a hydrothermal approach to prepare carbon-coated CoS_2 as a thermal battery electrode, which presented higher cell

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Reproductive periodicity in the edible oyster Saccostrea cucullata from Deogad, Sindhudurg district, Maharashtra State, India.

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ABSTRACT:

The locality of Deogad (16^0 23' N ; 73^0 23' E) in Sindhudurg district of Maharashtra State, India was selected on the basis of the habitat , topography, vegetation and local market value to study the reproductive periodicity of the oyster *Saccostrea cucullata* . The maximum sizes attained by *S. cucullata* in the estuaries at Deogad was 44-45 mm shell length. However, larger sized oysters are found round the year in the estuary at Deogad.

The environmental parameters such as tidal heights ,pH, temperature , dissolved oxygen and salinity existing on the oyster beds in Deogad was recorded on every new-moon and full-moon days for a period of twelve months.

The microscopic details of the gonad tissue processed on every new moon (NM) and full moon (FM) days of each month revealed following stages ; (i) Gametogenesis ; (ii) Maturing ; (iii) Mature; (iv) Partial spawning ; (v) Complete spawning ; (vi) Recovery ;(vii) Neutral . The gonads of twenty oysters were staged for males and females separately on each NM and FM days and percentage of the males and females in these different stages were calculated.

The study on reproductive periodicity in male oysters of *S. cucullata* from Deogad showed that many oysters were in gametogenesis stage in entire June and once again on November NM. Maturing stage was seen on March NM, May FM, July NM and again on November FM and in entire December. Many oysters were in mature stage on March FM, April FM and July FM and again on January NM. Most of oysters were under spent stage on March FM, in entire August and September, and on January FM. Many oysters were under recovery stage on May NM and in entire October. Most of the samples collected in entire February and on April NM showed prominent neutral stage. The female oysters showed that the gametogenesis was dominant on March NM, in entire June and on November NM; maximum on NM of March and on November. The maturing stage was dominant in entire April and May and on July NM and December NM. Oysters under spent condition were dominant on April NM and December FM, and all the gametes were released in entire August, September and on October NM. The recovery stage was recorded in many oysters on October FM and January FM, while the neutral stage was recorded in entire February.

These different stages of the gonads have been correlated with the changes in environmental conditions over the oyster beds from the two localities. The results are discussed in the light of possible impact of the environment on reproductive events.

Key words: *S. cucullata*, Deogad, Achra, NM, FM, gametogenesis, maturing, mature, spent

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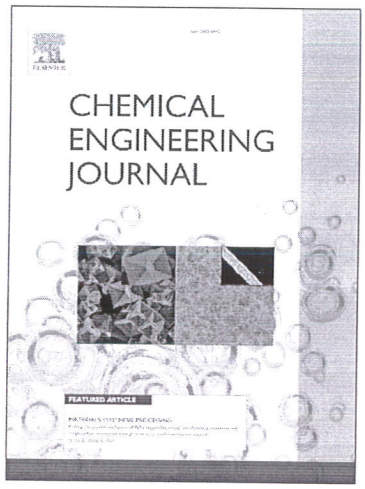

Exceptional electromagnetic interference shielding and microwave absorption properties of room temperature synthesized polythiophene thin films with double negative characteristics (DNG) in the Ku-band region

Gopal Kulkarni, Priyanka Kandesar, Ninad Velhal, Varsha Phadtare, Aviraj Jatratkar, S.K. Shinde, Dae-Young Kim, Vijaya Puri

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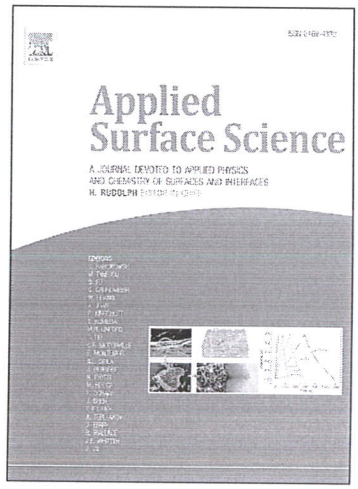

Full Length Article

Chemical synthesis of flexible nanoflakes-like $NiCo_2S_4$ electrodes for high-performance supercapacitor application

S.K. Shinde, M.B. Jalak, G.S. Ghodake, N.C. Maile, V.S. Kumbhar, D.S. Lee, V.J. Fulari, D.-Y. Kim

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8. The Roles of ICT in Education

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Abstract

Technical advancement of the modern world, popularity of social networks are significantly changing the direction in education. Both the future of the education and of society in general depends on understanding by all participants of educational process of the direction of a strategic development of education (Koryuhina C, Shamshina T). ICTs are making dynamic changes in society. They are influencing every aspects of human life. ICT is a scientific, technological and engineering discipline and management technique used in handling information, its application and association with social, economic and cultural matters (UNESCO, 2002).

As world is moving rapidly towards digital information, the role of ICTs in education becomes more and more important and this importance will continue to grow and develop in 21st century. This paper highlights various impacts of ICT on contemporary higher education and also discusses potential future developments. It also explores some challenges in higher education like cognitive tutors, need for developing a model, collaborative authoring etc. It is generally believed that ICTs can empower teachers and learners, making significant contributions to learning and achievement. The innovation of the Information Communication Technology (ICT) in modern teaching, which is a pivotal for national development, has not been inculcated in third world countries.

Key words: ICT, technology, scientific, information, communication

Introduction

According to Daniels (2002) ICTs have become within a very short time, one of the basic building blocks of modern society. Many countries now regard understanding ICT and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and numeracy. However, there appears to be a misconception that ICTs generally refers to 'computers and computing related activities'. Pelgrum and Law (2003) state that near the end of

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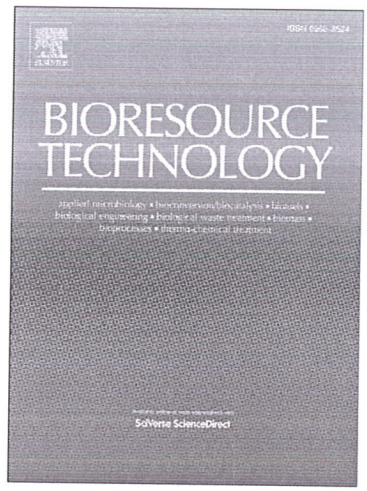

Adsorptive remediation of cobalt oxide nanoparticles by magnetized α-cellulose fibers from waste paper biomass

Avinash Kadam, Rijuta Ganesh Saratale, Surendra Shinde, Jiwook Yang, Kyojung Hwang, Bhupendra Mistry, Ganesh Dattatraya Saratale, Saifullah Lone, Dae-Youg Kim, Jung-Suk Sung, Gajanan Ghodake

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polymers

MDPI

Article

Green-Synthesis of Anisotropic Peptone-Silver Nanoparticles and Its Potential Application as Anti-Bacterial Agent

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Abstract: This study demonstrates a green-route-based synthesis of high-concentration suspensions of anisotropic silver nanoparticles (AgNPs) by peptone (Pep), a soluble protein hydrolysate and an abundantly used nutrient source in microbial-media. The transformation of Ag ions from solution into a high-concentration suspension of anisotropic Pep-AgNPs, at an extremely low concentration of peptone (0.02%), indicates that the present green-route synthesis method follows "low volume high concentration nano-synthesis", and, hence, enhances the economic significance of the process. Process optimization with different concentrations of AgNPs (1–5 mM), NaOH solution (5–40 mM), and peptone (0.004%–0.12%) gave the optimized Pep-AgNPs synthesis at 3 mM of $AgNO_3$, 20 mM of NaOH, and 0.02% of the peptone concentrations. The green-route synthesized Pep-AgNPs were structurally characterized by the TEM, XPS, FT-IR, and XRD analyses. The Pep-AgNPs against the clinically relevant bacteria *Escherichia coli* and *Staphylococcus aureus* gave significant anti-bacterial properties, with a MIC (minimum inhibitory concentration) of 100 ppm. The colony counting and morphological observation of the bacterial cell under SEM corroborated an anti-bacterial potential of the Pep-AgNPs. Therefore, Pep-AgNPs are green-route synthesized, anisotropic, and have a significant anti-bacterial potential that can be used in many relevant applications.

Keywords: Peptone; Microbial nutrient; Anti-bacterial silver nanoparticle; *Escherichia coli*; *Staphylococcus aureus*

1. Introduction

As the development of nanotechnology progresses, the silver nanoparticles (AgNPs) have become one of the most demanding nanoparticles, owing to their increasing number of applications in different sectors [1–9]. The shape, surface chemistry, and size of the AgNPs gives them typical physical, optical, chemical, and electronic properties. Therefore, the specific design of AgNPs has

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Water Utilization in the Indapur Tahsil District Pune Maharashtra

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Abstract

Water is life and it is universally acclamation as the most important natural resource. The end use of water is essential for every inhabitant and for a wide range of economic and informal sector activities. It is vital for agriculture, industry, health and hydropower. India accounts for about 17.5 % of the world's population and roughly 4% of the total available fresh water resources. With increasing population and growing demand from industrial and agricultural sectors the water consumption is set to jump up tremendously in the near future. Climate change can severely threat Indapur tahsils water security. Observing these outcomes in the present context, in this paper utilization of water resources and requirement of water resources in the Indapur tahsil. Present study attempts to highlight the utilization of water resources in the Indapur tahsil Pune district of Maharashtra. This paper has been attempt has been made to quantify the water budget of the study area. The proportion of water utilization is in three different activities i.e. domestic purpose, agriculture purpose and industrial purpose in Indapur tahsil are also discussed in the paper. The area being in monsoon climatic conditions it is subject to high variability conditions, it's likely to affect on the availability of water. The outcomes of these studies are briefly presented in the paper. It has been observed that the utilization of water resources are not uniform over the study area.

Key words: domestic, agriculture, industrial, utilization of water.

Introduction

Water is the basic need of life for the human beings and any alteration in its availability is directly going to impact them through various means. India accounts for about 17.5 % of the world's population and roughly 4% of the total available fresh water resources. Most of the rivers are rain-fed and seasonal and only few are perennial. The present study has been taken up to quantify the area being in monsoon climatic conditions it is subject to high variability conditions, it's likely to affect on the availability of water. Water use includes all individual and collective activities of human society which affect water resources and change their quality and quantity. The beneficial utilization of water depends, as does its natural functions, on the water properties. The method of water use and distribution depends especially on the degree of development and organization of the social system. It becomes systematic as a consequence of agricultural, social and industrial development. The end use of water is essential for every inhabitant and for a wide range of economic and informal sector activities. It is vital for agriculture, industry, health and hydropower. Water is also an integral part of the natural environment and the habitat for many forms of life; it may be human, animal and plant (Opoku-Agyemang, 2005). The household wise water utilization statistics has also been worked out through personal interviews conducted during the field visits. For this purpose a questionnaire was framed. Questions are related to domestic, agriculture, livestock and industrial water use and requirement has also been incorporated accordingly.

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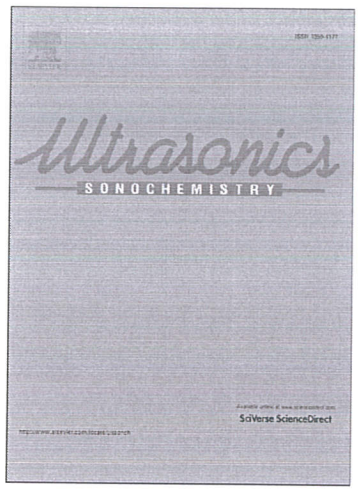

Effect of different electrolytes and deposition time on the supercapacitor properties of nanoflake-like $Co(OH)_2$ electrodes

N.C. Maile, S.K. Shinde, R.R. Koli, A.V. Fulari, D.Y. Kim, V.J. Fulari

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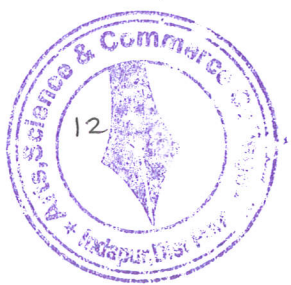

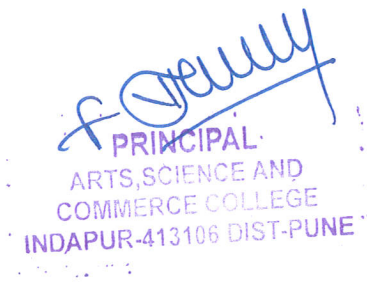

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Problems and Prospects of Ground Water Resources in Pune District of Maharashtra

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B. K. Deshmukesh College, Chakur

Abstract

Based on the data obtained from Central Ground Water Board, Ministry of Water Resources and empirical data collected personally and attempt has been made in this paper to identify the status of ground water level in Pune District of Maharashtra. In order to suggest remedies for elevating ground water levels and improve upon the water quality, a careful investigation of exciting problems has been made. It is found that, the potential yield of ground water is medium at most of the places while, ground water is suitable for irrigation with low level risk. Low rainfall and heavy use of ground water in the study area lead to decline of ground water level. The industrial influent and domestic sewage release are responsible for deteriorating the quality of ground water at some places. Over irrigation is responsible for salinization of ground water. Thus various measures have to be taken in view of qualitative and quantitative improvement of ground water. The present study may prove to be of some help in ground water management of the study area.

Keywords: Pune, Ground water level

Introduction

Groundwater, which is in aquifers below the surface of the Earth, is one of the Nation's most important natural resources. The importance of groundwater for the existence of human society cannot be overemphasized. Groundwater is the major source of drinking water in both urban and rural India. Groundwater is the source of about 33 percent of the water that county and city water departments supply to households and businesses (public supply). It provides drinking water for more than 90 percent of the rural population who do not get their water delivered to them from a county/city water department or private water company. Besides, it is an important source of water for the agricultural and the industrial sector. About 42 percent of the water used for irrigation comes from groundwater. Being an important and integral part of the hydrological cycle, its availability depends on the rainfall and recharge conditions. Till recently it had been considered a dependable source of uncontaminated water. Withdrawals of groundwater are expected to rise as the population increases and available sites for surface reservoirs become more limited.

Study Area

Pune district is located between 17°54' to 19° 24'North latitude and 73°10' to 75°10' East longitude. The district has geographical area of 15,642 sq.km (Census, 2011). Pune district is bound by Ahmadnagar district on north-east, Solapur district on the south-east, Satara district on south, Raigad district on the west and Thane district on the north-west. The landscape of Pune district is distributed triangularly in western Maharashtra at the foothills of the Sahyadri Mountains and is divided into three parts: "Ghatmatha", "Maval" and "Desh". Pune district forms

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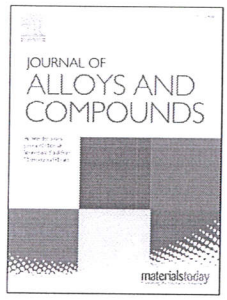

Electromagnetic shielding, magnetic and microwave absorbing properties of Polypyrrole/$Ba_{0.6}Sr_{0.4}Fe_{12}O_{19}$ composite synthesized via in-situ polymerization technique

Ninad Velhal, N.D. Patil, Gopal Kulkarni, S.K. Shinde, N.J. Valekar, H.C. Barshilia, Vijaya Puri

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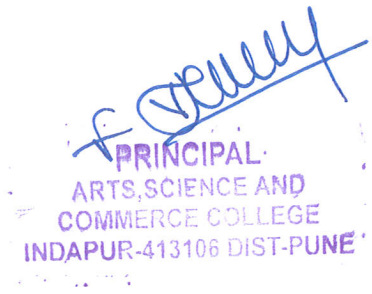

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A Delineation of Crop Diversification of Bawada Circle in Indapur Tahsil (Pune District)

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Abstract :

In this paper an attempt has been made to analyze crop diversification in study area. Ten major crops have been considered for analysis. Crop diversification is one of the technique delineating agricultural regions. The factors like rainfall and irrigation affect crop diversification. The study area though experiences semi-arid climate, has the irrigation facilities due to canal and backwater of Ujjani dam. The primary and secondary data are collected and crop diversification is done using Gibb's Martin Index.

General Introduction :

The agriculture is a basic activity of human beings since ancient period. Agriculture contributes 27 percent to India's total national income. 62 percent population is associated in the agriculture activity and 90 percent of rural population is engaged in agricultural and allied activities. Agriculture provides raw materials to small as well as large scale industries and much of export items. (Davis, 1982) Agro-based industries give output and employment to many people. Rainfall is vital and instrumental in case of Indian agriculture. The present paper is attempted to study the landuse pattern in *Indapur*tahsil in Pune district for its better landuse planning. The regional survey of landuse and its mapping is made by *Patrick Geddes*, Later, on Late *L. D. Stamp* in Britain (1930). This is perhaps, the first attempt to survey the land. Many geographers, economists and planners have further attempted for landuse planning. The *Indapur*tahsil is one of the tahsils in Pune district consisting of 143 villages and only three urban settlements. *Indapur* Tahsil is situated in South-east side of Pune district; it lies entirely in the *Bhima-Nira* basins. The present study has attempted to study the crop diversificationof *Bawada* Circle in *Indapur*tahsil (Pune district) for its better landuse planning and management for the development of circle.

Study Area :

The *Bawada* Circle is one of the circles in *Indapur*tahsil consisting of 18 villages. Geographically, this area extents from 17.894959° to 18.072995°North latitudes and 74.940695 to 75.135104°East longitudes The study area experiences semi-arid climate. Month April, May and June are the hottest months with maximum mean temperature of 40° centigrade Temperature gradually reduces in December and January with minimum mean temperature 12 ° centigrade. The medium black and deep black soils appear within study area. The soil fertility encourages growing various crops like Sugarcane, *Jawar*, *Bajra*, Wheat, Vegetables etc.

Morphometric Analysis of Linear Aspects of Upper Neera River Basin, Maharashtra

Sandip Shinde

Arts, Science and Commerce College, Indapur, Dist. Pune 413 106, MS, India

Abstract

Watershed managers require understanding and synthesizing hydrologic response of river basin for which they have started looking into its basin characteristics or morphologic features and establish connection of fluvial geomorphology to hydrology. According to Strahler (1968), the science of geomorphology treats the origin and systematic development of all types of landforms and is a major part of Physical Geography. Drainage basin is an ideal unit of the earth surface for the study of its landform. Therefore the present study deals with the quantitative analysis of selected drainage basin. Using drainage basin as a basic unit in morphometric analysis is the most logical choice because all hydrologic and geomorphic processes occur within the drainage basin. Measurement of shape, or geometry, of any natural form- be it plant, animal, or relief feature- is termed as morphometry (Strahler, 1957). Systematic description of the geometry of a drainage basin and its stream channel system requires measurement of linear, areal and relief aspect of drainage network. In current research paper only linear aspects are analyzed such as stream order, Stream numbers, bifurcation ratio, stream length, mean stream length and stream length ratio.

KEYWORDS : Morphometric, drainage network, linear aspects.

Introduction

River basin and its characteristics are controlled by nature and its hydro-climatic parameters are mostly interrelated with each other. Watershed managers require understanding and synthesizing hydrologic response of such basin for which they have started looking into its basin characteristics or morphologic features and establish connection of fluvial geomorphology to hydrology. Geomorphology is the study of landforms (valley, gorge, waterfall, cavity, sand-dunes). Worcester defines geomorphology, the interpretative description of relief features. (Worcester, 1948) Drainage basin is an ideal unit of the earth surface for the study of its landform (Singh S. a., 1974). Therefore the present study deals with the quantitative analysis of selected drainage basin. (Singh S. a., 1974)Using drainage basin as a basic unit in morphometric analysis is the most logical choice because all hydrologic and geomorphic processes occur within the drainage basin. The landscape as well as relief features play a dominant role to influence source of transportation, location of cities and agriculture field so their study is great importance and interest to geomorphologist. The aim of the watershed management is to conserve the soil and water resources, so as to achieve improvement in the agriculture. So the emphasis is on the development of regional resources.

Study Area

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Study of Total Dissolved Solids (TDS) of Water in Indapur Taluka

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Abstract

The present study was undertaken to know the variation in Total Dissolved Solids (TDS) of various sources of water i. e. Ujjani reservoir, open well and bore well located in Indapur taluka. The study was carried out over a period of one month. In India there are enormous number of natural and manmade water bodies used for various purposes, mainly for drinking and agriculture. One of the most severe problems in arid and semi- arid regions is high concentration of salts in soils and water resources. Thus, water quality and its management have received much attention in developing countries. The present study is aimed at assessing the Total Dissolved Solids (TDS) for water quality of sources of water and find out the causes of increased TDS. The analysis reveals that the surface water of the area needs some treatment before consumption; and it also needs to be protected.

Keywords: Total Dissolved Solids, Water quality

Introduction

Ground water is a good source of fresh water available on the earth. It is the important renewable resource having several inherent advantages over surface water (Sinha, 1945). Hence it is very important to assess the ground water quality not only for its present use but also from the view point of a potential source of water for future consumption (Kotadiya, et al, 2013). Water sources available for drinking and other domestic purpose must possess high degree of purity, free form chemical contamination and micro organism (Borul and Banmeru, 2012). Water is also one of the most important factors for every living organism on this planet. The quality of water is getting vastly deteriorated due to unscientific waste disposal, improper water management and carelessness towards environment, which has also led to scarcity of potable water affecting the human health (Agarkar, 2003).

In India there are enormous number of natural and manmade water bodies used for various purposes, mainly for drinking and agriculture. However, in recent years due to rapid urbanization industrialization and modern agricultural activities, the quality of water bodies deteriorated causing environmental hazards. Due to the growth of population, and man-made activities, the quality of water is deteriorating everywhere (Datye, 1984). Thus, water quality and its management have received much attention in developing countries.

For this research, Indapur taluka is selected as study area because it is one of the talukas of Maharashtra which is fall under drought prone area. Water quality of eastern area of Indapur taluka is very poor. In this research paper water quality of Indapur taluka is assessed.

Study Area

Indapur taluka is situated in Pune district. The northern and eastern border is demarcated by Bhima in Pune and Solapur districts while southern boundary is confined by Neera in Pune and Satara and Solapur districts. The region extends between 17° 53′ to 18°

15. Evaluation of Computer Assessed Learning Module for the Topographical Map Interpretation Skill

Dr. Mahammad Mulani
Department of Geography, Arts, Science and Commerce College, Indapur, Dist. Pune.
Sandip Shinde
Department of Geography, Arts, Science and Commerce College, Indapur, Dist. Pune.

Abstract

Teaching and learning is one of the processes of education system in all over the world. Various teaching and learning methods are implemented in education system like lecture method, discussion method, seminar method, tutorial method etc. by teachers, professors and persons who is working in education and research fields. ICT (Information and Communication Technology) have been using in teaching-learning process since two to three decades. Computer and various software are used in teaching to provide information and knowledge effectively for students. James Kulik (1994) used research technique called meta-analysis to aggregate the findings from more than 500 individuals research studies of computer-based instruction. Computer-assisted Learning software seems to be a promising option for undergraduates, as it not only provides them in-depth knowledge to visualize live experiments on a computer screen but also helps them to self-assess their acquired knowledge through a series of multiple choice questions (Govindaraja C, et al, 2011). In the present study, Computer-assisted Learning Module is used for the geography subject. We found that Computer Assisted Learning Module is effective method which increases the skills of Topographical map interpretation.

Keywords: Teaching, learning, Computer Assisted Learning Module, Topographical Map.

I. Introduction

Computer-assisted Learning software seems to be a promising option for undergraduates, as it not only provides them in-depth knowledge to visualize live experiments on a computer screen but also helps them to self-assess their acquired knowledge through a series of multiple choice questions (Govindaraja C, et al, 2011). Geography is description and distributional study

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Spatio-Temporal Analysis in Agricultural Cropping Pattern of Indapur Tahsil, Pune District (Maharashtra)

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Abstract:

Agricultural land use means cultivation of crops during the agricultural year on a certain piece of land. The present study is related to the changing agricultural land use in Indapur Tahsil, Pune district. The Indapur Tahsil is one of the Tahsil in Pune district which consist of 143 villages. Geographically, this area extents from 17° 53´ to 18° 15´north latitudes and 74° 35´ to 75° 8´east longitude. Indapur Tahsil lies in southeast of Pune district with geographical area of 1,569.76 square kilometers.

The Spatio-temporal analysis of ten selected crops has been studied in Indapur tahsil. In study area sugarcane, corn and fodder crops have increased, reason behind it the sugarcane are main commercial crop now day's sugar, Gur factories as well as Dairy farmers purchasing it for the Making a Sugar, Gur, and Animal Fodder. The share of Jowar, Sugarcane and Some extent fodder crops are growing fast because it supported Animal husbandry. But jowar, wheat, bajara, fruits, oilseed and pulses have declined percent in this tahsil during the study period. Sugarcane is first ranking crop occupying 38.89 percent to net sown area. Sugarcane was cultivated on 22.60 percent in 2001 which is increased by 16.29 percent in 2016

Keywords: Land use pattern, cropping pattern, Agricultural land use, Spatio-temporal variation.

Introduction:

Agriculture is the basic occupation of the people. Agriculture provides food grains to human beings and fodder for animals. There is rapid growth of industry and service sector in modern India. But agriculture is still an important economic activity. The rural economy is still based on agriculture. The present study focuses on spatio-temporal distribution of agricultural crops in Indapur Tahsil.

The spatial distribution and their temporal variations have been studied for the period from 2001-2016. The data regarding crops of 143 villages collected from agriculture office, Indapur. The collected data converted into percentage to net sown area. After that, these crops percentage were arranged into different groups and finally, spatial distribution was studied for ten crops in study area. The study of temporal variation of crops in study region was computed for 16 years (2001-2016).

Study Area:

Indapur Tahsil is selected for the study. The Indapur Tahsil is one of the Tahsil in Pune district including of 143 villages. Geographically, extent of study area is from 17° 53´ to 18° 15´north latitudes and 74° 35´ to 75° 8´east longitudes. The area of Indapur Tahsil is drained by Bhima on north and east sides and the Nira River in south side. The study area lies in southeast of Pune district, it is surrounded by Baramati Tahsil in west side, Daund Tahsil in northwest side, Satara in southwest side and Solapur district belongs to east, south and north side. The geographical area of Indapur is $1,569.76^2$ km.

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अठराव्या शतकातील पुणे प्रांताचे कमाविसदार

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सहाय्यक प्राध्यपक, कला महाविद्यालय, भिगवण, ता. इंदापूर, जि. पुणे.

- **प्रास्ताविक–**

१७ व्या शतकात मराठी राज्याचा उदय झाला. छत्रपती शिवाजी महाराजांनी स्वराज्याचे प्रशासन उभारले. 18 व्या शतकात मराठी राज्य साम्राज्यात रुपांतरीत झाले. त्याचबरोबर मराठा राज्यव्यवस्थेत बदल झाले. प्रशासकीय व्यवस्थेत सुद्धा बदल झाले. 18 व्या शतकातील प्रशासकीय व्यवस्था ही कमाविसदारी व्यवस्था होती. या काळात वतनी अधिकार्यांचे महत्व कमी झाले. देशमूख, देशपांडे यांचे आक्रसले आणि कमाविसदार नावाच्या अधिकार्याच्या कार्याचा विस्तार झाला. महाल हा तत्कालीन प्रशासकीय व्यवस्थेतील मुलभूत घटक बनला. महालांचा आकार अगदी दहा गावांपासून एखाद्या सुभ्याएवढाही असे. हा एक प्रकारे महसूली एकक बनला. महसूली आकारणी, नोंदी, हिशोब, वसूली यासाठी हे मध्यवर्ती घटक बनले.

- **कमाविसदारी व्यवस्था–**

मराठेशाहीच्या विस्ताराबरोबरच स्थिर प्रशासन ही अत्यंत महत्वाची बाब बनली. मराठी राज्यविस्तारास टिकविण्यासाठी प्रशासकीय स्थौर्य आवश्यक होते. कमाविसदारी व्यवस्थेने साम्राज्यास स्थिरता दिली. वर्तामान काळातील जिल्हाधिकार्याप्रमाणे तत्कालिन कमाविसदार हा त्या महालाचा प्रमूख असे. त्याला मोठे अधिकार असत. कमाविसदाराप्रमाणे मामलेदार नावाचे अधिकारीही या काळात दिसतात. मामलेदाराची कार्यकक्षा मोठ्या प्रदेशाची असावी असे मत डॉ. सुरेंद्रनाथ सेन यांनी व्यक्त केले आहे.[1] मामलेदार वा कमाविसदार त्या महालाचा हिशोब ठेवित असे आणि तो हिशेब प्रत्यक्ष मध्यवर्ती शासनास जमा केला जात असे.[2]

कमाविसदारास वर्षाच्या सुरुवातीस अथवा कमाविसी नेमनूकी वेळी आजमास दिला जात असे. या आजमासाच्या कागदाच्या विवरणात जमा व वसूलाची माहीती दिलेली असे. त्यानूसारच त्याला वसूली करावी लागे तसेच खर्चही करावा लागे.[3]

- **कमाविसदारांचे अधिकार व कार्य–**

1. दिलेल्या प्रदेशातून रयतेकडून महसूल वसूली करणे.
2. दरसाल पिकपहाणी करणे.
3. पाऊस न पडला, अतिरिक्त पडला, शत्रूचे आक्रमण यातून रयतेचे नुकसान झालेस कमी–अधिक सूट देने, हप्तेबंदी, मुदतवाढ इत्यादी उपाययोजना करणे.
4. महसूल थकल्यास वसूली करणे.
5. तंटयांचे व गुन्ह्यांचे तपास, निवाडे करणे, शिक्षांची अमलबजावणी करणे.

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Physical Exercise is part of Our Life

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Abstract:

In today's world physical exercise is essential. Exercise plays a vital role in preventing health diseases and stroke. Human body is a composition of various systems, it is necessary to keep these systems fit and in good working conditions. These systems will function properly if there be a kind of co-ordination between them. Such kind of co-ordination can be developed with the help of various physical activities. Various kinds of physical exercises help in developing the organic system and functioning of the body. They also improve the abilities of human being to resist fatigue, to remain active and perform efficiently. Man can live healthy and better life only by doing physical exercise. Physical exercise is not only about having a sound physical health but is also concerned about various other aspects of the personality of any individual. It works towards shaping the overall personality of a human being. Through physical exercise man can live his day to day life healthily. Physical exercise plays important role in man's development and proves helpful for better physical, mental, social, emotional and spiritual life.

Introduction

Physical exercise is widely recognized as the best way to keep the body healthy and active. Neglect of bodily health can be disastrous for us. It causes several physical and mental problems. Slowly our body becomes vulnerable to many diseases. His energy and beauty is lost early. He grows old early. Strength, stamina and power of concentration decline.

A sedentary lifestyle and a lack of physical activity can take a toll on a person's body. Physical inactivity is associated with an increased risk for certain types of cancer, numerous chronic diseases, and mental health issues.

Regular exercise and physical activity promotes strong muscles and bones. It improves respiratory, cardiovascular health, and overall health. Staying active can also help you maintain a healthy weight, reduce your risk for type 2 diabetes, heart disease, and reduce your risk for some cancers.
In other words, staying active is a crucial part of maintaining good health and wellness.

Importance of fitness:

Physical fitness is one of the most vital aspects that determine the quality of life lead by any person. Fitness does not only refer to being physically fit, but also refers to a person's mental state as well. If a person is physically fit, but mentally unwell or troubled, he or she will not be able to function optimally. Mental fitness can only be achieved if the body is functioning well. You can help relax your own mind and eliminate stresses by exercising regularly and eating right. A healthy lifestyle ensures a better health and this is the reason that right eating habits along with the required exercise is known to be the key to a sound physical health.

People who are physically fit are also healthier, are able to maintain their most optimum weight, and are also not prone to cardiac and other health problems. In order to maintain a relaxed state of mind, a person should be physically active. A person who is fit both physically and mentally is strong enough to face the ups and downs of life, and is not affected by drastic changes if they take place.
Becoming physically fit requires a change in life style as well. A person will have to incorporate a regular exercise routine in his life and also eat healthier. By avoiding junk foods, fizzy drinks, bad habits like

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Effect of different electrolytes and deposition time on the supercapacitor properties of nanoflake-like $Co(OH)_2$ electrodes

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ABSTRACT

The effect of ultrasonic treatment and deposition time on nanoflake-like $Co(OH)_2$ thin films were prepared using the potentiostatic mode of electrodeposition method on stainless steel substrates by a nitrate reduction reaction. After ultrasonic treatment, we used stainless steel substrates for deposition of the nanoflakes like $Co(OH)_2$ thin films. The effect of deposition times and electrolytes on different physico-chemical properties of $Co(OH)_2$ was investigated in detail, such as X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM), energy dispersive X-ray spectroscopy (EDS), and electrochemical testing. After ultrasonic treatment $Co(OH)_2$ thin films had devolvement of the uniform and interconnected formation of nanoflakes nanostructures. Supercapacitor performance of the $Co(OH)_2$ electrodes suggest that, specific capacitance are depends on the surface morphology, and $Co(OH)_2$ electrodes after ultrasonic treatment exhibited higher performance than without ultrasonication. The maximum specific capacitance of the 30 min. deposited $Co(OH)_2$ nanoflakes exceeded 276 Fg^{-1} in 0.5M KOH electrolyte at 5 mVs^{-1} scan rate.

1. Introduction

Supercapacitors are promising energy-storage devices because of their high-power density and their capability to quickly charge and discharge, which are characteristics desirable for devices used in hybrid vehicles, backup energy systems, and portable electronics [1,2]. Supercapacitors store energy in the form of a double layer or in the form of redox reactions involving a change in the oxidation state during the charging and discharging process [3]. For both mechanisms, functional electrode materials are crucial for the conversion and storage of energy, and they are an essential component of supercapacitors. Among different methods of fabricating functional electrode materials, electrochemical deposition is a simple, binder-free, low-cost method compared with evaporation, sputtering, chemical vapor deposition (CVD), etc.

Homogeneous surface morphologies are of the interesting the formation of different functional coatings for the electrochemical testing. Morphology could be observed, controlled, and studied in electrodeposition by optimizing parameters such as deposition time. Previous studies have investigated the effect of deposition time on surface morphology for metal oxides such as MnO_2 [4], TiO_2 [5], Cu_2O [6,7], Fe_2O_3 [8], and WO_3 [9], hydroxides $(Ni–Co)(OH)_2$ [10], conducting polymers such as polypyrrole [11] and carbon nanotubes [12], etc. These studies have identified the crucial deposition time-dependent properties of these materials. For supercapacitors, transition metal oxides and hydroxides are considered to be the most promising electrode materials. The high-cost RuO is not commercially available even though it has a high specific capacitance [13]. On the other hand, $Co(OH)_2$ is considered to be a promising electrode material due to its layered structure with large interlayer spacing [14]. The electrodeposition method of $Co(OH)_2$ on nickel foam has been demonstrated by Kong et. al. [15]; they found that $Co(OH)_2$ was too thin to form stable and effective structures with a short deposition time, whereas the pores were covered by nanostructured flakes with a longer deposition time, resulting in a significant decrease in the specific capacitance value. Cost-effective stainless steel has been used for the deposition of $Co(OH)_2$ thin films. The cathodic potentiostatic electrodeposition of $Co(OH)_2$ on a stainless steel substrate was reported by Gupta et. al. [16]; they found that the specific capacitance value was not affected by mass loading from 0.1 to 0.8 mg/cm^2. There have been no reports on the specific capacitance values for higher mass loading and higher deposition time. The significance of deposition time in electrodeposition method and the effect of the different electrolytes on the specific

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Role of Sericulture in Self-Employment

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Abstract:-

Sericulture provide gainful employment, economic development and improvement in the quality of the life of the people in rural area and therefore it plays an important role in anti-poverty programmes and prevents migration of rural people to urban area in search of employment. The industry activities help in eradicating poverty and hunger, promote gender equality and empower women, ensuring environmental sustainability and develop a global partnership for development. It is the only one cash crop in Agricultural sector that gives return within 30 days. Due to high labour force participation rate, silk industry has emerged as the ideal tool for employment generation and rural development. 60 % of the income from Sericulture industry flows back to primary producers, i.e., farmers. There is a strong and assured domestic demand for silk products which is consistently in upward trend for the last five decades. It is benefiting the weaker sections of the society. The most important consideration is the effective utilization of family labor, Particularly the aged, handicapped illiterate and women folk. Silk industry provides employment to weaker section in rural economy. Sericulture is an agro-based industry which has high potential to generate employment Opportunities in rural areas.

Key words: - [sericulture, Agro Based, silkworm, Cocoons, Mulberry, Eri, Tasar , Muga]

Introduction: -

Agriculture & allied activities sector plays an important role in the economic development of the nation. The share of agriculture & allied activities sector in the total Gross State Value Added (GSVA) is about 12.2 per cent during 2016-17 .In the agro allied activities sericulture activity is one of the best activity. Though India is the second largest silk producer in the world after China it accounts for just 14% of the global silk production. Sericulture is rightly known as "Industry of the poor". The art of silk production is called Sericulture that comprises cultivation of mulberry, silkworm rearing and post cocoon activities leading to production of silk yarn.

Self-employment:- Self-employed:

"Persons who operate their own farm or nonfarm enterprises or are engaged independently in a profession or trade on own-account or with one or a few partners are considered as self-employed. The essential feature of the self-employed is that they have autonomy (i.e., regarding how, where and when to produce) and economic independence (i.e. regarding market, scale of operation and money) for carrying out operation. The fee or remuneration received by them consists of two parts - the share of their labor and profit of the enterprise". In other words, their remuneration is determined wholly or mainly by sales or profits of the goods or services which are produced.

The self-employed persons may again be categorized into the following groups:

Freshwater fish fauna of Pune District (MH): A review article

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Abstract:

The ecological diversity of aquatic ecosystem is affected by different environmental conditions and manmade activities. Study of bio diversity is essential to keep records and conserve them. Fishes are important animal in the freshwater ecosystems due to their ecological significance. Freshwater fishes also have economical viability. Conservation of freshwater fish is equally important as source of food, important position in food chain and conservation practice is only possible when diversity of freshwater fishes is known. In present investigation was undertaken to study the biodiversity of fish fauna from Pune district. In this study there was 80 species of fishes belonging to 10 orders, 16 families. In which Cypriniforme is most diverse order of freshwater fish and it is 66 %

Keywords: freshwater, ichthyofauna, Pune.

Introduction:

Biodiversity is essential to stabilise the ecosystem and environmental quality for understanding species the earth (Ehrlich and Wilson, 1991). Diversity of fish in river essentially represents their abundance. The total length of rivers in India is about 29,000 km. All these rivers, their tributaries, canals and irrigation channels have an area of roughly 13,000 km. They are Ganga, Brahmaputra, Indus, East coast and West coast of river system these five major river system an India (Pandey and Shukla, 2007). Fish are rich source of carbohydrate, protein, fat, vitamins and many of these by-products (Shinde et.al 2009).

Freshwater fish comprise almost 13,000 species belongs to 2,513 genera or about a 15,000 if all species occurring from fresh to brackish water (Leveque et.al. 2008). In Mula and Mutha 62 fish species observed (Ghate and Wagh 2003). In western ghat there are endemic and 51 are unique (Dahanurkar et al., 2004) and in Pune district there are many researchers takes effort to access diversity. The investigation in 1942 by Hora & Misra found 61 fish species in Pune appeared in the *Journal of the Bombay Natural History Society.* Then Yezdani and Sing (1990) he reported 42 species belonging to 14 families in Bhima river, second effort was Jadhav and Bhosale (1996) reported 2 order and 13 species, third effort was Yazdani and Sing, (2002) reported 54 species belonging to 15 families Bhima river, fourth effort taken from Shendge (2007), 24 fish species belonging to 11 families from Nira river. Fish diversity of two perennial lakes in Indapur was studied by Sarwade et. al. (2009) found 27 species belongs to 9 families and 4 order. In Ujani wetland there are presence of 60 Species belongs to 6 orders and 15 families (Sarwade and Khilare 2010). 12 species belongs in 03 Orders, 07 Families of 11 Genera in Indira lake Rajgurunagar (Theurkar et. al., 2013).10 species belongs to 03 Orders, 04 Families and 10 Genera in Dimbhe

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India's internal security challenges and solutions

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Today, India has achieved a place of honor at the international level. Political stability and economic development have given India a special place in the international arena compared to the countries of the Asian continent. But the nation is cultivating its nationality. Real challenges are being created in front of India's security system by neighbors and big nations. But security is essential in the life of the individual and the nation.

Because people of different castes and religions live in India, come on

- It is a country with a mixed social system formed by various caste-religion customs and traditions, with an area of 5,87,949 sq. The land area of India is equal to the area covered in miles i.e. 7517 km. This country has the 7th largest area in the world. India has the second largest population in the world.

India has achieved development in many fields. Today India has achieved great progress in the fields of agriculture, political, social, educational, economic, cultural, space, research etc.

On the one hand, India is developing and there are incidents that are affecting internal security. Individual's own behavior in social life and compliance with their duties, political leadership and employees, teachers, businessmen show internal differences. It does not appear that they are becoming successful.

Because there are many factors that contribute to internal vulnerability. It reflects the continuity of historical heritage, geographical position, size of population, quality of administration, sense of national unity and the effect of unequal economic crisis, poverty, diversity, education, religious traditions and regional and global developments on internal security. While giving independence to India, the British were of the opinion that when India gets independence, it will not be safe for a long time due to its internal issues and the democratic process will not be able to run for a long time. India feels like this even after 76 years

The issue of internal security has not been resolved. Mongal is not left behind in development. Even today there are major challenges facing India in terms of internal security as follows. Among them corruption, Naxalism, sectarianism, regionalism, terrorism, militarism, fishism, casteism, communalism, cultural hegemony, borderism, authoritarianism, economic disparity, abuse of media, illiteracy, unemployment, environmental pollution, etc. are challenging the internal security of India. It is as follows

1) Corruption The biggest internal system problem facing India is corruption. The spread or infection of corruption in India is far reaching from the national level to the local level which hinders the development of India i.e. corruption. Personal development is stunted due to corruption. Instability has arisen in the society, a major security issue has arisen.

2) Communalism A unique feature of India is unity through diversity. This is a huge diversity seen in India as there are many different castes, religions, creeds, customs, traditions, as well as different sects. Warkari Sect, Hindu Sect, Jain Sect, Muslim Sect, Buddhist Sect, Parsi Sect, Christian Sect oppose each other's morals, oppose each other's religious tradition and try to show how our religious tradition is superior. Hence, it poses a major threat to Indian internal security. This is a national security challenge.

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Antifungal Activity of *Kigelia pinnata* Aqueous and Ethanolic Fruit Extract on Infected *Clarias batrachus*.

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ABSTRACT

Kigelia pinnata belonging to family Bignoniaceae showed many medical uses. One of its main properties is antifungal activity of it. In the present paper, the antifungal activity of Kigelia pinnata extracts was observed. For test LC50/10 concentrations of aqueous (725.71 PPM) and ethanolic extracts (172.00 PPM) of fruit were used. The infected fish were exposed to these different extracts over a period of week. It was observed that the ethanolic extracts of fruit are more effective than aqueous extracts. Hence, the safe application of Kigelia pinnata extracts can be advocated to control the fungal infection in freshwater catfish, Clarias batrachus and similar catfish culture. Application of LC50/10 concentration of Kigelia pinnata, ethanolic and aqueous fruit extract showed the effective antifungal activities that help to reduce Aspergillus niger, Aspergillus flavus and Saprolegnia sp. infections in different duration of days.

KEY WORDS: *Aspergillus flavus*, *Aspergillus niger*, *Saprolegnia sp.*, *Clarias batrachus*, *Kigelia pinnata* aqueous and ethanolic fruit extract.

INTRODUCTION

Kigelia pinnata is a species of flowering plant belongs to the family *Bignoniaceae* also known as Sausage tree (Burkill, 2000). In central Kenya, *kigelia* is also used in a number of skin care products (Roodt, 1992; Kamau, L., 2016). It occurs all over India, found on riverbanks, along streams and on flood plains of India. (Ogbeche et al., 2002; Abioye et al., 2003). *Kigelia pinnata* have naphthoquinones, iridoids, terpenes, flavonoids, tannins, steroids, coumarins, saponins and caffeic acid in the fruits, stem, leaves and roots (Saini et al., 2009). Commonly *Kigelia pinnata*is used to treat skin ailments such as fungal infections, boils, psoriasis, eczema, and more serious disease like leprosy, syphilis and skin cancer (Houghton et al., 1994; Grace et al., 2002; Azu, 2013).

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MATERIAL AND METHODS

Collection of plant material

The fruit was collected in the month of February 2015, from university campus Sant Gadge Baba Amravati University, Amravati. Foreign matters and elements in the collected *Kigelia pinnata*is were removed, rinsed twice with large quantity of de-ionized water, spread on a clean sack and cut into small pieces, placed under shade to air dry at ambient temperature. Sun dried for 1 hr and then fruit was ground into larger pieces using grinding machine. Fruit pieces were put in oven at 360 C temperature for 4-5 days till their weight remained constant and then ground into fine powder. The powder was stored in airtight container at room temperature.

Extraction

Aqueous and ethanolic extract: 25gm of *Kigelia pinnata*is fruit powder in 200 ml distilled water and ethanol was added separately to obtain extracts by Soxhlet apparatus which was then stored in glass bottles and refrigerated at 40C prior to use.

Antifungal Activities

The differently infected *C. batrachus* of moderate length after collected from the Wadali Lake or market were used to determine the antifungal activity. As all the time infected fish were not available, artificial infection of cultured molds of *Saprolegnia sp.*, *Aspergillus niger* and *Aspergillus flavus* were used to infect the fish. Isolation and identification of fungus was carried out according to Alexopoulus and Mins (1979) key.

FTIR Study of Chemically Synthesized Conducting Polyaniline by Using Natural Acid

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Abstract:

The conducting polyaniline was synthesized by using natural acid rather than chemical acids such as hydrochloric acid, sulphuric acid etc. extracted from Citrus Limon which is commonly known as Lemon. The citric acid present in lemon juice so called natural acid was taken as electrolyte for the preparation of conducting polyaniline. The polymerization took place after certain conditions and colouration happened. A dark green coloured powder form of conducting polyanline was obtained. This ecofriendly conducting polyaniline was then comparing with chemically synthesised conducting polyaniline. The characterization of this material was done by using FTIR, Nicolet iS5, and Keithley Electrometer. It has been seen that there are new and modified wavelength peaks observed in FTIR Spectra of conducting polynailine. This may be happening due to modification and recombination of bonding between atoms and molecules while polymerization process has been done.

Keywords: Polyaniline, Natural Acid, FTIR, Keithley etc.

Introduction

The field of conducting polymers has been largely dominated by the search for higher conductivities, better stability, and greater processibility. The doped conducting polymers that have been widely investigated are polypyrrole, polythiophene and polyaniline. Polyaniline is unique among the class of electrically conducting polymers in that their electrical properties can reversibly be controlled by changing the oxidation state of main chain and by the protonation of amine nitrogen chain [1].

One of the important areas of research on conducting polymers concerns methods about their processibility. Various acids are used for doping polyaniline such as perchloric acid, sulphuric acid, hydrochloric acid and many others. Doping of strong acids imparts high electrical conductivities but makes the polymers unstable at high humidity conditions. Like most of the conducting polymers, PANI is doped with strong acids, however less attempt has been made to use weak acids [2].

It has been seen that Polyaniline(PANi) was doped with different dopants like camphosulphonic acid (CSA), diphenyl phosphate(DPPH), suiphonic acid(S), and Maleic acid (MAC) by chemical method. The samples were prepared in the form of pellets as well as films [3]. It has been reported that use of maleic acid (Mac), camphosulphonic acid (CSA) and diphenyl phosphate (DPPH) as weak acid dopants in polyaniline and to use them for sensing porpose.[4]

Polyaniline (PANI) is one of the most intensively investigated polymers during the last few decades. The establishment of the scientific principles allowing regulation of its properties, determining the potential application areas (alternative energy sources and transformers, media for erasable optical information storage, non-linear optics, membranes, etc.) is an important scientific problem [5]. Polyaniline is an environmentally stable and technologically important conducting polymer, whose electronic conductivity can be altered reversibly by both oxidation/reduction and acid/base chemistries. Polyaniline can exist as "salts" or "bases" in three isolable oxidation states, leucoemeraldine (LES or LEB), emeraldine (ES or EB), and pernigraniline (PS or PB), among which only emeraldine salt (ES) is electrically conductive [6].

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Using chemical bath deposition to create nanosheet-like CuO electrodes for supercapacitor applications

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ABSTRACT

We report the effect of ionic liquids on chemically synthesized hierarchical-like copper oxide (CuO) thin films for supercapacitor applications. Concisely, the CuO thin films were deposited via chemical bath deposition (CBD) using 2-dimethylimidazolium chloride [HPDMIM(C1)], 1-(2′,3′-dihydroxypropyl)-3-methylimidazolium chloride [DHPMIM(C1)], and *N*-(3-methyl-2-oxopropyl)pyridine chloride [MOCPP(C1)] ionic liquid solvents. The effects of the ionic liquid solvents on the morphological evolution of the as-prepared films were analyzed, and electrochemical properties were investigated. The highest specific capacitance was achieved for the electrode with a nanosheet-like structure produced by functionalization with the HPDMIM(C1) ionic liquid. The maximum specific capacitance achieved for the HPDMIM(C1):CuO hybrid electrode was 464 F g^{-1} at 5 mV s^{-1} in a 1 M Na_2SO_4 electrolyte. Thus, our findings, in addition to the stability of the HPDMIM(C1):CuO, indicate that it is a candidate for energy-storage applications.

1. Introduction

Increasing worldwide energy demand has played a catalytic role in the advancement of several energy storage technologies [1]. Two of the most important factors in energy storage research is renewability and sustainability [1–4]. Many researchers are currently focusing on addressing problems regarding energy storage technologies such as batteries and supercapacitors [4–9]. The main motivation in the case of supercapacitors is to improve their performance because these devices can supply very high power compared with batteries and other electronic devices [1–6]. Supercapacitors are distributed into three core types: electrochemical-double-layer capacitors, pseudocapacitors, and hybrid capacitors [1,5–9]. All three supercapacitor types have high charge–discharge rates, high power densities, long lifecycles, and safe operating processes [2,2,3,4].

Copper oxides are useful in various applications involving heterogeneous catalysis [5–9], gas sensing [10], photoelectrochemical cells [11], and supercapacitors [12]. They have been extensively investigated as an electrochemical material for supercapacitors because of their high abundance in the earth's crust, low cost, low toxicity, and good charge transport properties, all of which are beneficial in supercapacitor applications. The copper oxide are two common phases likes copper (II) oxide (CuO) and copper (I) oxide (Cu_2O) [13–15]. Different CuO nanostructures have been prepared and applied in supercapacitors, including flower–[16,17] and nanoflakes [18], willow-leaves [19], micro-roses and micro-wool [20], nanosheets [21,22], nanospheres [23], nanoplatelets [24], nanowires [25], nanoribbons and nanoflowers [26], dandelion-like CuO microspheres [27], and nanorods [28].

Several methods have been used to prepare CuO and Cu_2O electrodes for supercapacitors [29–35]. Ghasemi et al. [36] reported using electrodeposited Cu_2O–$Cu(OH)_2$ nanoparticles as a supercapacitor electrode material. They attained a specific capacitance 425 F g^{-1} in 0.5 M Na_2SO_4 electrolyte. Li et al. [37] synthesized CuO thin films and its different nanostructures using thermal method. He reported a

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Availability of Water Resources in the Indapur Tahsil, Pune District

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Abstract

The average annual rainfall is 550 mm. Owing to lack of rainfall there is a need of restoring and maintaining water. In Indapur tahsil, out of 142 villages, around 73 villages (51% area of the total area) gets the benefit of Ujani Dam, Bhima river, Nira river, Nira Left canal and Khadakwasala right canal. The remaining 71 villages (49 % area of the total area) depend on uneven rainfall. All these villages fall under the drought-prone area. The middle part of Indapur tahsil is the most water scarcity area. The majority of small and marginal farmer and landless depends on agriculture, especially in the dry area. Primary and secondary data are used in this paper and data process through Arc View 9.3, Surfer version 10, Global Mapper version 11 for this paper.

The availability of fresh water for domestic use, agriculture purpose and industrial purpose water conservation and management is necessary. Water resources are available through canal, reservoir, K.T. weirs, farm tanks, tanks and other sources in the study area. From all reservoir types water is made available for Indapur tahsil and around 273.81MCM.

The major amount of availability of water resources is rainfall and existing conservation measures. It is observed that the wells and canals are major source of water supply in the study area.

KEYWORDS: availability, domestic, agriculture, industrial, reservoir, water scarcity.

Introduction

Water is the basic need of life for the human beings and any alteration in its availability is directly going to impact them through various means. Most of the rivers are rain-fed and seasonal and only few are perennial. The present study has been taken up to quantify the area being in monsoon climatic conditions it is subject to high variability conditions, it's likely to affect on the availability of water. Thus the conservation and optimum utilization of water as scare resource is extremely important for national economic development. Verma and Phansalkar (2007) studied the temporal and spatial variation in availability of water and it was observed that 71 percent of India's water resources are available to only 36 percent area while the remaining 64 per cent has 29 percent available. Till the middle of the 20th century, the importance of water on life had not been particularly felt because of its moderate demand. But relentless increase in the demand of fresh water in recent years has lead to the scarcity of this basic resource in country.

In Indapur tahsil, out of 142 villages, around 51% area of the total area gets the benefit of different natural and manmade sources. The remaining 49 % areas of the total area depend on uneven rainfall. Water use includes all individual and collective activities of human society which affect water resources and change their quality and quantity. The method of water use and distribution depends especially on the degree of development and availability of water. It becomes systematic as a consequence of agricultural, social and industrial development. Water is also an

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Rainfall Distribution and Its Variation in the Indapur Tahsil District Pune Maharashtra

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Abstract: *Indapur tahsil is one of the drought-prone areas in Pune district. It is always known as a region of scarce rainfall in Maharashtra. The study area comes under the rain-shadow region, due to which it is considered as a drought-prone area. The average annual rainfall is 503.8 mm. The onset of monsoon, amount of rainfall and the variability of rain are very irregular in the study area. As such, a large part of agricultural land depends on the monsoon and there is an uncertainty of rainfall. The majority of small and marginal farmer and landless depends on agriculture, especially in the dry area. The present research work secondary data sources are used. In addition to this detail, spread of average annual rainfall which has been analysed for more than 90 years of data has also been considered for interpretation. All the supported data is collected from different offices and online. There are seven watershed areas in the study area. Average rainfall distribution spread over the entire study area thus produced in grid format has been used for volumetric analysis. The average annual volume of rainfall is 1052.46 MCM. The very low rainfall volume is observed to the northern side and very high rainfall volume is observed to the eastern side of Indapur tahsil.*

Key words: *distribution, rainfall, variation, watershed.*

1. Introduction:

Investigations of Rao and Mishra (1971) have shown that annual rainfall of India is quite stable in general, but it is most uncertain in the north-western parts of the country. Currently, the main problem emerging in many parts of the world is water scarcity. The Indapur tahsil being a semi arid and arid track incorporated under the Drought Prone Area Programme (DPAP) the area is characterized by scanty and uneven rainfall ranges from 450 to 550 mm.. The Rainfall is mainly received from the south-west monsoon. Monsoon sets in the month of June and lasts up to the month of October. Monsoon onsets first week of June and having its peak period during the month of September and October. It is also characterizes by uneven and scanty rain with long dry spell during summer. The highest rainfall is observed in the in 2009 and it is recorded to be 1103 mm at Bawada and minimum at Sansar 85 mm in 2003. Agro climatically, this study area belongs to scarcity zone of rainfall to about 80 to 90 percent received from southwest monsoon and remaining very less rainfall receives from retreat of monsoon. It can be clearly noticed that rainfall distribution decreases steadily from north-west to south-east direction. The study area comes under the rain shadow region, hence rainfall is very irregular. The onset of monsoon, amount of rainfall and the variability of rain are very irregular in the study area.

2. Objectives

- To understand rainfall condition.
- To study the variation of the rainfall.
- To analyze the rainfall distribution in the study area.

3. Study area

Indapur tahsil is one of the tahsils in the Pune district consisting of 142 villages along with one urban centre in the study area. There are eight revenue circles in the tahsil. The area extends from 17° 53′ 42" to 18° 19′ 58" North latitudes and 74° 39′ 16" to 75° 09′ 39" East longitudes **(Fig. 1)**. The area is drained by the river Bhima on north and east both sides. Nira River flows south of Indapur tahsil. Total geographical area of the tahsil is 1575.38km^2 (Census 2011), out of which Nira river

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Flower-like $NiCo_2O_4/NiCo_2S_4$ electrodes on Ni mesh for higher supercapacitor applications

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ABSTRACT

In this research, we have effectively synthesized a novel $NiCo_2O_4/NiCo_2S_4$ powder by co-precipitation and thin films prepared using a screen-printing method on Ni mesh for supercapacitor applications. Herein, we report the effect of unique hierarchical nanostructures and the systematic effect of Ni and Co on the structural, morphological and electrical properties of the $NiCo_2O_4/NiCo_2S_4$ electrodes. The optimized $NiCo_2O_4/NiCo_2S_4$ electrode shows outstanding performance with a specific capacitance of 1966 $F g^{-1}$ at 5 $mV s^{-1}$. The cycling stability reports indicate the $NiCo_2O_4/NiCo_2S_4$ electrodes have an outstanding cyclic stability with 91% capacity retention. From the supercapacitor performance results, we confirmed that the $NiCo_2O_4/NiCo_2S_4$ electrode is useful for the fabrication of symmetric supercapacitors. These results reveal that the $NiCo_2O_4/NiCo_2S_4$ electrodes is a capable electrode material for supercapacitor applications in the future.

1. Introduction

In recent years, with the growth of the world economy, society has demanded electrical energy storage devices with high power and energy densities for use with alternative energy sources [1]. In recent years, many electrical energy storage devices are available in the market. Out of these, supercapacitors receive great consideration due to their low-cost, high power and energy densities [1,2], excellent stability [3], and fast charge-discharge compared to lithium-ion batteries and traditional capacitors [4]. Anodic and cathodic materials play an important role in the storage of electrical energy in supercapacitors [1–5]. However, the main problem in commercial device fabrication is lower power and energy density in supercapacitors [5]. Specific capacitance and cycling performance of supercapacitors can be enhanced by changing working materials. This is an important factor, which is beneficial for commercial applications of supercapacitors [6]. The main key is developing new strategies to improve energy storage with higher specific capacitance and long cyclic stability [7].

Currently, binary and ternary transition metal oxides are used for higher theoretical and experimental specific capacitance, which are very useful for portable electronic device fabrication [8]. However, transition metal oxides have comparatively lower electrical conductivity and low cyclic stability [9]. To avoid these problems, we apply a new strategy to design new nanostructure composite materials that have higher electrical conductivity and device performance [10,11]. Binary and ternary metal sulfides, like NiS, CoS and $NiCo_2S_4$, demonstrate better performance in various fields, such as oxygen evolution reactions [12], supercapacitors [13], water splitting [14], photocatalytic hydrogen evolution [15], and dye-sensitized solar cells [16], etc., than other oxides and hydroxides, for example NiO, CoO, $Co(OH)_2$, $Ni(OH)_2$, $MnCo_2O_4/CoCo_2O_4$, $Mn:Co_3O_4$, and $ZnCo_2O_4$ thin films [17–19]. Out of these ternary transition metal sulfides, $NiCo_2S_4$ and $NiCo_2O_4$ electrodes are better for supercapacitor application, because they provide higher electrical conductivity, high surface area, have excellent capacitive properties, and are environmentally stable [20–22].

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Study and Analysis of Water Resources in Indapur Taluka (Pune District)

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Indapur, Dist-Pune, Maharashtra

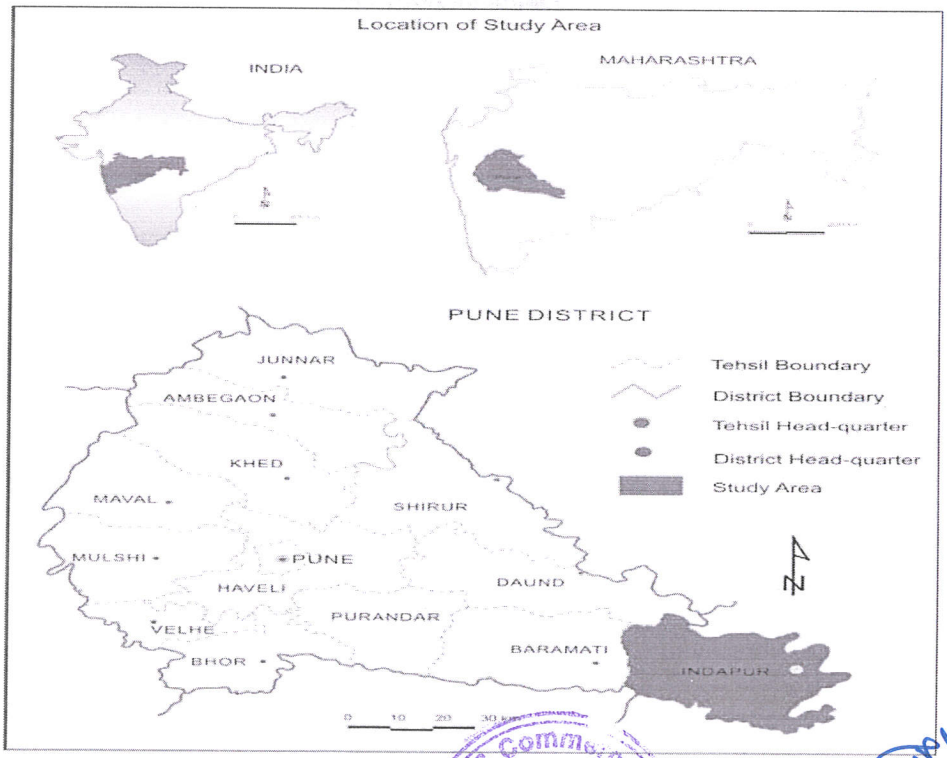
1. Introduction

Water is vital to life, without which no living body can survive. Water is considered as prime natural resource, a basic human need and a valuable national asset. Water is core component of environment. There is vast disparity in the distribution and utilization of water resource at the global, regional and local levels. Water scarcity due to depletion of surface as well as ground water following fast population growth, urbanization, rising incomes, industrial development etc. For water management, we need to assess the water resources.

The main problem is that water source is abundant in the part of east and south of Indapur taluka, whereas water sources is scanty in west and north side of Indapur taluka. So we have studied the water resources in Indapur taluka.

2. Study Area

Indapur tahsil is situated in Pune district. The northern and eastern border is demarcated by Bhima river in Pune and Solapur districts while southern boundary is confined by NiraRiver in Pune and Satara and Solapur districts. The west boundary is confined by Baramati and north boundary is delimited by Daundtahsil of Pune district. The region extends between 17° 53′ to 18° 15′ north latitudes and 74° 35′ to 75° 8′east longitudes. The total geographical area of this tahsil is 1552.93 square kilometres having 3, 83,183 population (2011). This tahsil consists of 142 settlements and three urban settlements.



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Short communication

Effect of deposition parameters on spray pyrolysis synthesized CuO nanoparticle thin films for higher supercapacitor performance

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ABSTRACT

In this study, copper oxide (CuO) thin films were synthesized at different deposition temperatures on fluorine doped tin oxide coated glass (FTO) substrates by spray pyrolysis for supercapacitor applications. The physical and electrochemical properties of the as-synthesized CuO samples were characterized via different analytical techniques such as X-ray diffraction (XRD), X-ray photoelectron spectroscopy, scanning electron (SEM) microscopy, surface wettability tests, and electrochemical measurements. The results showed that the deposition temperature affected their structural, morphological, and supercapacitor properties. The higher specific capacitance and extensive charge/discharge capability of the nanoparticle-like CuO thin films demonstrated their suitability as outstanding candidates in electrochemical applications. The evaluated specific capacitance further confirmed the effect of the deposition temperature on the supercapacitor performance of the CuO electrodes; its values for the thin films synthesized at 300, 350, and 400 °C were 363, 691, and 487 F g^{-1}, respectively, at a scan rate of 5 mV s^{-1} in a 2 M Na_2SO_4 aqueous electrolyte. Hence, this study demonstrates that the surface morphology and electrochemical supercapacitive properties of materials are dependent on the deposition temperature of CuO thin films.

1. Introduction

The world is currently demanding for new energy storage/conversion devices that are lightweight, eco-friendly, and inexpensive. Various types of such devices including capacitors [1], batteries [2], fuel cells [3,4], solar cells [5], and supercapacitors are available commercially [6–8]; among them, supercapacitors are better than capacitors and batteries because of properties such as their high energy and power densities [7-10], fast charging/discharging, and long-term cycling stability [11,12]. These properties are useful in various applications, including in portable media players, digital electronics and cameras, medical devices, railways, street lights, and power banks [9–13]. Supercapacitors can be classified as EDLCs and pseudocapacitors based on their charge storage mechanism [7, 10–15]. This mechanism is related to non-faradaic capacitance resulting from the ion transformation in the Helmholtz double layer between the electrode and electrolyte in the former [11,13–19] and to faradaic reactions involving electrostatic charge storage in the latter [20,21].

Researchers have been investigating various metal oxide materials such as ruthenium oxide, iron oxide, manganese dioxide, nickel oxide, and copper oxide as well as conducting polymers for use in supercapacitors [8–13,20,21]. Among them, ruthenium oxide has exhibited high specific capacitive, high power density, and good stability, but its commercial distribution is hindered by its higher cost and environmental impact compared to those of other binary metal oxides. Dubal et al. [22] synthesized CuO via chemical bath deposition (CBD), reporting three different nanostructures that affected the supercapacitor performance; they attained a higher specific capacitance of 346 F g^{-1} with microwoolen-like CuO nanosheets at a scan rate of 5 mV s^{-1}. Sagu et al. [23] deposited CuO thin films as photoactive materials on FTO-coated glass substrates using electrodeposition, and measured a highest photocurrent density of 2.1 mA cm^{-2} in a 1 M NaOH electrolyte. Shu et al. [24] fabricated CuO thin films on a Cu foam by electrochemical anodization; they observed single-phase copper oxide with good electrochemical properties and a specific capacitance of around 600 mF cm^{-2} in a 2 M KOH aqueous electrolyte at a current density of 1 mA cm^{-2} and excellent cycling stability with around 94% retention

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कलम ३७० निर्मिती व प्रवास

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भारताला स्वातत्र्य मिळून सात दशके पूर्ण झाली स्वातंत्र्य मिळाल्यापासून आजपर्यंत आपण अनेक समस्यांशी झगडत आहोत. त्यातील प्रमुख समस्या म्हणजे काश्मीर आणि कलम ३७० ही होय. एकंदरीत भारताच्या घटनात्मक आणि राजकीय प्रक्रियेला दीर्घकाळ प्रभावीत करणारे सर्वात वादग्रस्त व चर्चेचा विषय ठरलेले कलम म्हणजे ३७० होय. कलम ३७० हे कश्मीरच्या वेगळेपणाचे (कश्मिरीयतचे) एक प्रतिक मानले गेले, त्यामुळे ते अधिकच अडचणीचे ठरले. सर्वसाधारणपणे ३७० कलमाबावत दोन टोकाचे दृष्टीकोन पहायला मिळतात. एक म्हणजे कलम ३७० रद्द केलेच जाऊ शकत नाही अशी भावना व समज आणि दुसरे म्हणजे कलम ३७० रद्द करणे हाच काश्मीर समस्येवरील एकमेव रामबाण उपाय आहे. मात्र ३७० कलम हा मुद्दा वाटतो त्यापेक्षा अधिक राजकीय व भावनिक आहे. तो तसा भावनिक व राजकीय का झाला हे समजून घ्यायचे असेल तर कलम ३७० ची निर्मीती कशी झाली? कलम ३७० कोणत्या तरतुदीमुळे विशेष ठरते? कलम ३७०चा प्रवास? कलम ३७० रद्द करण्यामुळे काय बदल होणार? कलम ३७० रद्द केल्यानंतरचे धोके काय? इ. प्रश्न समजून घेणे गरजेचे आहे. प्रस्तूत संशोधन लेखामध्ये या प्रश्नांचा शोध घेण्याच्या दृष्टीने प्रयत्न करण्यात आलेला आहे.

कलम ३७० ची निर्मीती

घटना समितीचे एक सदस्य एन.गोपालस्वामी अय्यंगर यांनी १७ ऑक्टोबर १९४९ रोजी घटनासमिती मध्ये ३०६ (अ) (आत्ताचे कलम ३७०) सादर केले या कलमावर फारशी चर्चा न होता त्याच दिवशी ते मान्यही करण्यात आले. या कलमानुसार जम्मू – काश्मीर राज्याला इतर संस्थानापेक्षा वेगळी वागणूक देण्याचे कारण अय्यंगर यांनी स्पष्ट केले ते पुढीलप्रमाणे.

१) काश्मीर राज्यातील सांस्कृतीक –सामाजिक परिस्थिती भिन्न आहे त्यामुळे ती तात्काळ भारताशी एकात्म होण्यासारखी नाही. कालांतराने असे एकात्मीकरण होईल.

२) काश्मीरमध्ये सध्या अंतर्गत अशांतता आहे तसेच हा प्रश्न संयुक्त राष्ट्राकडे आहे. त्यावर लागलीच तोडगा निघण्याची चिन्हे नाहीत.

३) काश्मीरमध्ये शांतता प्रस्थापित झाल्यानंतर तेथे सार्वमत घेऊन लोकेच्छेचा आदर करण्यास भारताने बांधिलकी मानली आहे.

कलम ३७० मधील तरतुदी

भारतीय संविधानाच्या पहिल्याच कलमात काश्मीरला भारताचे १५ वे राज्य म्हणण्यात आले. परंतु त्याची तत्कालीन पार्श्वभूमी लक्षात घेऊन संविधानात कलम ३७० चा अंतर्भाव करण्यात आला होता. ज्यात तात्पुरती, संक्रमणात्मक व विशेष प्रावधाने अंतर्भूत होती यात.

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Variation in chemical bath pH and the corresponding precursor concentration for optimizing the optical, structural and morphological properties of ZnO thin films

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Abstract

In the present study, ZnO thin films were deposited by chemical bath deposition carried out by selective correlation of varying (i) pH values at fixed concentration and (ii) concentration of the precursors at fixed pH. The selective correlations were done by using the characterization tools like X-ray diffraction, scanning electron microscopy, transmittance, refractive index, dielectric constant, Fourier-transform infrared spectroscopy and IV measurements. Transmittance was found to increase from 57 to 87% on varying the pH from basic side (10.8) to acidic side (pH 6.8) with a blue shift in band gap. The nature and morphology of the deposited films were found to be dependent on pH as well as concentration. Acidic pH 5.0 was found to be most suitable for deposition of highly transparent film with low absorption coefficient, refractive index and dielectric constant. On the other hand, nearly complete coverage of the substrate and high purity was observed in the ZnO thin films which was deposited by taking equal 100 mM concentration of $Zn(NO_3)$ and HMTA precursors at a fixed pH 5.0 as desired, sheet resistance was also found to increase on the acidic pH side which is useful in case of buffer layer solar cell application. These studies lay a foundation stone for understanding the optical and morphological parameters by selectively correlating the pH and concentration variation at the same time.

1 Introduction

Zinc oxide (ZnO) is a wide bandgap semiconducting material with unique chemical, optical and electrical properties. It has attracted considerable attention due to its various applications such as gas sensor [1], solar cell materials [2], antimicrobial materials [3, 4], optoelectronics devices [5, 6] and several other important applications [7]. These films are widely used as conductive and optical cover layers of large area solar cells [8, 9]. Different methodologies have been reported by several groups for deposition of ZnO nanostructures [10, 11]. Wet chemical techniques [12], physical vapor deposition [13], metal organic chemical vapor deposition (MOCVD) [14], pulsed laser deposition [15], molecular beam epitaxy (MBE) [16], sputtering [17], electrospinning [18] etc. are few common techniques. Most of these techniques are performed at high temperature and require expensive instrumentation. Wet chemical methods are comparatively simple, less expensive and reliable method.

Chemical bath deposition (CBD) is a low temperature wet chemical technique being widely used for the deposition of ZnO thin film buffer layers [19, 20]. It is a simple technique,

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Kinetic Study of Fast Brominations of Xylidine Using Competition Techniques

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Absract: *The competitive kinetics applied with assurance and determine the kinetic in milliseconds due to fast bromination reaction. Determination of kinetics is fundamental aspects for the design and operation of the reactor. Competition kinetic method was proposed to determine directly bromination rate constant of regioisomers of Xylidine.The specific reaction rates determined from this study are 1.7 x* $10^5M^{-1}S^{-1}$ *for 3,5 Xylidine, 1.4 x* $10^5M^{-1}S^{-1}$ *for 2,5 Xylidine* ***and*** *1.2 x* $10^5M^{-1}S^{-1}$ *for 2,3 Xylidine. Kinetic evidence gives information about mechanistic route.*

Keywords: *Regioisomers of Xylidine, Competitive kinetics, Bromine, Potassium nitrate, potassium iodide*

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I. Introduction

Kinetics of chemical reaction deals with the rate of chemical reaction, Chemical reaction is one or two step process usually involve collision between two reactants refer to as a bimolecular step or dissociation of a single reactant molecule which is refer as unimolecular. Kinetics study of chemical reaction is carried out analysis of elementary steps i.e. the reaction mechanism and determination of absolute rate of reaction. The rate of chemical reaction means the rate at which reactants are used up or equivalently the rate at which products are formed, In kinetic studies the kinetic parameters such as frequency factor, activation energy, stiochiometric concentration, enthalpy and entropic changes on the rate of reaction[1]

Experimental techniques have been developed to monitor reactions over timescale varying as few femto seconds (1Fs= 10^{-15}sec.) It is to monitor the kinetic study of a slow reaction occurring over minute to hour or longer and kinetic study of a fast reaction occur in few seconds or femto seconds therefore highly specialized techniques are used to study fastest reaction. In 2003, more than twenty US Army troops were allegedly exposed to 3,4-xylidine during the operation of Iraq, leading to a number of health complaints.[2]

A kinetic experiment essentially consists of mixing the reactants and initiating reaction on a timescale that is negligible to that of reaction and then monitoring concentration of reactants and products as the function of time. Reaction in pharmaceutical industries is known for their complexities, reaction with intermediate product are common in these industries.[3] For kinetic study of a fast reaction a large number of techniques have been developed as Flow Techniques, Flash photolysis techniques, Relaxation Method, Life time methods, Absorption Spectroscopy, Competition Techniques. The competition techniques are necessitated to study the kinetics of these brominations of aromatic substrate due to their rapidity.

Competition Techniques-

In Competitive Techniques A and B react with C However A and B do not react with each other but competition take place with A and B react with C Where C is insufficient quantity although A and B are large amount, if the rate constant for one of the competitive reaction is known, the other can be determined.

II. Experimental Method:

The Competition ratio V-v/v is maintained to be near to unity In titration **v** Cm^3 of sodium thiosulphate in the iodometric titration corresponds to the bromine reacted with potassium iodide V-v is corresponds to that reacted Xylidine in the competition. The Competition ratio V-v/v is arranged as that of near about 1. By using the following equation K can be calculated

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Mechanistic study of colorimetric and absorbance sensor developed for trivalent yttrium (Y^{3+}) using chlortetracycline-functionalized silver nanoparticles

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Lanthanides

ABSTRACT

The presence of hazardous, radioactive, and rare earth metal such as yttrium (Y^{3+}) in water poses a serious health concern to the public health, thus, exploring novel Y^{3+}-binding molecules and colorimetric indicators are desired. Chlortetracycline (CTC)-functionalized silver nanoparticles (AgNPs–CTC) were synthesized, purified by centrifugation and then characterized by UV–vis spectroscopy, XPS, XRD, and HR-TEM. Functionalization of AgNPs with CTC molecules enabled the rapid and sensitive detection of trivalent yttrium ion (Y^{3+}). A decrease in the intensity of the original surface plasmon resonance peak at 420 nm was observed within the fraction of a min, with the simultaneous appearance of a new peak at a longer wavelength (540 nm); thus, a novel colorimetric and ratiometric absorbance probe was achieved. The free-O-containing moieties of CTC on the AgNPs surface coordinate with Y^{3+}. Thus, CTC molecules led to the bridging of the AgNPs and subsequent aggregation. A good linear relationship (R^2 = 0.933) in the range of 18 to 243 nM for Y^{3+} was observed, and the limit of detection (LOD) for ratiometric results was approximately 57.7 nM. The AgNPs–CTC sensor exhibited better colorimetric performance in terms of excellent sensitivity, LOD, and rapid formation of the AgNPs-CTC complex towards Y^{3+}. The Y^{3+} spiked water samples from different sources and fetal bovine serum suggest that the developed method is practically useful and essentially portable for on-site monitoring. The AgNPs–CTC sensor can be also applied as a common colorimetric indicator for the detection of trace levels of Y^{3+} and lanthanides.

1. Introduction

Facile detection of metal ions is of interest with high sensitivity, basically in aqueous media, is an important research area. Over the past several decades, research into the applications and biological significance of yttrium-compound based biomedical products has increased dramatically [1,2]. It is one of the important radioisotopes frequently released from radioactive waste into the environment [3]. Yttrium (Y^{3+}) are quite hazardous and non-biodegradable; thus, they must be detected and safely removed from polluted streams. Similarly, increased use of lanthanides in catalysis, fertilizer, and medical diagnosis, it has raised serious concerns over their potential in pollution and deserves new methods detection of trace levels [4]. Traditional methods such as inductively coupled plasma atomic emission spectrometry [5], and inductively coupled plasma mass spectrometry (ICP-MS) [6] have typically been used to detect Y^{3+}. Also, some fluorescence sensors for Y^{3+} have also been reported, that shown molecular recognition capability for the Y^{3+} metal ions [7,8]. In addition, only a limited number of Y^{3+} samples have thus far been examined [9]. As such, the developments of more effective, rapid, and selective colorimetric or spectrophotometric methods with the capability to detect Y^{3+} ions with nanomolar-level sensitivity are needed. To the best of our knowledge, the present work is the first report on the sensitive colorimetric detection and determination of Y^{3+} using chlortetracycline (CTC)-functionalized silver nanoparticles (AgNPs–CTC) with a dependable and rapid absorbance response.

Organic compounds with electron-donor functionality are important in analytical chemistry, where they participate in environmental, biological, medicinal, and organometallic coordination reactions for binding with metal ions [10]. Members of the tetracycline class of

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Research Article

Capacitive property studies of inexpensive SILAR synthesized polyaniline thin films for supercapacitor application

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Abstract

The polyaniline (PANI) is an eco-friendly conductive polymer which has been considered for diverse applications. The partially oxidized phase of the PANI is useful for the charge storage application. Here, a unique nanograin/nanofiber structured PANI was grown on inexpensive stainless steel (SS) current collector by the simple oxidative polymerization process and its charge storage properties were systematically investigated. For that, the inexpensive successive ionic layer adsorption reaction method was used to grow a uniform nanostructured PANI on the SS conductor. This evolution of the nanostructure was studied with the Field emission scanning electron microscope. Furthermore, the as-prepared PANI was confirmed by the X-ray diffraction and the Fourier-transform infrared spectroscopy. In the half cell electrochemical testing, the prepared PANI exhibited a maximum specific capacitance of 710 F g^{-1} with a specific discharge capacity of 119 mAh^{-1} at 0.2 mA cm^{-2} in 1 M H_2SO_4 for the supercapacitor application. Also, by using the power-law relation it was observed that, in a charging and a discharging current, initially a contribution of the diffusive faradaic reactions is more as compared with the surface capacitive non-faradaic reactions.

Keywords Polyaniline (PANI) · Supercapacitor · SILAR · Stainless steel · Power-law · Charge storage

1 Introduction

Evolution in the electrical systems for a wide spectrum of application in recent years have been increased the demand for electrical energy consumption [1, 2]. The sophisticated energy storage units with desired energy-power output for targeted electrical systems has been the main goal in front of the research community. In the global market, batteries, supercapacitors (SCs), hybrid energy storage systems have been providing the desired requirements of electrical systems. Among several energy storage systems, the Li-ion batteries are still dominating in the market for different applications, from the medical devices to the hybrid vehicles as the main central electrical energy storage and supplying system (EES) unit [3–5]. However, SCs with low initial capital costs, low operation-maintenance costs, with easy and efficient operation, high power density have been considered as the best option for main backup EES unit [6–8].

The materials generally used in the SC's stores electrical energy either in the form of columbic (electric double layer) and faradaic (redox reaction) charge transfer process or the combination of both, which influences its power-energy output [9, 10]. The SCs having more electric double layer transitions can deliver more electric power density due to the fast charge transfer rate of adsorbed ions on the electrode surface. Whereas, the SCs having more redox transitions can deliver low power density due to poor charge transfer rate [11, 12]. More surface adsorption reaction in the charge transfer process increases the

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Nanorods to hexagonal nanosheets of CuO-doped manganese oxide nanostructures for higher electrochemical supercapacitor performance

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ABSTRACT

In this work, the extraordinary properties of CuO addition on the morphology and supercapacitive performance of Mn_2O_3 electrodes were demonstrated. Concisely, CuO/Mn_2O_3 thin films were prepared by an easy and inexpensive successive ionic layer adsorption and reaction (SILAR) method. The prepared thin films were characterized by various sophisticated physiochemical systems. The results demonstrated formation of Mn_2O_3 thin films with noteworthy morphological alteration upon introduction of CuO. Furthermore, a significant effect of CuO introduction was observed on the electrocatalytic properties of the nanostructured Mn_2O_3 electrodes. At 3% CuO doping, the Mn_2O_3 electrodes displayed the maximum specific capacitance owing to formation of nanoplate-like structures. The enhanced specific capacitance attained for 3% CuO doping in the Mn_2O_3 electrode was 500 F/g at 5 mV/s in a 3 M KOH electrolyte. All results confirmed the plausible potential of the CuO/Mn_2O_3 electrode for supercapacitor applications.

1. Introduction

In recent years, supercapacitors have emerged as good candidates for different energy storage applications owing their excellent power density, extensive cycle life, high rate capability, high reversibility, and extremely fast charging/discharging [1]. The increasing energy demands and the consequent environmental impact have encouraged a search for alternative clean and sustainable energy storage technologies with high efficiency and excellent performance [2]. Accordingly, considerable attempts have been made to find a suitable electrode materials with decent capacitive features analogous to those of NiO, CoOx, CuO, MnO_2, Fe_3O_4, etc. [3–7]. Among the different transition metal oxides, manganese oxide has attracted attention because of its low cost, environmental friendliness, high energy density, universal abundance, high theoretical capacity (1370 F/g), and excellent electrochemical properties for applications in supercapacitors and use as an electrocatalyst in basic reagents for the oxygen reduction reaction (ORR) [2,8–10].

Different strategies have been proposed to boost the electrochemical properties of manganese oxides. The electrochemical features of a substance are mainly determined by their electronic structure. Extra energy states can be introduced to metal oxides by doping other materials to alter their electronic characteristics [8]. The most prominent method to enhance the specific capacity of metal oxide is the addition of metal ions to develop desired mixed metal compounds [11]. The doping of heteroatoms can strengthen the pseudocapacitive and electrochemical properties of manganese oxides [8]. Among different metal dopants, the copper cation is considered as a superior dopant because of its electrical conductivity, environmentally benign nature, and low cost [2,12]. P-type materials such as CuO and manganese oxides with a tiny band gap (E_g = 1.2 eV) are considered dynamic materials in batteries and supercapacitors [2]. Copper-based manganese oxides material has been used as catalyst for the oxidation of CO [13], hydrogenation reaction [14], oxidative decomposition of ethyl acetate [15], and oxidation of 5-hydroxymethylfurfural [16], Fe, and Mn doped CuSe [17].

Recently, Li et al. prepared various transition metal (Fe, Co, Ni, and V) ion-doped MnO_2 on carbon for the ORR and supercapacitor applications. They prepared manganese oxides nanosheets by a redox reaction between the macroporous carbon and a $KMnO_4$ solution. They found that the electrochemical performance can be improved by doping

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Communication

Facile Synthesis of Triphenylamine Based Hyperbranched Polymer for Organic Field Effect Transistors

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Abstract: In this study, we reported the synthesis and characterization of a novel hyperbranched polymer (HBPs) *tris*[(4-phenyl)amino-*alt*-4,8-bis(5-(2-ethylhexyl)thiophen-2-yl)benzo[1,2-b;4,5-b']dithiophene] (PTPABDT) composed of benzo[1,2-b:4,5-b']dithiophene (BDT) and triphenyleamine (TPA) constituent subunits by $A_3 + B_2$ type Stille's reaction. An estimated optical band gap of 1.69 eV with HOMO and LUMO levels of −5.29 eV and −3.60 eV, respectively, as well as a high thermal stability up to 398 °C were characterized for the synthesized polymer. PTPABDT fabricated as an encapsulated top gate/bottom contact (TGBC), organic field effect transistors (OFET) exhibited a p-type behavior with maximum field-effect mobility (μmax) and an on/off ratio of 1.22×10^{-3} cm^2 V^{-1} s^{-1} and 7.47×10^2, respectively.

Keywords: benzo[1,2-b:4,5-b']dithiophene; triphenylamine; Stille reaction; OFET

1. Introduction

Solution processable π-conjugated semiconductors, a subset of organic materials, has progressively attracted much attention from both academic and industrial applications as the best candidate for lightweight, transparent, flexible electronic devices with less production cost for high throughput processing [1–4]. These materials have been fabricated as active organic layers in organic field-effect transistors (OFETs), organic photovoltaic (OPV) cells, and organic light emitting diodes (OLEDs) [5,6]. OFETs remain as the fundamental building block for flexible electronics [7,8]. Significant progress has enhanced device performance remarkably and currently considered as viable alternative to amorphous silicon-based transistors [9–12]. In spite of that, further fabrication methods and reliable device models are required for expansion of its application in sophisticated electronics [7,13]. This realization

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Silver nanoparticle probe for colorimetric detection of aminoglycoside antibiotics: picomolar-level sensitivity toward streptomycin in water, serum, and milk samples

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Abstract

BACKGROUND: The low cost of aminoglycoside (AMG) antibiotics facilitates their excessive use in animal husbandry and the agriculture sector. This scenario has led to the occurrence of residues in the food chain. After several years of AMG use in antibacterial therapy, resistance to streptomycin has begun to appear. Most of the detection methods developed for AMG antibiotics lacks specificity. A broad target specific nanoprobe would be ideal for detecting the entire class of AMGs. A rapid and sensitive method for the detection of AMGs is urgently needed.

RESULTS: Gallic acid-coated silver nanoparticles (AgNPs) were demonstrated as a nanoprobe for the colorimetric detection of AMGs (yellow to orange / red). A linear dynamic range of 50–650 pmol L^{-1} was achieved readily by ratiometric spectrophotometry (A_{560}/A_{400}) with a limit of detection (LOD) as low as 36 pmol L^{-1}. The amine-groups of the AMGs function as molecular linkers, so that electrostatic coupling interactions between neighboring particles drive the formation of AgNP aggregates. The assay can also be applied for the determination of streptomycin residues in serum and milk samples.

CONCLUSION: This study revealed the potential of an AgNP probe for the rapid and cost-effective detection of low-molecular-weight target analytes, such as the AMGs. A ligand-induced aggregation of AgNPs coated with gallic acid was reported to be a rapid and sensitive assay for AMGs. Analysis of streptomycin was demonstrated with excellent picomolar-level sensitivity. Thus, the validated method can find practical applications in the ultrasensitive detection of AMGs in complex and diagnostic settings.

Keywords: AgNP probe; ratiometric assay; picomolar sensitivity; antibiotics residues; food safety

INTRODUCTION

Aminoglycoside (AMG) antibiotics are RNA-binding drugs with a common core structure called the streptamine ring. They bind to the ribosomal subunit, thereby hindering mRNA translation and finally leading to nonsense mutation and rapid cell death. Aminoglycoside antibiotics are known for their broad-spectrum antibacterial action against a range of gram-negative aerobic bacteria.[1] However, the substantial variation between the administered AMG antibiotic dose and variations in the resultant levels in the blood is of great concern.[2] The negative impact of antibiotic residues in food and water has also received worldwide attention due to their abuse in animal husbandry and agricultural practices.[3,4] This global scenario has emerged as a pressing concern owing to the evolving multi-drug resistance observed for bacteria.[5] There is thus an urgent need to develop novel assays with high selectivity and sensitivity for the detection of AMG antibiotics in water and food samples.

Streptomycin is a broad-spectrum AMG antibiotic that was discovered in 1943 from a soil actinomycete, *Streptomyces griseus*.[6] It is effective for gram-negative bacterial treatment and is used not only in controlling human diseases but also in modern agriculture

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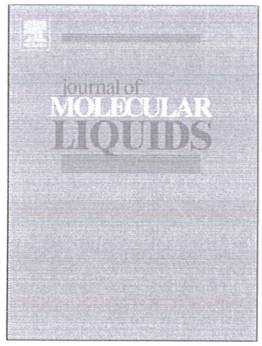

High-performance symmetric supercapacitor; nanoflower-like NiCo2O4//NiCo2O4 thin films synthesized by simple and highly stable chemical method

S.K. Shinde, H.M. Yadav, Sivalingam Ramesh, C. Bathula, Nagesh Maile, G.S. Ghodake, Haridas Dhaygude, D.-Y. Kim

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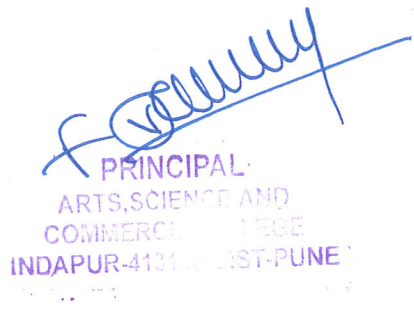

nanomaterials

MDPI

Article

Extracellular Synthesis and Characterization of Silver Nanoparticles—Antibacterial Activity against Multidrug-Resistant Bacterial Strains

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Abstract: Herein, we report the use of a cell-free extract for the extracellular synthesis of silver nanoparticles (AgNPs) and their potential to address the growing threat of multidrug-resistant (MDR) pathogenic bacteria. The reproducibility of AgNP synthesis was good and AgNP formation kinetics were monitored as a function of various reaction factors via ultraviolet-visible absorption spectroscopy. This green method was dependent on the alkaline pH of the reaction mixture. With the addition of dilute sodium hydroxide, well-dispersed AgNPs could be produced in large quantities via the classical nucleation and growth route. The new biosynthetic route enabled the production of AgNPs within a narrow size range of 4 to 17 nm. The AgNPs were characterized using various techniques and their antibacterial activity against MDR pathogenic bacteria was evaluated. Field-emission scanning electron microscopic imaging revealed prominent morphological changes in *Staphylococcus aureus* cells due to mechanical damage, which led to cell death. *Escherichia coli* cells showed signs of contraction and intracellular fluid discharge as a consequence of disrupted cell membrane function. This new biologically-assisted extracellular strategy is potentially useful for the decontamination of surfaces and is expected to contribute to the development of new products containing AgNPs.

Keywords: extracellular nanosynthesis; green chemistry; silver nanoparticles; intracellular fluid discharge; pathogenic bacteria

1. Introduction

The frequent and widespread use of antibiotics in the last few decades has led to the development of antibiotic-resistant bacteria. In recent years, *Escherichia coli* (*E. coli*) and *Staphylococcus aureus* (*S. aureus*) have been identified as the sources for most common infections. Multidrug-resistant (MDR) pathogens are known to cause scalded skin syndrome, meningitis, endocarditis, osteomyelitis, food poisoning, urinary tract infections, pneumonia and diarrhea worldwide [1–3]. Resistance in pathogenic microorganisms poses a severe threat to global public health because conventional antibiotics will no longer be effective [4,5]. Thus, there is an urgent need for the development of novel antibiotics, antimicrobial agents and nanomaterials that exhibit strong antimicrobial activity without the induction of resistance in bacterial strains.

Oxide nanomaterials, including copper, zinc, cerium and iron, appear promising as antibacterial agents. However, oxide nanomaterials are limited by their poor dispersibility and

Journal Pre-proof

Gallic acid-functionalized silver nanoparticles as colorimetric and spectrophotometric probe for detection of Al^{3+} in aqueous medium

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Full Length Article

Assembling ZnO and Fe_3O_4 nanostructures on halloysite nanotubes for anti-bacterial assessments

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E. coli
S. aureus
Biofilms

ABSTRACT

This study reports anti-bacterial assessments of 'halloysite nanotubes (HNTs) surface-tuned with Fe_3O_4 and ZnO nanostructures (M-HNTs-ZnO)' against the non-drug resistant pathogenic *E. coli* and *S. aureus*, drug-resistant methicillin-resistant *S. aureus* (MRSA) and their respective biofilms. Naturally occurring clay mineral the halloysite nanotubes (HNTs) are emerging materials in nano-bio-medicines. Fabricating HNTs' tunable surface with anti-bacterial nanomaterials can be a significant application in combating the deadly bacterial infections. SEM, TEM, FT-IR, XPS and VSM analysis corroborated a successful synthesis of M-HNTs-ZnO. The acquired results established the significant anti-bacterial potential of M-HNTs-ZnO against the *E. coli*, *S. aureus* and MRSA, respectively. The stepwise modifications made on HNTs enhanced anti-bacterial performance. Detailed SEM image analysis established possible anti-bacterial mechanisms. M-HNTs-ZnO found effective against the successfully established biofilms of *S. aureus*. The M-HNTs-ZnO applied in repeated anti-bacterial performance against *E. coli*, *S. aureus* and MRSA, marked its importance for water-treatments. In conclusion, M-HNTs-ZnO showed significant anti-bacterial properties that can be used in the treatment of infectious diseases. Also, its repeated anti-bacterial capabilities might be applied in water disinfection protocols.

1. Introduction

The use of antibiotics dominated as a treatment for the pathogenic micro-organisms in the last century [1]. The dramatic increase in antibiotic resistance of pathogenic bacteria constitutes one of the major threats to human health [1,2]. To combat these problems, several antimicrobial nanomaterials have been studied in recent years for the replacement of antibiotics. Despite this, the robust nano-material with natural-availability, higher-efficiency, and multi-functional properties are necessary to be investigated. However, the highly-applicable and multi-dimensional materials which have the anti-bacterial effect to methicillin-resistant *Staphylococcus aureus* (MRSA) and their biofilms can counter the rising drug-resistance in micro-organisms.

Halloysite nanotubes (HNTs) are the biocompatible materials, known for exceptional drug carrier potential [3-6]. HNTs are naturally occurring clay mineral having a significant potential of the surface modification for diverse applications [3]. Structurally, HNTs $[Al_2Si_2O_5(OH)_4{\cdot}2H_2O]$ are made up of aluminosilicate layers with the composition of aluminum, silicon, hydrogen, and oxygen [7]. HNTs structure shows hollow-tubular nature with an inner-lumen diameter of 5–20 nm and the length of the tube is in the range of 0.5–10 μm [8]. Chemistry of HNTs includes a tubular morphology with the Al—OH sheet forming the inside and the Si–O sheet the outside [9,10]. The HNTs' outer surface mainly covered by Si—O—Si groups and have some Si—OH groups present on the edges [11]. HNTs nano-tubular framework provides there utilization in diverse applications including; environmental, catalytic, and nano-medicinal [12]. Due to their outstanding properties, HNTs are widely used in many emerging applications. So, the impact of the HNTs on human health and the environment needs to test. The biocompatibility of HNT is one of the

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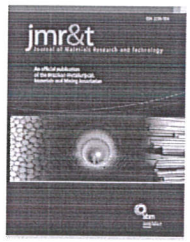

Short Communication

Microwave assisted synthesis of imidazolyl fluorescent dyes as antimicrobial agents

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ABSTRACT

In this article, we report, the synthesis and characterization of series of novel fluorescent imidazolyl dyes (**5a-d**) *via* highly efficient and cost-effective microwave assisted protocol as a potential candidate to overcome the problem of microbial resistance. By utilizing the green microwave protocol the reactions are completed in a short span of time without using the harsh conditions. The incorporation of imidazole nucleus is an important strategy in drug discovery. While designing desired fluorescent imidazole dyes **5a-d**, with a suitable auxiliary donor such as aromatic rings and $-OCH_3$ group on one end of the imidazolyl moiety and electron acceptors such as $-NO_2$ and $-COOH$ on other end of the compounds was achieved to get a promising fluorescent dyes for antimicrobial. The optoelectronic properties and antimicrobial studies of the synthesized materials indicated their exploration as a promising candidate as antimicrobial agents.

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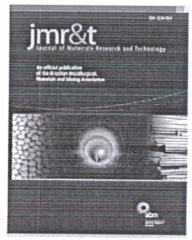

Original Article

Fabrication of nanostructured SnO_2@Co_3O_4/nitrogen doped graphene oxide composite for symmetric and asymmetric storage devices

Sivalingam Ramesh[a], *Hemraj M. Yadav*[b], *Surendra K. Shinde*[c], *C. Bathula*[d], *Young-Jun Lee*[e], *Ravi Kumar Cheedarala*[f], *Hyun-Seok Kim*[d], *Heung Soo Kim*[a,*], *Joo-Hyung Kim*[e,*]

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ABSTRACT

The fabrication, and characterization of SnO_2@Co_3O_4/NGO composite with a nanogranular-like morphology was synthesized by a thermal reduction process in presence of ammonia and urea as catalyst. The structure and morphology of the composite were investigated by sophisticated techniques. Cyclic voltammetry was performed to determine the electrochemical performance of the composite electrode for supercapacitor applications. The composite symmetrical electrode was displayed a specific capacitance of ~375 F g^{-1} at 0.5 A/g in a 2 M KOH aqueous electrolyte with a capacity retention of ~93% after 10,000 cycles. The SnO_2@Co_3O_4/NGO composite asymmetric electrode exhibited a specific capacitance of~256 F/g at 1 A/g and excellent cyclic retention. The improved electrochemical properties of the composite depends on the nanogranular-like morphology, large surface properties, and excellent conductive networks. Therefore, the ternary oxide@NGO composite electrode is promising architecture for energy storage applications.

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Designing of nanoflakes anchored nanotubes-like $MnCo_2S_4$/halloysite composites for advanced battery like supercapacitor application

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ABSTRACT

In this study, we report a facile chemical synthesis of a novel $MnCo_2S_4$/halloysite (HNTs) nanoflakes decorated on nanotubes which coated on Ni foam via a screen-printing technique. The $MnCo_2S_4$ thin films were prepared using a coprecipitation method which demonstrate battery kind of behavior. The $MnCo_2S_4$/HNTs-based electrode shows a specific capacity of 359 mAh g^{-1} at 5 mV s^{-1} with excellent cycling stability. Furthermore, the symmetric system exhibits an outstanding energy density and power density of 6.98 Wh kg^{-1} and 1976.0 W kg^{-1}, respectively. The results obtained with the $MnCo_2S_4$/HNTs composite in a symmetric system indicate that this composite material can potentially be used as an alternative electrode material for electrochemical energy storage.

1. Introduction

In recent years, world pollution has rapidly increased, necessitating the development of alternative energy sources and storage schemes. Although the existing energy sources and storage techniques are convenient, they face various limitations such as low abundance and poor renewability [1–5]. Examples of non-renewable energy sources include fuels such as oil, coal, natural gas, and wood [5–7]. Overcoming such problems involves the progress of novel energy storage systems that alleviate environmental pollution, are based on a renewable energy source, and are green and cost effective. To this end, solar cells, supercapacitors, batteries, and capacitors are now commercially available [8–10]. Solar cells, batteries and supercapacitors are the most capable electrical energy storage systems. In supercapacitors, battery type materials are particularly promising because they show outstanding characteristics such as high energy and power densities and good long-term cycling stability; they also do not generate environmental pollution and are inexpensive to fabricate [11–15].

Currently, many researchers are developing various binary and ternary metal oxide/hydroxide/chalcogenide nanostructures [16–20] for use in supercapacitors [21], batteries [22], dye-sensitized solar cells [23], sensors [24], water-splitting [25], hydrogen/oxygen evolution [26,27], and various electronic devices. Among these transition-metal chalcogenides, we have chosen

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Synergistics of Cr(III) doping in TiO_2/MWCNTs nanocomposites: Their enhanced physicochemical properties in relation to photovoltaic studies

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ABSTRACT

In the present investigation, optoelectronic modifications of the TiO_2 host lattice through insertion of Cr(III) (0.5–3.0 mol.%) as a dopant and thereafter its composites with MWCNTs prepared using single step *in-situ sol-gel* route and its photovoltaic performance of the hybrids was investigated using Ru(II) based sensitizer. The physicochemical properties (viz. structural, opto-electrical, morphological and charge transfer behavior) of the ternary Cr@TiO_2/MWCNTs NCs are compared with the TiO_2/MWCNTs NC through various spectroscopic (XRD, Raman, UV–Visible DRS, XPS, FT-IR, PL, TRPL and EIS measurements) and microscopic (HR-TEM with SAED) analysis. TRPL and EIS studies reveals that, average life time of the electrons in the excited state increases and interfacial charge transfer resistance decreases after the insertion of Cr(III) ion into the TiO_2 host lattice. After the detailed physicochemical investigations, binder free NCs were deposited on the F:SnO_2 (FTO) by doctor-blade technique using DMF and CH_3CN solvents and then anchored with N719 dye. Finally, sensitized photo-electrode sandwiched with Pt-counter electrode for making the sandwich dye sensitized solar cells (DSSCs) and photovoltaic performance of the assembled devices was measured under AM 1.5 solar simulator for *I-V* and *IPCE* measurements. The $Cr_{0.010}@Ti_{0.990}C$ NCs based DSSCs shows highest photovoltaic conversion efficiency up to η = 7.69% which is 20% (η = 6.18%) higher to that of undoped TiO_2/MWCNTs based DSSCs.

1. Introduction

Recently, semiconducting ternary nanocomposites (NCs) have pivotal role in the leading potential fields of the sustainable survive viz. energy conversion and storage (Chen et al., 2015; Rakhi et al., 2012; Santra and Kamat, 2013), environmental remediation (Deng et al., 2017), catalysis (Miao et al., 2017), sensing (Malik et al., 2018), biomedical (Regulacio et al., 2018), and electronics (Hu et al., 2018) due to their well coverage of the optical region of electromagnetic spectrum (Liu et al., 2013), tuning electronic properties (Mao et al., 2011), and separation of charge carriers (Mondal et al., 2018) etc. Among these potential applications, energy harvesting has a priority choice due the present need of the sustainable energy and available conventional energy sources are insufficient to consume the modern society and also injurious to environment (Yun et al., 2018). Hence, from last two decades investigators intent on the efficient conversion of highly abounded sunlight into electrical energy through low cost, stable dye sensitized solar cells (DSSCs) compared to conventional Si-based solar cells and recently used perovskite based solar cell devices (Mathew et al., 2014). From the discovery of DSSCs (O'regan and Grätzel, 1991), investigators demonstrated, the semiconducting TiO_2 acts as an efficient photocatalyst compared to others such as SnO_2 (Snaith and Ducati, 2010), ZnO (Sakai et al., 2013), Nb_2O_5 (Ou et al., 2012), and $SrTiO_3$ (Tang and Yin, 2015) etc. utilized for the DSSCs. Because of its tunable morphology (Bai et al., 2014), opto-electronic properties (Lee et al., 2012) higher chemical stability (Lee et al., 2012) and higher dye loading capability compared to others (Bai et al., 2014). Also its HOMO-LUMO levels are well matchable to the excited dye (De Angelis et al., 2011), and hence recently reported the highest photovoltaic conversion efficiency up to 14.5% for TiO_2 based DSSCs (Kakiage et al., 2015). With these advantages, it has some constrains viz., it active only in the UV region due to its wider energy band gap (Dette et al., 2014), and

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Article

Chlortetracycline-Functionalized Silver Nanoparticles as a Colorimetric Probe for Aminoglycosides: Ultrasensitive Determination of Kanamycin and Streptomycin

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Abstract: Aminoglycosides (AMGs) have been extensively used to treat infectious diseases caused by Gram-negative bacteria in livestock and humans. A selective and sensitive colorimetric probe for the determination of streptomycin and kanamycin was proposed based on chlortetracycline-coated silver nanoparticles (AgNPs–CTC) as the sensing element. Almost all of the tested aminoglycoside antibiotics can rapidly induce the aggregation of AgNPs, along with a color change from yellow to orange/red. The selective detection of aminoglycoside antibiotics, including tobramycin, streptomycin, amikacin, gentamicin, neomycin, and kanamycin, with other types of antibiotics, can be achieved by ultraviolet (UV) spectroscopy. This developed colorimetric assay has ability to detect various AMGs using in-depth surface plasmon resonance (SPR) studies. With this determination of streptomycin and kanamycin was achieved at the picomolar level (pM) by using a UV–visible spectrophotometer. Under aqueous conditions, the linear range of the colorimetric sensor for streptomycin and kanamycin was 1000–1,1000 and 120–480 pM, respectively. The corresponding limit of detection was 2000 pM and 120 pM, respectively. Thus, the validated dual colorimetric and ratiometric method can find various analytical applications for the ultrasensitive and rapid detection of AMG antibiotics in water samples.

Keywords: chlorotetracycline antibiotics; silver nanoparticles; ultrasensitive detection; aminoglycoside antibiotics; water samples; picomolar level sensitivity

To Compare the Effect of Improvement the Maximal Oxygen Uptake (VO2 Max) Capacity through Training Programs

Bharat Bhujbal*

ABSTRACT

This study presents hypothetical study comparing the improvement of the whole body maximal oxygen uptake (VO2max) when training with different methods at different intensities matched for total work performance and frequency of training. We compare VO2max improvement in two training methods. The methods are group of functional exercises and other is suryanamaskar and pranayama method. The study was conducted on 75 female students of 18 to 20 age having almost everyone has same physical ability. The selected subjects were measured of their physical fitness component maximum oxygen uptake capacity with Queens Colllege 3 Minutes Step Test. The total fitness standard of sample was calculated by converting the raw scores into standard scores. The data was analysed by applying repeated measure ANOVA test and Post Hoc test for multiple comparisons.

Keywords: Cardiorespiratory fitness, VO2max, maximal oxygen uptake training methods, Queen's Colllege Step Test, physical fitness.

INTRODUCTION

VO2 max is generally considered as the best indicator of cardiorespiratory fitness. Cardiorespiratory fitness is an important health variable, which is associated with several risk factors for cardiovascular diseases. VO2 max is a physiological parameter by which we are able to estimate body consumes how much oxygen when working at a very high level of exercise. Cardiorespiratory fitness is measured by VO_2max which is one of the most often used tests to evaluate endurance capacity. It is a best way to evaluate overall body function and health. It measures an aerobic fitness. Training programs are help to increase the VO2 max and improve overall fitness. Cardiorespiratory and aerobic fitness level are depends on lung capacity and heart volume, capillary delivery and muscle efficiency. When lung capacity is more the heart can pump more oxygenated blood that's why more oxygenated blood reach to the muscles through capillaries. Oxygenated blood supply to the muscles through the capillaries increases the efficiency of the muscles. Increasing muscle function increases the body's ability to function as a whole. Cardiorespiratory fitness is mainly increased through aerobic endurance exercises but in some not fit or diseased populations a small benefit can be achieved by muscular strength exercise (ACSM 2006b, Pollock M., et al 2000).

It is my intension to do this study to develop more oxygen capacity using the proper training methods. There is a great lack of exercise in college girls. There are many reasons for this, indifference

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6. Challenges before Higher Education in India

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Abstract

India, even after 70 years of its independence, is far away from the goal of universal literacy. There are number of college in the country, but they don't have proper basic infrastructure. However on a positive note, India is engaged in the use of higher education as a powerful tool to build a knowledge-based information society of the 21st Century. Indian professionals are considered among the best in the world are in great demand. This signifies the inherent strength of Indian education system.

The present paper is an attempt, to identify and discuss a number of problems & challenges faced by 'Higher Education' in India. The paper is an outcome of a review of a substantial number of secondary sources on the current problems and challenges of higher education in India.

Key words: Universal, Substantial, Higher Education.

Introduction

The story about the Indian Higher Education (India's university) system as it exists today started in 1857 with three essentially British creations – the Universities of Madras, Calcutta and Bombay. According to MHRD (NIRF-2015), India has the third largest higher education system in the world, behind China and the United States comprising of 795 universities, 39,671 affiliated colleges, 10,15,696 teaching faculty and 2,37,64,960 students including 29,34,989 post-graduate and 2,00,730 research scholars. The total enrolment has increased from a meagre 2 lakhs in 1947 to 238 lakhs in 2013-14. Colleges, affiliated to 194 affiliating universities, constitute the bulk of the higher education system in India contributing around 86.48% of the total enrolment. According to Wikipedia/AICTE, The total number of Professional college (2015) are 8526. Out of these there are 3364 are engineering colleges and 2450 management (MBA) college's.

Objectives

1. Find out the present status of Higher education in India.
2. To study the challenges Before Higher education.

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Analysis of Accumulated Heavy Metal Concentrations in Various Body Parts of Chillapi (*Oreochromis mossambicus*) Fish from Ujjani Reservoir of Maharashtra, India

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Abstract The heavy metal contamination is creating devastating effects on ecosystem and environment and eventually hazardous to human health. Ujjani is one of the largest reservoir in Maharashtra state. It receives water from different metropolitan cities harboring numerous industries. Moreover, anthropogenic activities pollute water and fish fauna of the reservoir. In the present study, the concentrations of heavy metals such as Iron (Fe), Copper (Cu), Zinc (Zn), and Manganese (Mn) were analyzed from various tissues namely muscles, liver, gill, and fin of Chillapi fish. The variation in level of metals was found with respect to tissue types and body weight groups. The concentrations of Fe were ranged between 15.94 to 91.56µg/g, Cu concentration was between 1.88 to 48.88µg/g, Zn concentration was between 25.72 to 84.2µg/g and Mn was recorded between 2.12 to 28.48µg/g in Chillapi fish. Fe and Cu have recorded highest in the liver, whereas peak of Zn and Mn was detected in fins. Furthermore, the minimal metal concentrations were observed in muscle samples of all different weight groups. It shows that Fe, Zn, Cu concentration in all four tissues was within the limit, whereas the Mn level was found to be exceeding the permissible limit as prescribed FAO/WHO, 1989. The presence of heavy metals higher than normal level in fish bodies is a clear indicator of biomagnifications. Furthermore, THQ and HI values were within limit for all studied metals in fish but if consumed in excess amount may cause toxicity in humans. Therefore, daily intake of fish should be strictly monitored to avoid excess intake of these heavy metals. Our study signifies the importance of addressing the heavy metal contamination issue to avoid health related problems.

Keywords Ujjani Reservoir, Heavy Metals, Chillapi, *Oreochromis mossambicus*, AAS, World Health Organization, Biomagnifications

1. Introduction

The pollution of fresh water resources is the major concern globally. The discharge of pollutant through anthropogenic activity has been increased tremendously and creating terrible consequences on quality of water [1-3]. However, the activities like rapid growth of industries, extensive use of fertilizers, pesticides in agriculture and mining has increasing discharge of heavy metals in aquatic environments [4]. Heavy metal contamination leads to devastating effect on the ecosystem and the environment [5, 6]. Heavy metals are predominantly natural trace components of the aquatic environment and also act as micronutrients which are required in limited quantity for growth of living organism, but their level has continuously rising due to anthropogenic activities which is lethal to aquatic environment [7]. Above mentioned sources of pollution alters the physiochemical properties of aquatic habitat, and quality and quantity of fish stocks [7 - 9]. It is well known fact that heavy metals accumulate in the sediment surface, benthic living organisms and these metals exhibit the increasing trend in the concentration through biomagnifications process in the food chain. Fishes are often top choice among all aquatic foods for consumers and frequently susceptible for accumulation of large amount of metals present in water [10]. Presence of organic

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A Study of Labour Welfare Initiative at Small and Medium Industries (Chatrapati Industry Ltd Loni Devkar, Indapur Dist. Pune Maharashtra)

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Abstract

During the pre-independence period, industrial relations policy of the British Government was one of *laissez fair* and also of selective intervention. There were hardly any labour welfare schemes. After independence, labour legislations have formed the basis for industrial relations and social security. These legislations have also provided machinery for bipartite and tripartite consultations for settlement of disputes. Soon after independence, the Government at a tripartite conference in December 1947 adopted the industrial truce resolution. Several legislations including the following, were enacted to maintain industrial peace and harmony; Factory Act 1948, Employees State Insurance Act, 1948 and Minimum Wages Act, 1948. The Payment of Bonus Act was passed in 1965.

In the early 1990, the process of economic reforms was set in motion when the Government introduced a series of measure to reduce control on industries, particularly large industries. The workers have opposed economic liberalization policy for fear or unemployment while entrepreneurs have welcomed in the hope of new opportunities to improve Indian industrial relations. The new economic policy has directly affected industrial relation in the country, because the Government has to play dual role, one of protecting the interest of the worker's and second to allow a free interplay of the market forces.

Economic reforms by removing barriers to entry have created competitive markets. Fiscal stabilization has resulted in drastic reduction budgetary support to the public sectors commercial enterprises while exposing his enterprises to increased competition from private sector.

Keyword: laissez fair, labour welfare, Minimum Wages, Bonus, Economic reforms

Introduction

Employee welfare is justified for several reasons. A typical worker does a lot of work life digging coal earth, fetching and refining oil, to build dams for society. They look after necessities as well as luxuries of people in society. Thus, welfare measuresare must for them.

Welfare measures are going to have a great impact on worker's productivity. Thus, a worker show safeguards economic and social factors of the industrial economy needs a boost with welfare activities.

Welfare may help retain the employee. Most welfare facilities are hygiene factors according to Frederick Herzberg, they create dissatisfaction if not provided. Replace dissatisfaction, place an employee in favorable mood, and provide satisfiers, and the motivation will take place. Welfare facilities, besides removing dissatisfaction, help develop loyalty in workers towards the organization.

Welfare may also help minimize social evils, such as alcoholism gambling, drug addiction etc. a

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Role of Primary Agriculture Cooperative Credit Societies (PACS) in the Development of Agriculture Sector in India

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Abstract

Primary Agriculture Cooperative Credit Societies(PACS) are the banks which are situated in rural area and plays a very important role in rural credit system by performing their activities on co-operative principles and also these banks are worked under the District Credit Co-operative Banks. They provide short term and medium term loan to rural people to meet their financial requirements. But, the rural people still depend on unorganized sources such as money lenders in village, mandies, traders etc. So , various measures taken by Government to reduce these unorganized sources through the establishment of PACS in rural areas. In order know the role of PACS in agricultural development in India the study has been undertaken.

Keywords: *primary, credit, agricultural, co-operative, society, finance.*

Introduction

The co-operative banks in India play a significant job in even today in provincial financing. These are enrolled under the Co-usable Societies Act and furthermore managed by the RBI. They are administered by the "Banking guideline Act-1949" and Banking Laws (Co-employable social orders) Act 1965. The matter of co-usable banks in urban territory additionally have increased in recent year due to sharp increment in the number of essential co-usable banks. The co-employable development was expressed in India generally with the end goal of giving agriculturists reserves foragricultural activities, at low paces of intrigue and shields them from the grip of cash moneylenders.

Objective of the Study

1. To study the role and performance of PACS in respect of agricultural credit and rural development.
2. To find out reasons for poor recovery of loans in PACS.
3. To offer suggestions to improve the performance of PACS.

Methodology

The study is based on Secondary data. The data has been collected from books, magazines and websites.

A) Role of PACS

A co-employable acknowledges society, ordinarily known as Primary Agricultural Co-usable Society (PACS) might be expressed with at least 10 people, regularly having a place with a town. The estimation of each offer is commonly ostensible in order to empower even most unfortunate rancher to turn into a part. PACS involve a prevalent situation in the co-employable structure and structure its base. A Primary Agricultural Credit Society is sorted out at grass-root level of a town or a gathering of little towns. It is the fundamental unit which manages rustic (horticultural) borrowers, gives those advances and gathers reimbursements of advances given. It fills in as the last connection between definitive

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SOLAR PHOTOCATALYTIC DEGRADATION OF METHYLENE BLUE USING Sb-DOPED TiO_2 NANOPARTICLES

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Abstract:
Sb-doped TiO_2 were synthesized by sol–gel process combined with surfactant incorporating method. The concentration level of Sb (III) additive was varied systematically from 1 to 11 wt.%. Wide structural and surface characterization of samples was carried out in order to establish a correlation between the effects of antimony incorporation on the TiO_2 photocatalytic properties. Results revealed that the anatase structure is highly stable for Sb/TiO_2 with enhancement in the surface area. UV–Vis diffuse reflectance spectra showed that this dopant was responsible for narrowing the band gap of TiO_2 and shifting its optical response from ultraviolet to visible-light region. The photocatalytic activity of the Sb/TiO_2 catalyst was evaluated in the decomposition of methylene blue solution under solar light irradiation with respect to the content of antimony on the catalyst surface. The results showed that the incorporation of antimony into the TiO_2 seems to enhance the photocatalytic activity of the samples, which is ascribed to the enlargement of specific surface area, photo generated carriers separation, light absorption, as well as the higher surface acidity. The photocatalytic efficiency and activity of the composites remained good, even after three cycles.
Keywords: Sb/TiO_2; Nanomaterials; Solar photocatalysis; Methylene blue.

Introduction:

Photocatalysis has emerged as an effective technique to decontaminate toxic and non-biodegradable environmental pollutants [1-2]. Among various functional metal oxides, TiO_2 is the most nontoxic, highly stable, cost effective, strong oxidant, and noncorrosive semiconductor, which make it more suitable choice for removing organic and inorganic contaminants from the environment [3-4]. The photochemical reactions proceed on a pure TiO_2 surface, when irradiated with ultraviolet light. This barricades the frequent and convenient use of TiO_2 photocatalyst. The increase in redox potential and decrease in the particle size is essential to enhance the photochemical reaction rates. Decreasing the particle size to nano scale, results in the larger surface area per unit mass. Reduction of band gap facilitates the catalyst to make use of solar and visible light energy, which makes it environmentally and electrically suitable photo catalyst [5]. Further, the anatase to rutile phase ratio is also an important factor in enhancing photo catalytic activity. The anatase phase is kinetically more stable and higher hydrophobicity of this phase increases the absorption of reactive species, while rutile phase scatters light which decreases its absorption power [6-7].

Recently, much attention has been paid in modifying TiO_2 to enhance its catalytic efficiency or expand its applicability under solar irradiation [8]. Different metallic [9] and nonmetallic dopants [10] have been doped to decrease the band gap and increase excitation life time of pure TiO_2. Mao et. al, used nitrogen dopant for the photo-oxidation of organic molecules in water [11]. Shamalah et. al, showed degradation of Brilliant Green dye with Zn and Cu-doped TiO_2 [12]. Moreover, many attempts have been carried out in direction of attaining high surface area photocatalysts to increase active sites by using the support materials like zeolites [13], HZSM-11 zeolite [14], Clinoptilolite [15] and silica–clay composite [16]. Zhang et. al. synthesized mixed platinum catalysts supported on various carbon nanomaterials [17]. The nano Ag/Pt and methyl violet co-doped catalyst was developed resulted in higher photodegradation activities towards various dyes [18]. Elham S. Baeissa investigated the removal of cyanide employing cobalt metal doped on TiO_2–SiO_2 nanoparticles [19]. Nano sheets of $Au/HTiNbO_5$ have also been synthesized by Hsin-Yu Lin, et. al to produce hydrogen from water splitting [20]. The important issue governing the efficiency of photocatalytic oxidative degradation is minimizing electron-hole recombination by maximizing the rate of interfacial electron transfer to capture the photogenerated electron and/or hole. Various n and p type photocatalysts are well documented in the literature. A Na-doped p-type flower-like ZnO photocatalyst (Na:ZnO) that is highly visible-light-sensitive in air at room temperature was synthesized by a continuous flow microreactor [21]. Rh-doped $BaTiO_3$ powder was prepared by the polymerized complex (PC) method, and the photocatalytic activity for H_2 evolution from water was examined. $BaTiO_3$ is a wide-gap n-type semiconductor having a band gap of 3.0 eV. Doping Rh species into the lattice of $BaTiO_3$ resulted in the formation of new absorption bands in visible light region [22]. Different p-type Cu_2O powders were prepared from electro deposition and subjected to analysis of their photocatalytic activity in water reduction [23]. Sb-doped catalyst on different supports has been synthesized previously [24-25]. However, they did not evaluate the effect of concentration level of Sb (III) on crystallite size, specific surface area and phase transformation and surface

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AN OVERVIEW OF INDIAN AGRICULTURE SECTOR IN THE ERA OF GLOBALIZATION

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Abstract

The term globalization refers to International Integration. It includes opening up of world trade, development of advanced means of communication, internationalization of financial markets, growing importance of MNC's, population migrations and more generally increased mobility of persons, goods, services, capital, data and ideas. It is a process through which the diverse world is unified into a single society. In short it is a creation of world into a global village. It is the recent concept that has come to govern the world since end of the 20th century with the end of the cold war and melting down of Soviet Union. The need of structural changes in various world economies, dominance of market related economies, growing importance of private resources and capital and pressure of world bank and other International organizations like IMF (International Monetary Fund) have started this process in many of the developing countries like India. It has brought in new opportunities to developing countries. Greater access to foreign markets, technology transfer, improved productivity and higher living standard are some of the advantages of this process to the countries like India. But it has also creates new challenges like growing inequality across and within nations, volatility in financial market and environmental deteriorations. As Indian is agrarian economy it is wise to know the impact of Globalization on Indian economy. An overview of Indian agricultural sector indicates that globalization did not yield the desired results in India. It has marginally contributing in minimizing poverty, and removing social inequalities. The desired objectives of this process have not been achieved in India. As far agricultural sector is concerned we have seen mixed results in the country. It is clear with the study that agriculture plays key role in the economy. Agriculture employees 59% of Indian population, yet it contribution varies only from 15 to20% of the GDP (Gross Domestic Product). After adoption of globalization in 1991 Indian agriculture growth rate increase but at present the economy condition of the farmers is not satisfactory because input cost is high and output cost is low. Cut off of subsidies are hindering growth of agricultural sector

Keywords: *Globalization, International integration, agriculture, social inequality, subsidy, International Monetary Fund, Gross Domestic Product.*

Introduction:

The term globalization refers to International Integration. It includes opening up of world trade, development of advanced means of communication, internationalization of financial markets, growing importance of MNC's, population migra-

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Finding Locations for Continuous Contour Trenches in Indapur Tahsil, Dist. Pune (Maharsshtra)

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Introduction

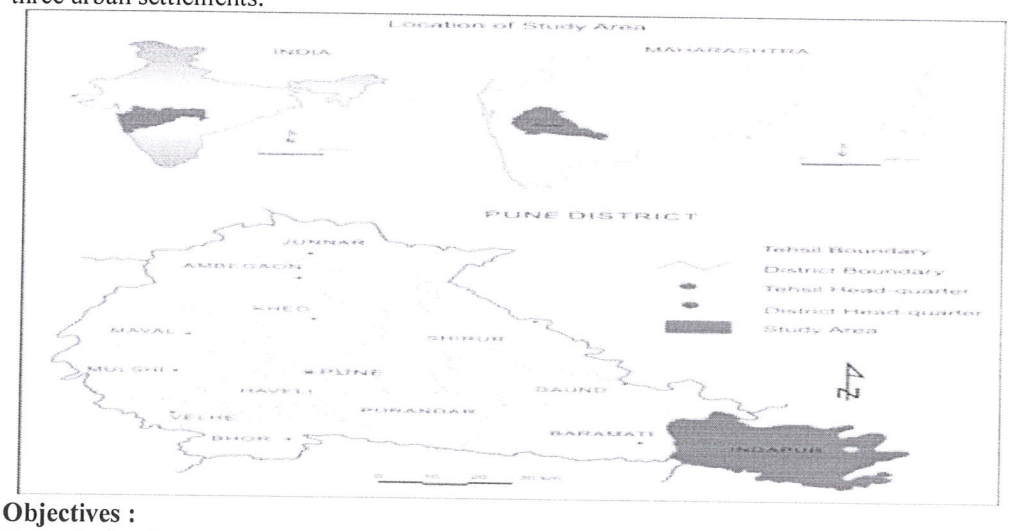
Water is vital to life, without which no living body can survive. Water is considered as prime natural resource, a basic human need and a valuable national asset. Water is core component of environment. Now days, there are many problems rises related to water quantity and quality. Water scarcity is also main problem because of over use of surface and ground water. So watershed management is the need not only for water conservation and soil conservation, but also has impact on food production and national economy. Continuous Contour Trenches (CCT) method is helpful to increase ground water level in the surrounding areas/ dug wells and tube wells which increases the yield of farms and water quality. This will also avoid loss of soil due to erosion; increase the grass coverage which will helpful for soil stabilization. This method can be adopted in low rainfall area to high rainfall area up to 3200mm and from flat area to hilly area with 65% steep slope. This method is suitable for plantation of all species and easy, simple for laborers and comparatively less record keeping. Indapur tahsil is one of the tahsils of rain shadow tahsil in Maharashtra. Average annual rainfall of Indapur tahsil is about 450 mm.

Origin of the research problem:

Indapur tahsil is selected for the study of water resources. The choice and topic under investigation is influenced by many considerations. Firstly, researcher belongs to Indapur tahsil hence is familiar with the study region. Secondly, study region falls in drought prone region of Deccan trap of Maharashtra state receiving annual average rainfall between 400-500 mm. It is distributed unevenly in study region. Thirdly, irrigation is dominant factor in study region having considerable impact on water use in Indapur tahsil. Although main sources of water for study region is the rivers like Bhima, Nira and other tributaries, there is drought in some region of Indapur tahsil. Fourthly, this region has not been so far studied in depth for water analysis point of view by geographers. The main problem is that water source is abundant in the part of east and south of Indapur tahsil, whereas water sources is scanty in west and north side of Indapur tahsil. So we study the water resources in Indapur tahsil.

Location, Situation and Site

Indapur tahsil is situated in Pune district. The northern and eastern border is demarcated by Bhima river in Pune and Solapur districts while southern boundary is confined by NiraRiver in Pune and Satara and Solapur districts. The west boundary is confined by Baramati and north boundary is delimited by Daundtahsil of Pune district. The region extends between 17° 53′ to 18° 15′ north latitudes and 74° 35′ to 75° 8′east longitudes. The total geographical area of this tahsil is 1552.93 square kilometres having 3, 83,183 population (2011). This tahsil consists of 142 settlements and three urban settlements.



Objectives :

1. To study the slope analysis and soil distribution of study area.

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Physicochemical characterization, drug release, and biocompatibility evaluation of carboxymethyl cellulose-based hydrogels reinforced with sepiolite nanoclay

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ABSTRACT

Polymer–clay nanocomposite hydrogel films (PCNCHFs) were prepared from caboxymethyl cellulose, polyvinyl-pyrrolidone, agar and nanosepiolite clay (0, 0.3, 0.5, 0.7, 0.9 and 1.5% reinforcement) by treating thermally in a simple, rapid, and inexpensive route. The PCNCHFs and its 5-fluorouracil (FU)-loaded composites (PCNCHFs@FU) were tested for FU release and characterized by FTIR, XRD, FE-SEM, EDX, DSC, and TGA analyses to investigate their structural, morphological, and thermal properties. The nanosepiolite-loaded polymer composites (PCNCHF1 to PCNCHF5) exhibited higher tensile strength than the pristine polymer hydrogel (PCNCHF0); consequently, the thermal properties (glass- and melting-transition) were improved. The PCNCHFs@FU demonstrated prolonged FU release at pH 7.4 for 32 h. The biocompatibility of PCNCHFs was tested against human skin fibroblast (CCDK) cells. The viability of cells exposed to all PCNCHFs was >95% after 72 h of culture. The live/dead assay show the proliferation of fibroblast cells, confirming the biocompatibility of the hydrogels. The pH-sensitive PCNCHFs@FU release could be suitable for drug release in cancer therapy, and the developed PCNCHFs may also be useful for tissue engineering, food packaging, and other biological applications.

1. Introduction

Biopolymer-based composite hydrogels are in great demand for various applications, including those encompassing the pharmaceutical, environmental, and biomedical fields, due to their economic, environment-friendly, biodegradable, and biocompatible nature [1–3]. In brief, three-dimensional hydrophilic polymeric networks with high water affinity usually do the construction of polymer-based hydrogels. Instead of dissolving into solution, their physically and/or chemically cross-linked structures allow them to hold water [4–6]. Hydrogels can be constituted with different macromolecules with various functional groups, such as -OH, -SO_3H, -COOH, -CONH-, and -$CONH_2$, in their polymeric backbone (either embedded in or grafted to). Because of their hydrophilic functional domains, the resulting hydrogels can absorb and retain large amount of water and other biological fluids/cells. Therefore, these swollen three-dimensional viscoelastic polymer network structures can resemble natural tissue and is of great importance in biomedical field [7–9]. Carboxymethyl cellulose (CMC) based hydrogel systems were developed by different methods, such as physical blending, chemical grafting, and ionic gelation etc. However, the polyelectrolyte behavior of CMC is due to the presence of carboxylate moiety, which is a pH sensitive group with in-situ gelation ability, resulting in bio-adhesive behavior. Hence, the electrically controlled CMC based systems are very useful in delivering various pharmaceuticals such as 5-fluorouracil (FU) for colon drug release, wound dressing, and tissue engineering, because of its biocompatibility [10–16].

Recently, the European Food Safety Authority reported that, CMC is a safe food additive for all animals; moreover, it was also shown to be harmless to the environment because of its biodegradation propensity [17]. The unique viscosity characteristics, hydrophilic nature, adhesive behavior, film forming ability, and biocompatibility, the CMC-based hydrogels have wide range of industrial applications [18–21], in addition to biomedical [22–24] and environmental applications [25–27]. The pristine polymer hydrogels show lower mechanical stability without chemical crosslinking agents. Therefore, it is necessary to use ecofriendly materials as alternative for reinforcement strategy. To

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Novel and efficient hybrid supercapacitor of chemically synthesized quaternary 3D nanoflower-like $NiCuCo_2S_4$ electrode

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ABSTRACT

In this work, we employed a simple and cost-effective chemical route to obtain a highly stable and efficient quaternary mesoporous 3D nanoflower-like $NiCuCo_2S_4$ nanocomposite for supercapacitor applications. The $NiCuCo_2S_4$ composite exhibited a mixture of $NiCo_2S_4$ and $CuCo_2S_4$ phases, confirming the formation a quaternary $NiCuCo_2S_4$ thin film. A surface morphological analysis revealed the unique nanoflower-like nanostructure of the annealed composite. The electrochemical analysis of the $NiCuCo_2S_4$ electrode demonstrated a high specific capacity (Cs) of 414 mAh g^{-1} at a lower scan rate of 10 mV s^{-1} and a superior cycling stability up to 3000 cycles. A solid-state hybrid supercapacitor (SHS) was also constructed by the $NiCuCo_2S_4$ and AC powder as positive and negative electrodes, respectively. The $NiCuCo_2S_4$//AC hybrid cell produced a high Cs, energy density, and power density of 159 F g^{-1}, 35.19 Wh kg^{-1}, and 0.66 kW kg^{-1}, respectively at a current density of 10 mA with good cycling stability. The results demonstrated that the fabrication process is effective for the development of a novel quaternary transition metal sulfide (TMS) electrode.

1. Introduction

The expansion of a high-energy storage system has fascinated significant consideration due to the rising demand for efficient renewable energy sources. The capable energy storage systems such as supercapacitors (Sc) offer a high power density, energy density, cycling stability, lower resistance, and greater safety compared to batteries [1,2]. Electrochemical supercapacitors store energy either through ion adsorption (electrochemical double-layer capacitors, EDLCs) or fast, reversible, multi-electron surface redox reactions (pseudocapacitors). Highly reversible redox reactions are responsible for the high specific capacitance of pseudocapacitor devices [3–5]. Physicochemical properties of the selected materials strongly affect the performance of supercapacitor devices. For instance, the electrochemical performance can degrade during the cycling due to change in the morphology of selected materials. Therefore, it is important to improve the morphological stability of supercapacitive electrode materials to maximize their cycle life [6]. Materials with hierarchical pores and tabular or layered structures are well-known to increase the charge transport, ion diffusion, power density, and the cycling stability [1,7]. In addition to structural design, the electrode composition also have a crucial role in the performance of electroactive materials [8]. The electrochemical performance can be tuned by optimizing the ratio of metal ions.

Several nanomaterials with desirable properties fabricated from carbonaceous materials and metal oxides have been employed in supercapacitor applications. In particular, metal chalcogenides exhibit excellent physiochemical properties that are suitable for supercapacitor applications. Ni, Co, and Cu-based materials have attracted significant attention in various fields, the oxides and sulfides of these metals have been proven to be useful for electrochemical energy storage applications [9]. These metals are an important strategic resources which are mostly suitable in electrochemical energy storage systems, catalysis, and other fields due to their unusual structural, optical, and electronic properties [10]. Ni, Co, and Cu-based battery materials in aqueous and alkaline electrolytes have been reported to facilitate fast Faradaic reactions on or near their surface, thus offering both high energy storage and power

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Green synthesis of novel $CuCo_2O_4$ nanocomposite for stable hybrid supercapacitors by deep eutectic solvents

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ABSTRACT

Currently, many transition metal oxides (TMOs) have been demonstrated as attractive nanomaterials for application in supercapacitors for energy storage/conversion systems. Among TMOs, $CuCo_2O_4$ has presented excellent electrochemical properties, including higher electrical behavior. Also, they are readily accessible in earth, ecofriendly and cost effective compared to other nanocompunds. In this research, we have for the first time synthesized $CuCo_2O_4$ (CCO) nanomaterials using a deep eutectic solvents (DES) method for supercapacitor (SC) applications. We systematically studied the effect of annealing temperature of CCO on its structural, morphological, and electrical properties. The CCO was annealed at different temperature of 150, 200, 250, and 300 °C for 3 h. CCO annealed at 250 °C exhibited the superior performance compared to other as-synthesized and annealed samples. The optimized CCO electrode shows outstanding supercapacitive properties with specific capacity 421 mAh g^{-1} at 10 mV s^{-1}, excellent GCD capability, and super cycling stability. This indicates that the DES-prepared CCO shows better electrochemical performance due to highly porous nanostructure providing more active sites for easy transformation of the ions.

1. Introduction

Supercapacitors (SCs) are the core component in the development of sustainable energy storage systems with high power density, high energy density, fast charge–discharge, long life, cycling stability, and low cost [1–4]. SCs can be classified into two categories based on the charge storage mechanism: electrical double layer capacitors (EDLCs), which consist of electrostatic charge accumulation at the electrode/electrolyte interfaces, and pseudocapacitors, which comprise reversible Faradic reactions. Pseudocapacitors deliver much higher specific capacitance and energy density than the EDLC [5–7] Metal oxides of copper, nickel, cobalt, and manganese have gained increasing attention in SCs research because of their electrochemical properties [8,9]. Copper oxide and cobalt oxide has many potential applications in various scientific technologies. Among numerous metal oxides, binary transition metal oxides (TMOs) of copper and cobalt showed excellent electrochemical properties, such as specific capacitance, conductivity, cycling performance, and structural stability [10].

The earth abundant spinel type cobalt oxide and its derived compounds offer a promising alternative cheap material for electrochemical energy storage application because of its high theoretical capacitance ~ 3600 F g^{-1}, electrochemical reversibility, and stability. However, the electrochemical performance was slightly lower than expected due to the internal low conductivity, morphology, surface area, chemical composition, and crystallinity [11,12]. Recently, many efforts have been devoted to overcoming these obstacles by designing mixed-metal oxides, controlling morphology, size, and structural properties. Previous reports found that the introduction of Cu in the host cobalt oxide could be beneficial towards improving conductivity and electrochemical properties. Therefore, copper cobalt-based oxides have been highlighted because of their natural abundance, excellent stability, and low cost. Furthermore, amalgamation of metal oxides is a promising way to boost electrical conductivity, electro-chemical properties, and structural stability.

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Study and Analysis of Water Resources in Indapur Taluka (Pune District)

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1. Introduction

Water is vital to life, without which no living body can survive. Water is considered as prime natural resource, a basic human need and a valuable national asset. Water is core component of environment. There is vast disparity in the distribution and utilization of water resource at the global, regional and local levels. Water scarcity due to depletion of surface as well as ground water following fast population growth, urbanization, rising incomes, industrial development etc. For water management, we need to assess the water resources.

The main problem is that water source is abundant in the part of east and south of Indapur taluka, whereas water sources is scanty in west and north side of Indapur taluka. So we have studied the water resources in Indapur taluka.

2. Study Area

Indapur tahsil is situated in Pune district. The northern and eastern border is demarcated by Bhima river in Pune and Solapur districts while southern boundary is confined by NiraRiver in Pune and Satara and Solapur districts. The west boundary is confined by Baramati and north boundary is delimited by Daundtahsil of Pune district. The region extends between 17° 53′ to 18° 15′ north latitudes and 74° 35′ to 75° 8′east longitudes. The total geographical area of this tahsil is 1552.93 square kilometres having 3, 83,183 population (2011). This tahsil consists of 142 settlements and three urban settlements.

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Probing the electrochemical properties of $NiMn_2O_4$ nanoparticles as prominent electrode materials for supercapacitor applications

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ABSTRACT

$NiMn_2O_4$ (NMO) powders have been prepared by facile sol–gel route, and the effect of annealing temperature and the concentration of KOH electrolyte on its electrochemical performance has been investigated. The electrochemical performance of the NMO electrodes is tested via a three electrode arrangement in KOH electrolyte. The NMO electrode (NMO1) prepared from the powder synthesized at a temperature of 500 °C with an approximate crystallite size of 10 nm exhibits maximum specific capacitance of 571 Fg^{-1} at a scan rate of 5 mVs^{-1} in 1 M KOH electrolyte. The specific capacitance of the NMO1 electrode is found to be improved from 571 Fg^{-1} in 1 M KOH to 762 Fg^{-1} in 6 M KOH electrolyte. The improvement in the specific capacitance of the NMO1 working electrode in 6 M KOH electrolyte can be attributed to good electrochemical utilization and an effective charge storage mechanism.

1. Introduction

Supercapacitors (SCs) have attracted much attention because of the fast rechargeability, higher power density over the batteries, and more energy storage ability as compared to conventional capacitors. The SCs have enormous energy storage capacity besides possessing the combined property of both conventional capacitor and battery [1]. Based on the charge-storage mechanism, electrochemical SCs can be classified into three categories: viz, pseudocapacitors, electrical double-layer capacitors (EDLCs), and hybrid capacitors. The conducting polymers and various metal oxides are utilized as the active electrode materials in pseudocapacitors, whereas in EDLCs carbon-based materials such as activated carbon, graphene, and carbon nanotubes are used as active electrodes. One more type of SCs is a mixture of both pseudocapacitors and EDLCs, known as a hybrid capacitor. To construct these types of SCs, the active electrode materials are made by combining either two or three distinct elements which give very large specific capacitance and enhanced energy density than pseudocapacitors or EDLCs [2]. However, all the above-mentioned SCs still suffer from some significant disadvantages such as poor cyclic life span of conductive polymers, the low capacitance of carbon-based materials and high cost of typical transition metal oxides like RuO_2 [3]. RuO_2 has been extensively investigated as a promising material due to its high specific capacitance and excellent cycling stability, but rareness and the high cost of ruthenium element are putting significant barriers to its commercialization [4]. To overcome these significant disadvantages, it is necessary to explore other alternative materials for the fabrication of supercapacitors.

Mixed transition metal oxides (MTMOs) are preferred to fabricate electrode materials for supercapacitor application over the single transition metal oxide component due to its enhanced chemical stability and electrochemical properties [5]. Out of the different MTMOs, considerable attention has been centered towards the synthesis of cubic spinel $NiMn_2O_4$ (NMO) as it offers high conductivity, outstanding electrochemical capacitance, high redox-active sites, and exceptional chemical

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Hierarchical nanosheets of ternary CoNiFe layered double hydroxide for supercapacitors and oxygen evolution reaction

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ABSTRACT

The preparation of stable and efficient thin films with excellent energy storage and conversion capabilities has attracted great attention in the field of supercapacitors and electrocatalysis. Herein, hierarchical nanosheets-based ternary CoNiFe layered double hydroxide (LDH) thin films are prepared via an inexpensive and facile electrodeposition method. The structural, morphological, and electrochemical properties of films are systematically studied and compared with their binary counterparts. As prepared CoNiFe LDH shows a maximum specific capacity of 360 C g^{-1} at the current density of 0.4 A g^{-1} with a capacity retention of 51% even at the higher current density of 10 A g^{-1}. Moreover, it shows excellent cyclic stability of 84% after 2000 cycles. As an electrocatalyst, CoNiFe LDH demonstrates an excellent performance in OER, affording an overpotential of 196 mV at the current density of 10 mA cm^{-2} with a Tafel slope value of 49 mV dec^{-1}. Also, it depicts excellent catalytic stability with stable operation for over 10 h. Thus, ternary CoNiFe LDH thin film can be used as a promising electrode material for both electrochemical energy storage and catalysis.

1. Introduction

The continuously increasing energy consumption and concerns over environmental pollution require significant global efforts on efficient generation, storage, and transmission of energy [1]. The electrochemical energy storage and electrocatalysis have been considered to be the most effective technologies to remove the aforementioned stumbling block [2]. Among electrochemical energy storage devices, such as batteries and supercapacitors (SCs), SCs have attracted great importance owing to their high specific capacitance, long cycle life, and high power density [3]. The SC bridges the gap between conventional capacitors and rechargeable batteries by combining advantages of both. However, SCs are characterized by their poor energy density. Therefore, a variety of different materials has been investigated to improve the energy density of SCs [4]. SCs are categorized into electric double layer capacitors (EDLCs) and pseudocapacitors. Compared with EDLCs, pseudocapacitors demonstrate superior capacitive performance owing to the involvement of fast redox reactions and tremendous scales of electrostatic charge diffusion and accumulation [5]. Electrode materials such as transition metal oxides, hydroxides, sulfides, carbides, nitrides, conducting polymers, etc. neither exhibit pure pseudocapacitive nor faradaic behavior. These materials can be classified as battery-like electrodes which have attracted great attention in recent years [6].

On the other hand, the electrochemical water splitting using high-performance electrocatalysts is imperative to produce oxygen and hydrogen for fuel cell and metal-air battery technologies [7]. During water splitting, the hydrogen evolution reaction (HER) is a straightforward process that readily happens at low overpotential. However, the oxygen evolution reaction (OER) ($4OH^- \rightarrow O_2 + 2H_2O + 4e^-$) is an arduous process owing to the sluggish four-electron transfer steps [2]. Previously, transition metal oxides such as RuO_2 and IrO_2 have been reported as high-performance electrocatalysts for OER [8]. However, it is important to explore highly competent and inexpensive OER catalysts based on earth-abundant elements.

Recently, transition metal-based layered double hydroxides (LDHs) have attracted great attention in the field of SCs, electrocatalysts, and electrochemical sensors because of their highly reversible redox kinetics, cost-effectiveness and excellent structural and compositional tunability [9–11]. The general formula for LDHs is

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Review

Review on biomass feedstocks, pyrolysis mechanism and physicochemical properties of biochar: State-of-the-art framework to speed up vision of circular bioeconomy

Gajanan Sampatrao Ghodake [a], Surendra Krushna Shinde [a], Avinash Ashok Kadam [b], Rijuta Ganesh Saratale [b], Ganesh Dattatraya Saratale [c], Manu Kumar [d], Ramasubba Reddy Palem [e], Hind A. AL-Shwaiman [f], Abdallah M. Elgorban [f], Asad Syed [f], Dae-Young Kim [a,*]

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ABSTRACT

The biochar is a solid carbon-rich, porous material produced by the thermochemical conversion of a diverse range of biomass feedstocks under an inert atmosphere (i.e., in the absence of oxygen). We can produce the biochar at all likely scales, ranging from the industrial to the domestic level and even at individual farms, thus, the biochar industry is leading as a most appropriate at different socioeconomic settings. The possibility of sustainable biochar production practices and multi-functionality features make it a promising candidate to fulfill an increasing demand in the fields of soil amendment, agricultural sustainability, environmental protection, cutting-edge materials, and to achieve circular bioeconomy and mitigation of climate change. An available fraction of waste biomass (agroforestry waste, biomass crops, agricultural residues, mill residues, and animal manure, and many more) can be used efficiently in pyrolysis and converted into desired biochar materials, besides this alternative energy products, such as syngas, bio-oil, electricity generation, and process heat. This report emphasizes the fate of biomass composition, pyrolysis mechanisms, and applications of modern analytical and characterization techniques that are being adopted, applied, and standardized to improve understandings of molecular, structural, and surface properties characteristics of biochar. To achieve precisely designed biochar, there is a need to understand the latest advances in biochar materialization mechanisms and structure-application relationships to speed up their agronomic applications and to achieve a zero-waste dream. This report also summarizes a wide range of literature published on feedstocks, pyrolysis, and biochar and suggests several practical recommendations appropriate to implement and bring together specific details on the thermochemical conversion of biomass, desired biochar properties, organic and inorganic phases, and the significance to the agronomic applications.

Contents

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Electrochemical synthesis of binder-free interconnected nanosheets of Mn-doped Co_3O_4 on Ni foam for high-performance electrochemical energy storage application

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ABSTRACT

In this study, various nanostructures of Mn-doped Co_3O_4 were synthesized on Ni foam using binder-free electrochemical technology for electrochemical energy storage applications. Using the cyclic voltammetry method with different scan rates, diverse nanostructures, i.e., irregularly oriented nanooctahedra, interconnected standing nanosheets, and nanopetals of Mn-doped Co_3O_4, were obtained. The standing interconnected nanosheets on the Ni foam exhibited remarkable supercapacitive performance due to the void space between the sheets and mesoporous structure, which provided additional active sites for faradic transitions. The nanosheets exhibited excellent electrochemical performance with a maximum specific capacitance of 1005F g^{-1} and a cyclic stability of 88% during 5000 charge–discharge cycles. Moreover, an asymmetric supercapacitor was assembled comprising activated carbon on Ni foam and interconnected nanosheets of Mn-doped Co_3O_4 on Ni foam as negative and positive electrodes, respectively. This assembled device exhibited an improved potential of 1.6 V, a maximum specific energy of 20.6 Wh kg^{-1}, and a maximum specific power of 16 kW kg^{-1} with 80.6% capacity retention after 2000 charge–discharge cycles, which is superior for SC devices.

1. Introduction

Effective electric energy storage and retrieval are important aspects for the development of sustainable and renewable energy devices. Most of the research on this topic has focused on the use of nontoxic, abundantly available materials for low production cost and enhanced operational safety [1]. In particular, Li-ion battery technology stands out for its ability to deliver high specific energy in various electrical appliances, including medical devices and communication implements [2,3]. However, for the development of next-generation hybrid devices, supercapacitors (SCs) with high specific power that can provide large amounts of electrical energy in short periods are required. Basic electrochemical reactions occurring at the electrodes of SCs play a vital role in SC operation. In this context, SCs can be divided into two types: electrical double-layer capacitors (EDLC) with nonfaradic charge storage and pseudocapacitors with faradic charge storage. In general, SCs based on carbon nanomaterials such as carbon nanotubes, graphene oxides, and activated carbon (AC) are EDLCs, which exhibit high electrical conductivity and large surface areas. In contrast, transition metal oxides (TMOs), including MnO_2, Mn_2O_3, RuO_2, Co_3O_4, Fe_2O_3, and TiO_2, which undergo reversible faradic reactions, are used as pseudocapacitive materials [1,4]. These TMOs can deliver much higher energy density than carbon-based materials [1,2]. In particular, thin-film nanostructures of Co_3O_4 are considered to be good pseudocapacitive materials offering broad redox peaks over wider potential ranges compared with the sharp redox peaks of battery electrode materials [5,6].

Unfortunately, the low conductivity of TMO materials is a limitation for SC applications, and extensive research efforts have been devoted to enhance their performance. Studies have shown that TMOs having more than one cation exhibit better performance than oxides with single cations [7-9] and that the properties of core TMOs can be altered by

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A review on electrodeposited layered double hydroxides for energy and environmental applications

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Sensors

ABSTRACT

The great demand for efficient and low-cost materials for energy and environmental applications has been inspiring researchers to develop novel and advanced materials. Recently, layered double hydroxides (LDHs) are found to be admirable materials for various applications owing to their tunable elemental composition and diverse nanostructures. The preparation of binder-free LDHs thin-film electrodes has attracted great attention in the field of supercapacitors, electrocatalysts and sensors. The electrodeposition method exhibits the capability of fabricating binder-free, uniform and well-oriented thin films with tunable elemental composition. In the present review, we provide a detailed electrodeposition mechanism behind the formation of LDHs with nucleation and growth processes. Also, we summarize the literature on electrodeposited LDHs based electrode materials for energy and environmental applications. In energy storage applications, a loading amount of active materials on the substrate is crucial to improve the areal and volumetric capacities. Therefore, the utilization of low-cost and scalable scaffold materials such as carbon nanofibers, graphene foam, etc. is highly recommended.

1. Introduction

Layered double hydroxides (LDHs), often called hydrotalcite-like systems or anionic clays have attracted great attention owing to their tunable chemical and metal-anion compositions. The general formula for LDHs can be written as $[M^{II}_{1-x}M^{III}_{x}\ (OH)_2]^{x+}[A^{n-}_{x/n}\cdot yH_2O]^{x-}$ (where M^{II} and M^{III} represent the divalent and trivalent metal cations, A^{n-} represents n-valent anions). Depending upon the nature of cations and M^{II}/M^{III} molar ratios, LDHs can be prepared with a wide range of layered structures [1]. The tunability of the molar ratio of metal cations and the nature of interlaying compensating anions lead to the formation of different nanoarchitectures with versatile physical and chemical properties, extending their applicability in diverse fields [2]. LDHs have been reported for different energy and environmental applications such as electrochemical energy storage, electrocatalyst, sensors, etc. These applications demand well-oriented, uniform and high conducting thin films [3,4]. Previously, LDHs have been prepared by different chemical methods such as co-precipitation [5], hydrothermal [6], sol-gel [7] and urea hydrolysis [8], either in thin film or powder form. These chemical methods are time-consuming and complex. Also, the powdered materials need to be combined with binders and conducting additives to be applied for many energy and environment-related applications, imposing additional inactive mass to the electrode [9]. In order to overcome these disadvantages, a binder-free LDHs can be prepared using electrodeposition method. The electrodeposition is rapid, facile, and scalable method which deposits well oriented and high quality thin film materials on the conducting support with enhanced conductivity and electrochemically active sites [10]. Recently, variety of different LDHs thin films have been prepared using electrodeposition method. Fig. 1 shows the number of publications and number of citations received by the research papers published in the field of electrodeposited LDHs, indicating the influence of the field.

Recently, some review articles have been published in the field of LDHs [1,11–13]. However, they mainly focus on general synthesis methods and their different applications. To the best of our knowledge, there is no review article published that emphasizes the detailed electrodeposition mechanism behind the formation of LDHs and review of electrodeposited LDHs for energy and environmental applications. It is important to understand the detailed electrodeposition mechanism in preparing LDHs for a variety of applications to fabricate efficient materials by overcoming present difficulties. Therefore, in this review, we have discussed the fundamentals of electrodeposition methods with

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α-Cellulose Fibers of Paper-Waste Origin Surface-Modified with Fe_3O_4 and Thiolated-Chitosan for Efficacious Immobilization of Laccase

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Abstract: The utilization of waste-paper-biomass for extraction of important α-cellulose biopolymer, and modification of extracted α-cellulose for application in enzyme immobilization can be extremely vital for green circular bio-economy. Thus, in this study, α-cellulose fibers were super-magnetized (Fe_3O_4), grafted with chitosan (CTNs), and thiol (-SH) modified for laccase immobilization. The developed material was characterized by high-resolution transmission electron microscopy (HR-TEM), HR-TEM energy dispersive X-ray spectroscopy (HR-TEM-EDS), X-ray diffraction (XRD), vibrating sample magnetometer (VSM), X-ray photoelectron spectroscopy (XPS), and Fourier transform infrared spectroscopy (FT-IR) analyses. Laccase immobilized on α-Cellulose-Fe_3O_4-CTNs (α-Cellulose-Fe_3O_4-CTNs-Laccase) gave significant activity recovery (99.16%) and laccase loading potential (169.36 mg/g). The α-Cellulose-Fe_3O_4-CTNs-Laccase displayed excellent stabilities for temperature, pH, and storage time. The α-Cellulose-Fe_3O_4-CTNs-Laccase applied in repeated cycles shown remarkable consistency of activity retention for 10 cycles. After the 10th cycle, α-Cellulose-Fe_3O_4-CTNs possessed 80.65% relative activity. Furthermore, α-Cellulose-Fe_3O_4-CTNs-Laccase shown excellent degradation of pharmaceutical contaminant sulfamethoxazole (SMX). The SMX degradation by α-Cellulose-Fe_3O_4-CTNs-Laccase was found optimum at incubation time (20 h), pH (3), temperatures (30 °C), and shaking conditions (200 rpm). Finally, α-Cellulose-Fe_3O_4-CTNs-Laccase gave repeated degradation of SMX. Thus, this study presents a novel, waste-derived, highly capable, and super-magnetic nanocomposite for enzyme immobilization applications.

Keywords: α-Cellulose; waste-paper-biomass; chitosan; laccase immobilization; super-magnetic

1. Introduction

Paper and cardboards related waste count near about 30% of the total urban solid waste produced worldwide [1]. Despite recycling rates is higher in most of the developed countries, solid paper waste [2], and food waste [3,4], remained as a significant concern to the landfill sites. At the same time, the growing population worldwide, and the emergence of linear bio economies in addition to the growing demand for end-use products causing over-exploitation of natural resources at a rapid pace [5,6]. On average about 55% of the slurry from the paper industry globally are made from the secondary fibers called

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Biological characteristics and biomarkers of novel SARS-CoV-2 facilitated rapid development and implementation of diagnostic tools and surveillance measures

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ABSTRACT

Existing coronavirus named as a severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has speeded its spread across the globe immediately after emergence in China, Wuhan region, at the end of the year 2019. Different techniques, including genome sequencing, structural feature classification by electron microscopy, and chest imaging using computed tomography, are primarily used to diagnose and screen SARS-CoV-2 suspected individuals. Determination of the viral structure, surface proteins, and genome sequence has provided a design blueprint for the diagnostic investigations of novel SARS-CoV-2 virus and rapidly emerging diagnostic technologies, vaccine trials, and cell-entry-inhibiting drugs. Here, we describe recent understandings on the spike glycoprotein (S protein), receptor-binding domain (RBD), and angiotensin-converting enzyme 2 (ACE2) and their receptor complex. This report also aims to review recently established diagnostic technologies and developments in surveillance measures for SARS-CoV-2 as well as the characteristics and performance of emerging techniques. Smartphone apps for contact tracing can help nations to conduct surveillance measures before a vaccine and effective medicines become available. We also describe promising point-of-care (POC) diagnostic technologies that are under consideration by researchers for advancement beyond the proof-of-concept stage. Developing novel diagnostic techniques needs to be facilitated to establish automatic systems, without any personal involvement or arrangement to curb an existing SARS-CoV-2 epidemic crisis, and could also be appropriate for avoiding the emergence of a future epidemic crisis.

1. Introduction

A severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was first appeared in the China Hubei Province, Wuhan at the end of December 2019. Considerable number of sick patients with severe and moderate symptoms including fever, shortness of breath, and coughing were rushed for admission to the nearby hospitals. These patients were underwent computed tomography (CT) scans and the results revealed opacities in their lungs (profuse, dense, and confluent types), which were differed from that of the CT scan images of the healthy human lungs (Ai et al., 2020; Zhou et al., 2020c). Ahead of the development, existing nucleic acid-based diagnostic kits, CT scans, and symptoms were collectively used in the initial diagnosis of SARS-CoV-2 infections. Later, well-established nucleic acid-based test kits were made available for most of the known viral panels and performed with a straight multiplex approach using a well-known technique called real-time polymerase chain reaction (RT-PCR), but, the results were found to be negative, indicated that the contagion of the infection was novel and thus, the origin of virus was unknown (Park et al., 2020; Zhang et al., 2020d). In the first week of January 2020, bronchoalveolar lavage (BAL) fluid samples of different patients were examined and mysterious virus with great similarity to the viral genome of the betacoronavirus-B family

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कन्हैयालाल भवचक्र, मत्स्या भवचक्र आणि आमळी भवचक्र व अनेक कमळांच्या नक्षीकामामुळे पाश्चिमात्यात चकित करणारे सौंदर्य अनुभवते.

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३. येदू देवराम गावित, आमळी ता. साक्री, जि. धुळे दि. ३०.११.२०२०

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२००० नंतरच्या भटक्या विमुक्त जमातींच्या आत्मकथनांचे बदलते स्वरूप

श्री. राजकुमार बबन शेलार
ता. इंदापूर, जि. पुणे

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प्रस्तावना :

भटक्या विमुक्त जमातींच्या आत्मकथनांनी मराठी साहित्य समृद्ध केले आहे. या आत्मकथनांची किर्ती जागतिक पातळीपर्यंत गेली आहे. मराठी साहित्य विश्वाला अपूर्व असे योगदान या आत्मकथनांनी दिलेले आहे. कारण या आत्मकथनांतून अविष्कृत होणारे अनुभवकथन सामाजिक, सांस्कृतिक, आर्थिक व धार्मिक जीवन विलक्षण अनुभव देणारे आहे. भटक्या विमुक्त जमातींच्या आत्मकथनांमध्ये ग्रामीण व शहरी भागातील जीवन व्यक्त झाले आहे. ग्रामीण भागातील येणाऱ्या भटक्या जातीजमातींचे ते जगत, भोगत असलेल्या जीवनांचे चित्रण आत्मकथनात आले आहे. या आत्मकथनांमध्ये पहिल्या पिढीतील जी निडरता नव्हती. ती निडरता २००० नंतरच्या भटक्या विमुक्त जमातींच्या आत्मकथनात प्रामुख्याने आढळून येते.

२००० नंतर कालखंडातील भटक्या विमुक्त जमातींची आत्मकथने :

भटक्या विमुक्त जमातींची आत्मकथने ही सामाजिक जाणीव आणि उपेक्षित समाजाचे वास्तव असलेला दस्तावेज आहे. डॉ. बाबासाहेब आंबेडकरांच्या विचारातून निर्माण झालेली ही आत्मकथने पहिल्या पिढीतील आत्मकथनांपेक्षा सर्वार्थाने वेगळी, भिन्न ठरली आहेत. कारण ही आत्मकथने केवळ अनुकरणातून आलेली असून सजग जाणिवेने लिहिली गेली आहेत. त्यामध्ये 'बिराड' हे अशोक पवार यांचे आत्मकथन (२००१) साली प्रकाशित झाले. विमल मोरे यांचे 'तीन दगडांची चूल' (२०००), रामचंद्र नलावडे यांचे 'दगडफोड्या' (२०००), संतोष पवार यांचे 'चोरटा' (२००१), रत्नेश पिंग्या काळे यांचे 'पारध्याचं जिणं' (२००७), ज्ञानेश्वर भोसले यांचे

Kinetic study of Fast brominations of regioisomers of Chloroacetanilide using Competition Techniques

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ABSRACT - The competitive kinetics applied with assurance and determine the kinetic in milliseconds due to fast bromination reaction. Determination of kinetics is fundamental aspects for the design and operation of the reactor. Competition kinetic method was proposed to determine directly bromination rate constant of regioisomers of Chloroacetanilid Xylidine.The specific reaction rates determined from this study are 1.7 x $10^5 M^{-1}S^{-1}$ for *P*-Chloroacetanilide, 1.8 x $10^5 M^{-1}S^{-1}$ for M-Chloroacetanilide and 1.3 x $10^5 M^{-1}S^{-1}$ for *O*-Chloroacetanilide Kinetic evidence gives information about mechanistic route.

KEYWORDS - Regioisomers of Chloroacetanilide, Competitive kinetics, Bromine, Potassium nitrate, potassium iodide

I. INTRODUCTION

Regio-isomers of Chloroacetanilide in the three competition reactions studied with the aim of maintaining the competition ratio nearly 1 and in view of the observed rapidity of the reactions. The concentrations of both the competitors are large and almost constant compared to that of bromine in the competition. The rate of reaction is an expression relating the rate of reaction to the concentration of the relating species present which may include reactant, product and catalyst[1]

Chloroacetanilide in which amide group is electron donating group it exerts +I effect and orienting ortho and para isomers.The rection rate is influenced by certain external factors such as concentrations of the reacting substances, temperature and pressure.[2]

The Competition ratio V-v/v is operate in such manner as that of approximately 1. By using the equation rate constant can be calculated. Fast reaction will have a low activation energy, but if the reactants are present in low concentrations the rate of reaction will be small[3] The competition techniques are necessitated to study the kinetics of these brominations of aromatic substrate due to their rapidity.[4]

II. EXPERIMENTAL METHOD

Table 1 : Bromination of 2-chloroacetanilide

Initial concentrations of the reactants in 100 ml reaction mixture

Sr. No.	Reactant	Concentration/M
1	Bromine	0.0025
2	2-chloroacetanilide	0.01
3	potassium iodide	0.04

Titre values V = 8.6 ml v = 4.9 ml

Table 2 : Bromination of 3-chloroacetanilide: Initial concentrations of the reactants in 100 ml reaction mixture

Sr. No.	Reactant	Concentration/M
1	Bromine	0.0025
2	3-chloroacetanilide	0.01
3	potassium iodide	0.04

Titre values V = 8.6 ml v = 4.2 ml

Table 3 : Bromination of 4-chloroacetanilide: Initial concentrations of the reactants in 100 ml reaction mixture

Sr. No.	Reactant	Concentration/M
1	Bromine	0.0025
2	4-chloroacetanilide	0.01
3	potassium iodide	0.04

Titre values V = 8.6 ml v = 4.5 ml

III. OBSERVATION

Velocity constant K can be calculated with the help of following equation

$$\frac{k_1 [\text{Chloroacetanilide}]^x [Br_2]^y}{k_2 [K\,I] [Br_2]} \times \frac{V-v}{v}$$

When x and y are both taken as 1, over a variation of the concentration range of Chloroacetanilide, the velocity constant values k_1 obtained for the bromination of Chloroacetanilide are found to be constant suggesting an overall order of second for the reaction in all the two reactions studied. The velocity constant values obtained.

Fig.1 Mechanism of bromination reaction of Chloroacetanilide

I. Bromination of *2*- Chloroacetanilide by molecular bromine

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REPRODUCTIVE CYCLES IN TWO GEOGRAPHICALLY SEPARATED POPULATIONS OF THE OYSTER *Saccostrea cucullata* FROM SINDHUDURG DISTRICT, MAHARASHTRA STATE, INDIA

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Abstract:

Two geographically separated localities at Deogad (160 23' N ; 730 23' E) and Achra (160 15' N; 780 26' E) in Sindhudurg district of Maharashtra State ,India were selected on the basis of the differences in habitat , topography ,vegetation and local market value to study the reproductive cycles of the oyster Saccostrea cucullata. The maximum sizes attained by S. cucullata in the estuaries at Deogad and Achra were 44-45 mm shell length. However, comparatively larger sized oysters are found round the year in the estuary at Deogad than at Achra.

The environmental parameters such as tidal heights, pH, temperature, dissolved oxygen and salinity existing on the oyster beds in Deogad and Achra were recorded on every new-moon and full-moon days for a period of twelve months.

The microscopic details of the gonad tissue processed on every new moon (NM) and full moon (FM) days of each month revealed following stages ; (i) Gametogenesis ; (ii) Maturing ; (iii) Mature; (iv) Partial spawning ; (v) Complete spawning ; (vi) Recovery ;(vii) Neutral . The gonads of twenty oysters were staged for males and females separately on each NM and FM days and percentage of the males and females in these different stages were calculated.

The study on reproductive cycle in male oysters of S. cucullata from Deogad showed that many oysters were in gametogenesis stage in entire June and once again on November NM. Maturing stage was seen on March NM, May FM, July NM and again on November FM and in entire December. Many oysters were in mature stage on March FM, April FM and July FM and again on January NM. Most of oysters were under spent stage on March FM, in entire August and September, and on January FM. Many oysters were under recovery stage on May NM and in entire October. Most of the samples collected in entire February and on April NM showed prominent neutral stage. The female oysters showed that the gametogenesis was dominant on March NM, in entire June and on November NM; maximum on NM of March and on November. The maturing stage was dominant in entire April and May and on July NM and December NM. Oysters under spent condition were dominant on April NM and December FM, and all the gametes were released in entire August, September and on October NM. The recovery stage was recorded in many oysters on October FM and January FM, while the neutral stage was recorded in entire February.

The male oysters from Achra showed gametogenesis stage on March NM, April FM and June NM. The maturing stage was seen in most oysters on April FM, June FM, July NM, September NM and FM. The mature stage was very conspicuous on July FM and November NM. Most oysters were in the spent stage on May FM , August NM ,October NM and December FM. Oysters under recovery stage were in high percentage on December NM , January NM and February FM. The neutral condition was most prominent in many oysters on March NM and January FM. The female oysters at Achra showed that many oysters under the gametogenesis appeared on April NM, June NM and December FM. The maturing condition in oysters was dominant on April FM, June FM, August FM, entire September and on February NM. Many oysters in mature stage occurred on October NM and November NM. The spent stage in oysters was dominant on December NM, In entire May and on July FM. The recovery stage was recorded in December NM, while the neutral stage in oysters was dominant on January FM and March NM. These different stages of the gonads have been correlated with the changes in environmental conditions over the oyster beds from the two localities. The results are discussed in the light of possible impact of the environment on reproductive events.

Keywords: S. cucullata, Deogad, Achra, FM, NM, gametogenesis.

Introduction:

Along the west coast of India the backwaters and estuaries are very extensive and play an important role for food production. These are widely scattered and have an area of 30.7 lakhs acres (Mitra, 1970) from which Maharashtra coast constitutes 3.0 lakhs acres

अठारहवीं सदी के महाराष्ट्र में भू-राजस्व व्यवस्था

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शोध सारांश:-

मध्यकालीन अर्थव्यवस्था में कृषि का अत्यधिक महत्व था। कृषि पर कर सरकारी राजस्व का सबसे बड़ा स्रोत थे। भारत में कृषि का महत्व प्रागैतिहासिक काल से ही रहा है। इसलिए प्राचीन और पूर्व मध्यकालीन ग्रंथों में कृषि से संबंधित कई संदर्भ मिलते हैं। कृषि आय के महत्व के कारण, सरकार ने खेती के तहत अधिक भूमि लाने का प्रयास किया है। भूमि की नियमित जुताई को प्रोत्साहित किया गया। भू-राजस्व एकत्र करते समय भूमि और फसल निरीक्षण बहुत महत्वपूर्ण था। पहले जमीन का सर्वे किया गया और फसल तैयार होने के बाद फसल का निरीक्षण कर कर का निर्धारण किया गया। मध्यकालीन शासकों निजामशाही के वजीर मलिक अंबर और छत्रपति शिवाजी महाराज ने एक बहुत अच्छी कृषि प्रणाली की स्थापना की जो बाद के समय में टिकाऊ बनी रही। अठारहवीं शताब्दी में, सरकार ने कृषि आय बढ़ाने के लिए सिंचाई सुविधाओं का निर्माण किया और बंजर भूमि रखने वाले किसानों पर एक बंजर भूमि कर लगाया।

किवर्ड : कुटीर उद्योग, बटाई, बिधावनी, चकबंदी, सारा, कास, टके / टका, रुका, पडीचा पैका.

मध्यकालीन शासनकी अर्थव्यवस्था में भू-राजस्व सबसे आय देनेवाला कर था। अधिकांश लोग खेती में लगे हुए थे। इसलिए, कृषि की प्रकृति, राजस्व संग्रह, कृषि से संबंधित अन्य महत्वपूर्ण विकासों का अध्ययन करना आवश्यक है। इस उद्देश्य के लिए वर्तमान मामले में विषय वस्तु तैयार की गई है। विषयवस्तु समझने के लिये में मुख्य रूप से अठारवीं सदी के प्रांत पुणे और तरफ पाटस प्रदेशोंसे से उदाहरण शामिल हैं।

कृषि की खोज मानव विकास प्रक्रिया के इतिहास में एक मील का पत्थर थी। प्रागैतिहासिक काल से ही भारत में मानव संस्कृति के विकास में कृषि महत्वपूर्ण रही है। हड़प्पा संस्कृति में, बैलों द्वारा खींचे गए लकड़ी के हल से जुताई की जाती थी और गेहूं, जौ और कपास की सूखी खेती की जाती थी।[1] ऋग्वेद में मुख्यतः ४५०० से २५०० ईसा पूर्व के वैदिक काल के कृषि और कृषि जीवन की जानकारी मिलती है। आर्य अपनी आजीविका के लिए कृषि पर निर्भर थे। आज की कृषि प्रगति के बीज वैदिक कृषि में दिखाई देते हैं। आर्य भूमि की पूर्व जुताई कर रहे थे, बीज बो रहे थे और खरपतवार नियंत्रण के लिए फसल की अंतर-फसल काट रहे थे।

मिट्टी की बनावट और जलवायु के अनुसार फसलों का चयन किया गया। वेद ग्रंथोमें हल, हल का फाल, कुदाल, चाबुक, सूप, दरांती आदि जैसे कृषि उपकरणों का उल्लेख है, जबकि अथर्ववेद में हल बनाने का वर्णन है।[2] प्राचीन काल में किसानों के पास निजी जमीन के साथ-साथ सरकारी जमीन भी थी और रबी के मौसम में फसलों का उल्लेख है ... बुवाई से पहले बीजों को संसाधित किया जाता था और फसलों की सिंचाई की सुविधा होती थी ... किसानों को वार्षिक कृषि उपज का भुगतान करना पड़ता था। अकाल के समय उन्हें सहायता मिलती थी... प्राकृतिक आपदाओं जैसे फसल की क्षति और सूखे से होने वाली बीमारियों, शत्रु सेना और जंगली जानवरों के कारण किसानों को माफ कर दिया जाता था।[3]

संत ज्ञानेश्वर द्वारा लिखित ज्ञानेश्वरी में ज्वार, धान, गेहूँ, हरा चना, चना, तिल, सरसों, सूरजमुखी, गन्ना, कपास, नागवेल, लहसुन, प्याज, मिट्टी, लौंग, अदरक, हींग, तेज पत्ता; कद्दू और पड़वल सब्जियां; केला, कपूर केला,

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Length-Weight Relationships of *Xenentodon cancila* (Hamilton, 1822) and *Hyporhamphus limbatus* (Valenciennes, 1847) from Bhima River of Maharashtra, India

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Abstract

Two fish species, *Xenentodon cancila* (Hamilton, 1822) and *Hyporhamphus limbatus* (Valenciennes, 1847) sampled from the Bhima river of Maharashtra state of India were investigated for studying the length-weight relationships. Total 124 specimens were collected on a monthly basis from September 2019 to November 2019 for analysis of their length–weight relationships (LWRs). The intercept (a value) for *X. cancila* and *H. limbatus* was found to be 0.0043 and 0.0013 whereas the slope (b value) for both species was 2.9538 and 3.2755 respectively. The LWRs analysis of both the species revealed that *X. cancila* has b value is less than 3 indicating negative allometry and *H. limbatus* has b value more than 3 indicating positive allometry and these values in expected range (2.5 to 3.5). The R^2 value in the present study was found to be greater than 0.9 for both the species, which indicates the proper fitness of the model for growth and good health status.

Keywords: *Xenentodon cancila*, *Hyporhamphus limbatus*, Length weight relationship, Bhima river, Conservation

1. Introduction

The Western Ghats of India is rich in ichthyofauna and most of the species are endemic (Shaji *et al.*, 2000; Dahanukar *et al.*, 2004). There are about 1030 Indian freshwater fish species (Froese and Pauly, 2019) has been reported so far from Indian waters of which 216 in the state of Maharashtra (Karmakar *et al.*, 2012). Bhima river, the tributary of river Krishna is one of the important river of Maharashtra. The Ujani dam is situated on the Bhima river is constructed as a irrigation project which has shallow expense of water and largest freshwater fishing co-operative in Maharashtra (Yazdani and Singh, 2002; Karmakar *et al.*, 2012; Joshi and Shahapure, 2020). The ichthyo-faunal diversity of the Bhima river consists of 60 fish species belonging to 6 orders, 15 families and 36 genera (Sarwade and Khillare, 2009). Among them, the species *Labeo rohita*, *Catla catla*, *Cirrhinus mrigala*, *Cyprinus carpio*, *Oreochromis mossambica* are found to be common in fisher's catch. The freshwater garfish, *Xenentodon cancila* (Hamilton, 1822) and Congaturi halfbeak, *Hyporhamphus limbatus* (Valenciennes, 1847) are the two important fish species sometimes considered as trash fish in certain areas. The species *Xenentodon cancila* (Beloniformes: Belonidae) is a fresh to brackish water species also found in marine-waters (Froese and Pauly, 2019). It is native to Asian countries and commonly known as Kokila in India (Hossain *et al.*, 2013). *Hyporhamphus limbatus* (Beloniformes: Hemirhamphidae) is a coastal surface dwelling species, found in the tidal freshwaters and brackish estuaries. Length weight relationship (LWR) is an important parameter in fish biology commonly used to convert length data from the field studies into weight data because fish weight measurement is time-consuming and difficult often in the field (Pauly, 1993; Goncalves *et al.*, 1996; Panda *et al.*, 2016; Karna *et al.*, 2017a; Sahoo *et al.*, 2020). Further, LWRs and conditional factors are important indices for the aquaculture studies and establishment of a relationship between length and weight, which is essential for calculating the production of biomass in fish population (Safran, 1992; Petrakis and Stergious, 1995). In view of the importance of length and weight parameters and lack of fisheries study from the Bhima river, we attempted to report LWR for two fish species (*X. cancila* and *H. limbatus*) which has never been attempted earlier from this ecosystem.

2. Materials and Methods

In total 124 specimens (59 for *X. canxila* and 65 for *H. limbatus*) were collected from September 2019 to November 2019 from local fish market of Bhigwan, Pune, Maharashtra (18.29^{0}N, 74.76^{0}E) which receives the fish supply from nearby Bhima river. After collection, specimens were preserved in 10% formalin solution and brought to the research laboratory for identification and measurements. Fishes were identified based on Jayaram (1981) and Fricke *et al.* (2018). Measurements of total length (TL) were done by using digital calliper (Mitutoyo, Japan) to the nearest 0.1cm and body weight (W) were measured using weighing machine closest 0.01 gm (CONTECH – CB Series).

Length weight relationships was estimated by the common formula: $W = aL^b$ (Froese 2006), where, 'L' is the total length (cm), 'W' is the body weight (g), 'a' is the intercept and 'b' is the slope of the log-transformed linear regression, r^2 is the coefficient of determination to estimate the goodness of fit. Some outliers from the length-weight plots were identified and removed.

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PTERYGOPLICHTHYS PARDALIS (CASTELNAU, 1855) (SILURIFORMES: LORICARIIDAE) FROM UJANI RESERVOIR, MAHARASHTRA, INDIA

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Key words : *Pterygoplichthys pardalis,* Ujani reservoir, Maharashtra

Total 60 fish species have been reported from Ujani reservoir (Sarwade and Khillare, 2010), however, *Pterygoplichthys pardalis* was not included among them. Present communication describes its occurrence for the first time at this location.

The specimens of *Pterygoplichthys pardalis* were collected in the month of July 2018 and identified following Armbruster and Page, (2006).

The body weight and length of the specimens ranged from 85.8 to 185.35 g and 23.5 to 28.4 cm respectively. The specimens had fork length 20.2-25.8 cm, standard length 16.4-20.8 cm and head length 4.21-5.3 cm. Body depth ranged from 3.3 to 4.3 cm while eye diameter from 0.79 to 0.86 cm.(Table 1).

Dorsal fin had one spine and 12 branched rays while pectoral fin had one spine with 6 rays. Anal fin had 4 rays and pelvis fin had one spine with 5 rays (Table 2) the species was ventrally flattened. Their lateral and dorsal surfaces were covered with rough bony plates (Figure 1.A and B).

The fish had thick, fleshy lips from a sucking disc for attaching to rocks and grazing on algae (Figure 1.C) and flat bottom body shape with a spine in front of the adipose fin. Fish samples had a base with light gray colour becoming lighter towards the ventral side.

Pterygoplichthys species possess numerous characteristics that enable them to become invasive populations in their non-native range. The species from *Pterygoplichthys* genus are known to be capable to grow rapidly. Particularly, the species *Pterygoplichthys pardalis* is known for its prolific spawning activity. Hence, it becomes abundant within a short period (Devick, 1989).

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Assessment of Heavy Metal Concentration in Ujjani Reservoir Water and Sediment, Maharashtra, India

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Keywords: Heavy Metals, Sediment, Acid Digestion, Ujjani Reservoir, Ecological Restoration

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Trace Metal Accumulation in Water, Soil and Crop Plants along the Basin of Ujjani Reservoir, India

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Abstract The excessive application of fertilizers and of polluted irrigation water increases the trace metal level in an agricultural ecosystem. This study aimed to assess the concentrations of trace metals (Fe, Cu, Mn, and Zn) in irrigation water, field soil and crop plants. The contents of metals were analyzed by Atomic Absorption Spectroscopy. The range and hierarchy of trace metals concentration (µg/ml) in irrigation water are as follows, Fe (2.16 - 1. 53) > Zn (0.30 - 0.17) > Cu (0.18 - 0.11) > Mn (0.11-0.09). The concentration (µg/g) range in field soil showed in an order as Fe (9000- 6961.5) > Mn (984.6-408.9) > Cu (698.5-26.3) > Zn (145.3- 22.9). Moreover, crop plant parts showed maximum concentration (µg/g.dry weight) range for metal Fe (516.3 - 126.7) followed by Mn (169.7-0.4), Zn (78.8- 50) and least for metal Cu (70.5- 4.1). It was noticed that the Fe concentration in irrigation water is higher than the water quality standards proposed by the Food and Agriculture Organization. Furthermore, the field soil exhibited more Cu, and crops have accumulated excess Fe and Cu than the Indian and European Union guidelines. Further, we reported that among the all plant part, leaves are more prone to accumulate trace metals. The value of the transfer factor indicates that plant has low bioaccumulation potential for studied trace metals. Whereas the accumulation index shows that there is a significant Cu contamination in the field soil. So we suggest that farmers should avoid the application of copper-rich fertilizers.

Keywords Trace Metals, Irrigation Water, Bioaccumulation, Ujjani Reservoir, Atomic Absorption Spectroscopy

1. Introduction

The environmental pollution with trace metals has become a worldwide problem during recent years. Among the environmental pollutants, trace metals are of particular concern, because of their bioaccumulation potential in ecosystems [1,2]. Trace metal pollution in aquatic ecosystems is usually studied by measuring their concentrations in water, sediments and biota. It was noticed that their concentrations generally exist low levels in water and attain substantial concentration in sediments as well as biota. Trace metals such as Fe, Cu, Ni, and Cr are essential metals since they play a central role in biological systems, whereas Pb and Cd considered as non-essential metals, they are toxic, yet in trace amounts. These essential metals can also create toxic effects when the metal ingestion is excessively high [3-5].

Agricultural soil and crops contaminated by trace metals becoming serious environmental problem. Their non-biodegradable nature and long biological half-life leads to their potential accumulation in different plants and animals' body parts. Trace metals such as Zn, Pb, Cd and Cu are generally found as contaminants in vegetables grown using polluted water. These trace metals enter into plants, animals, and humans through air and water. Trace

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Bioaccumulation of Heavy Metal by Aquatic Macrophytes Around Ujjani Reservoir, India

Dnyaneshwar Shinde, D. M. Mahajan, Sanjay Chakane

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ABSTRACT

This study aimed to analyze the level of heavy metals in water and organs (stem, leaves and roots) of three aquatic macrophytes from the Ujjani reservoir. Among the studied metals (Fe, Cu, Zn and Mn) the concentration (µg/ml) of Fe (2.23) and Mn (1.52) in water were detected more than Canadian water quality guidelines. The roots of studied aquatic macrophytes plants accumulate maximum level of heavy metals than stem and leaves. The heavy metals contents (µg/g dry weight) in roots of plant species *Pistia stratiotes* L. FF were observed in the following order ; Mn (11292.7) > Fe (2637) > Zn (285.6) > Cu (92.4). Whereas order of metal contents in the roots of *Ottelia alismoides* Pers. RL observed as follows ; Fe (1340.3) > Mn (609.11) > Zn (35.8) > Cu (24.23). Moreover roots of *Eichhornia crassipes* Solms. FF accumulate maximum content of Mn (4890) followed by Fe (1731.1), Zn (48.2) and Cu (42.6). The bio-concentration factor showed that the organs of *Pistia stratiotes* L. FF and *Eichhornia crassipes* Solms. FF has more capacity to accumulate Mn. However organs of *Ottelia alismoides* Pers. RL accumulate maximum Fe. It was noticed that studied macrophyte has greater potential of bioaccumulation for metal Fe and Mn, hence can be used for their phytoremediation from contaminated water bodies.

Keywords Macrophytes, Heavy metals, Bioaccumulation.

INTRODUCTION

The Macrophytes are aquatic plants and categorized such as emergent, submerged and floating. Aquatic macrophytes live in a completely different environment even they are taxonomically closely related to terrestrial plants. They are beneficial to the aquatic ecosystem as a reason they supply food and settler for fish and aquatic invertebrates. Aquatic plants grow more vigorously where nutrient loading is high. They are consistent biological filters and play a vital role in heavy metals accumulation in aquatic ecosystem (Devlin 1967, Chung and Jeng 1974). Their uniqueness to accumulate metals make them remarkable research objects for testing and modeling ecological theories such as evolution and plant succession, nutrient and metal cycling Föstner and Whittman (1979).Large aquatic plants accumulate heavy metals in their tissues mainly through the root and leaves, which after decomposition responsible for

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'System of Income and Expenditure in 18th Century Maratha Reign'

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Introduction-

Maratha state and its economy was established by Chhatrapati Shivaji. His grandson got his legacy as a dynasty but he had never got any administrative setup or any documentation and treasury. All these things were developed through Peishwa. 18th century Maratha economy was state economy was developed on substructure of 17th century Maratha Swaraj. It is having a concrete administrative structure. The administration had never getting back effect of political or military jerk. It could work very smoothly in these types of up and downs.

Aims and objectives:-

1. To understand the System of income and expenditure through Modi Script documents on state finance.
2. To study the sources of income and nature of expenditure in the reign.
3. To understand the silent features of the income and expenditure
4. Similarities and differences in income and expenditure of village to central govt.
5. Nature of income and expenditure of village, town, Prant (sub-district), fort, custom duty or octroi and central govt's Income-expenditure.
6. To search uniformity income and expenditure at village to central Government level.

Concepts-

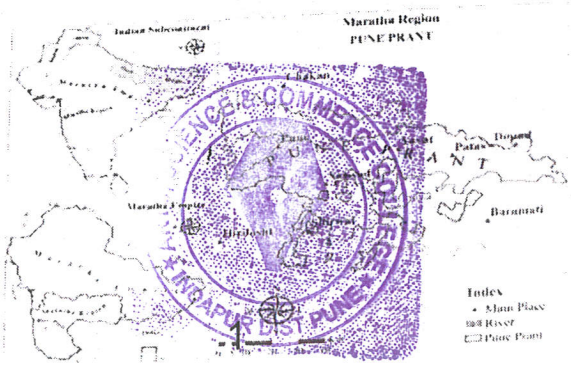
1. *Sal-gudasta* (सालगुदस्ता)- means Revenue collection in or during the past year.
2. *Sal-majakur* सालमजकूर- Means the afore – mentioned year or the present or passing year.[1]
3. *Ek-berji* (एकबेरजी)- The first entering upon the books of sums disbursed or received. It is actually a single entry.

There is also a *Ekaberjii Daftar* (एकबेरजी दफ्तर) means an office for arrangements, registry, and deposit of all accounts from the other departments; and from them where framed abstracts of the total receipt, expenditures, and balances of government on all accounts for the year.[2]

4. *Du-berji* (दुबेरजी) means twice brought to a account; regularly entered; i.e. a sum is first set down under the name of him from whom it is received, or to whom it is advanced for expenditure; and afterwards accounted for under the articles purchased, payments & c. made. It also applied to money received for another, entered on the deposit side, and remitted; entered afterwards upon the expenditure side upon intelligence of its having been received and credited.[3]
5. *Varata* (वरात) – It's an assignment or order upon revenue or a treasury[4]. It's a promissory note issued by government for their departments or its stakeholders, to provide money, indirectly through their departments.

Administrative procedure in respect to finance-

Higher authorities like *Kamaavisadaar* (कमाविसदार) or *Mamalatadaar* were appointed by central government. Reliance, financial credit and relations with *Peshwa*, these are the basic eligibility to became a *Kamaavisadar*. After appointment or continuation on post of higher officers (like *Kamaavisadar*) they started to work with the help of previous years accounts. Few months later the central government had to send a copy of estimated income and expenditure sheet or budget, it is known as '*aajamaas*' (अजमास). There was a separate budget or '*Aajamas*' for every *Prant*, which noted down gross demand, deductions, and gross balance and temporary additions etc[5]. It's mandatory to run the account through '*Aajamas*' After completion of the financial year and closing the accounts, *kamavisadar* had to submit the account, known as *taleband* (ताळेबंद). Similarly Balance Sheet / *taleband*, *hishob* (हिशोब), *tarjuma* (तर्जुमा), Details of receipts and expenditure or *jhadati* (झडती) these are documents were prepared. Audit was also performed by higher authorities.



Status of Covid -19 Pandemic In Indapur Tehsil

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Abstract

The corona virus is showing its strength and spreading exponentially in all the corners of India. In Maharashtra Pune is highly infected district Therefore, this paper aims to study the infection level and current scenario of fatality cases in Indapur tehsil. All the supported data is collected from Sub-District Hospital (SDH), Indapur. Fatality rate defined as per the number of currently active cases per 100 positive cases of covid-19. This paper deals with the village wise current situations of current cases, recovered cases, deceased cases .There are reported 4667 confirmed cases up to the month of December 2020. These infected cases are found in 138 villages and tehsil headquarter. Out of them 2.95% deaths occurred in the study area. A wide variation was observed across the tehsil .There was no single fatality case found in 0 to 14 age group people in the study period. Only four villages has not infected by COVID-19. As compare to the rural area the infection level of corona virus is high in urban area.The infected cases are increasing on one side and on another side the numbers of recovered cases are also increasing in the study area.

Key words: *COVID19, infection, mortality, pandemic,*

Introduction

Society is an asset of the every nation. Due to the corona virus almost every nation of the world are suffering from pandemic situation. The corona virus (COVID-19) is spreading rapidly, and scientists are endeavoring to discover drugs for its efficacious treatment in the world (Gao et al., 2020). Older people, suffering from medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer, are more likely to develop severe illness (Remuzzi & Remuzzi, 2020; Singhal, 2020). Maharashtra has more than 1984768 confirmed cumulative infected cases (31 December 2020). The impact of preventive measures on daily infected-rate is discussed for each village of Indapur tehsil dist. Pune.

Objectives

1. To identify the infection level in the study area.
2. To study the mortality status in the study area.
3. To make favorable suggestions for COVID-19 control.

Database and methodology

. For the present research work secondary data source are used. All the supported data is collected from Indapur TehsilHealth Office, Indapur, Dist. Pune, Maharashtra.This office provides the most updated information on the daily and total confirmed cases, active cases, recovered and deaths from each village of the study area. Data considered for analysis up to 31 December 2020. Fatality rate defined as per the number of currently active cases per 100 positive cases of covid-19.

Month wise COVID-19 infection in the study area

In the study area, the disease was first detected on 27th April 2020 in Bhigwan station a women who returned from Pune. The gradual incidence of COVID-19 cases has increased in June and July and in the month of August and September these cases has increased rapidly. Mostly the daily infection-rate (DIR) is higher in urban area than the rural. In the high population-density area has found high COVID-19 infected cases i.e. Indapur city and western side villages. Indapur Tehsil Health Office reported total 4667 new confirmed cases up to month of December 2020 (**Table 1**). In this period in urban area 673 and in the rural area 3994 cases found. There are also reports of near capacity utilization of ICU and Ward beds, in the Sub-District hospital in the study area. **Table 1:-** Month wise COVID-19 positive patients in Indapur tehsil.

Sr. No.	Month	March	April	May	June	July	Aug.	Sept.	Octo.	Nove.	Dece.	Total	Perc.
1	Urban	0	0	0	14	45	166	230	68	71	79	673	14.42
2	Rural	0	1	4	10	111	466	1562	738	673	429	3994	85.58
3	Total	0	1	4	24	156	632	1792	806	744	508	4667	100

Source: Indapur Tehsil Health Office, Indapur.

Above Table and figure shows the month wise infection of corona virus. After the first five cases during 27th April to 20th May 2020, there were no more confirmed COVID-19 cases was not found for the next two months. The COVID-19 cases appeared again from 3rd June 2020 onwards. These cases are

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Synthesis of 3D nanoflower-like mesoporous $NiCo_2O_4$ N-doped CNTs nanocomposite for solid-state hybrid supercapacitor; efficient material for the positive electrode

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ABSTRACT

In this research work, we report a novel method for developing ternary $NiCo_2O_4$ compounds using deep eutectic solvents (DESs) and a strategy for improving their pseudocapacitive performance. $NiCo_2O_4$ composites with N-doped carbon nanotubes (NCNTs) were fabricated on Ni foam using a hydrothermal method. The electrochemical performance of the $NiCo_2O_4$ was altered with the change in the reaction temperature. The composite of $NiCo_2O_4$ and NCNTs demonstrated a maximum value of specific capacity of 303 mAh g^{-1} at a scan rate of 5 mV s^{-1}. The specific capacity for the composite compound was 1.3-fold greater than that of the pristine $NiCo_2O_4$ sample. For practical applications, we constructed a flexible solid-state hybrid supercapacitor comprised of $NiCo_2O_4$/NCNTs//activated carbon (AC) cells with an excellent energy density of 12.31 Wh kg^{-1}, outstanding power density of 8.96 kW kg^{-1}, and tremendous electrode stability. The three-dimensional mesoporous nanoflowers and nanotubes-like nanostructures of $NiCo_2O_4$ are well-suited for use in hybrid devices as well as convenient for flexible electronic devices.

1. Introduction

Supercapacitors are actively being investigated by researchers for extended commercial use due to the increasing demand for energy storage devices in smart-grid digital electronic gadgets [1]. However, supercapacitors are currently limited by their low energy density compared to Li-ion batteries. Therefore, improving the energy density is the fundamental goal of current supercapacitor research. To this end, many attempts have been made to develop highly efficient super-capacitive materials such as metal oxides, chalcogenides, polymers, polyoxometalates, metal-organic frameworks, Mxene, and siloxene [2, 3]. The combination of two different metals to form bimetallic oxides is also an efficient approach to enhance the electrochemical performance of supercapacitors compared to bare metal oxides [1,4].

Recently, various binary and ternary metal oxides have been synthesized for supercapacitor applications including $MnCo_2O_4$, $FeCo_2O_4$, $CoFe_2O_4$, $ZnFe_2O_4$, and $ZnCo_2O_4$, $NiCo_2S_4$, $NiCo_2Se_4$, etc. Among them, the $NiCo_2O_4$ is widely used as a supercapacitor electrode because of its various properties like good electrical conductivity, excellent redox activity, long-term stability, environmental nontoxic, easily available on the earth, and simple preparation [5]. Interestingly, $NiCo_2O_4$ has been utilized for various applications in several research fields such as supercapacitors, Li-ion batteries, water splitting, solar cells, oxygen reduction, hydrogen evolution, and electrocatalysts [1,3]. Recently, many researchers focus on the ternary $NiCo_2O_4$ nano-compounds with various nanostructures for supercapacitor applications. Because, it offers good electrical conductivity and better electrochemical performance, faster redox reaction, multivalence states of Ni^{3+}/Ni^{2+} and Co^{3+}/Co^{2+}, good cycling stability as compared to the binary NiO and Co_3O_4 [3].

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Review—Mitigating Supercapacitor Self-Discharge Through Strategic Materials Modification

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A high-power density, rapid charge-discharge and long cycle life are important features of supercapacitors (SCs). However, SCs are mainly suffered from their high self-discharge (SD) which is a spontaneous decay of voltage with time under open-circuit conditions. Due to SD behavior, SCs cannot be employed or coupled with many important energy harvesting devices including piezoelectric and triboelectric nanogenerators. It is highly desired to develop different innovative strategies to mitigate the SD. This review aims at discussing a SD mechanism and reviewing different mitigation strategies based on the modification of materials and devices. We discuss design, underlying principle, mechanism of the mitigation strategies and corresponding SD performance in detail. Moreover, the summary and prospects in this field have been provided. It is recommended to test an individual electrode for SD, identify the mechanism and develop different strategies for suppression. This review will be beneficial for researchers around the world to have a better understanding of the SD mechanism and to develop innovative strategies for SD mitigation and thereby the high-performance SCs.
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As a high-performance energy storage device, supercapacitor (SC) has gained major interest owing to its rapid charging-discharging ability, high power density and long cycle life.[1–5] Based on electrode material used, SCs are classified into electric double-layer capacitors (EDLC) and pseudocapacitors.[6–9] The EDLC stores charge via physical adsorption/desorption of electrolytic ions on the electrode surface, whereas, pseudocapacitor stores charge via fast redox reaction at/near the surface of the electrode.[10–12] SCs are normally characterized by their energy density, power density and cycle life, however, one of the important parameters, such as self-discharge (SD) is often ignored by the research community.[13,14] The SD is nothing but the spontaneous voltage decay of charged SC with time in the absence of an external load. Since the energy and power densities are voltage-dependent parameters, the loss of a significant amount of energy due to SD has raised a question on the energy storage efficiency of SCs. The SD rate in SCs is greater than the batteries, in conventional SCs, the voltage reduces about 40% after 12 h.[15] This is a serious decrement since SCs are mainly utilized in the first half of their operating potential window. Owing to this limiting character, SCs cannot be employed or coupled with many important energy harvesting devices including piezoelectric and triboelectric nanogenerators.[16] Previously, different models have been developed to study and predict the SD mechanism.[17–20] The SD originates due to the higher thermodynamic state of the charged SCs from which it finds ways to naturally relax and return to the lower energy state (uncharged). In general, the main contributions to the SD are ohmic leakage, parasitic faradaic reaction and charge redistribution.[21–23] It is imperative to identify the main SD mechanism involved in a particular electrode or device and develop different strategies to mitigate it. Previously, different strategies have been developed and effectively employed on the materials and device level. However, in literature, most of the SD profiles are obtained for full cells rather than for individual electrodes. Besides, the data has been poorly analyzed and presented. Therefore, it is the need of the hour to discuss different SD mechanisms, find efficient methodologies for identifying the mechanism and recognize effective strategies from the literature. There are very few review articles focusing on SD, for instance, Ike et al.[13] emphasized understanding the SD mechanism and its suppression in electrochemical SCs and hybrid SCs. In another perceptive review, Andreas[24] touched upon some important aspects such as the theoretical background, identification of SD mechanism and future directions. Recently, the work of Liu et al.[25] have sufficiently reviewed the SD mechanism and different strategies of suppression, however, recent important developments and comprehensive description of strategies are missing.

Herein, we updated an SD mechanism by referring to recently published important contributions. Furthermore, different strategies have been reviewed and classified based on their employment made not only on materials but also on device level to mitigate the SD. We discussed mitigation strategies, their design, underlying principle, mechanism and corresponding SD performance in detail. Moreover, the summary and prospects in this field have been provided.

Self-Discharge Mechanism

The SD of a conventional capacitor is governed by the equation $V = V_{initial}\, e^{\frac{-t}{RC}}$ where V, $V_{initial}$, R and C are potential difference, initial voltage, ohmic resistance and capacitance, respectively. In this case, the SD process is completed within microseconds that leads to negligible retention of energy. The RC is the time constant which is the intrinsic property of the capacitor that decides the value of SD.[26] However, in SCs, the SD mechanism involves mainly three processes, (1) ohmic leakage between the electrodes of a full cell, (2) parasitic faradaic reactions on the electrode surface and (3) the charge redistribution.

Self-discharge due to ohmic leakage.—The ohmic leakage between the electrodes is the least discussed mechanism because it is originated due to the faulty construction of the cell (Fig. 1a). This can be avoided by eliminating the resistive pathways which connect the positive and negative electrodes. This can be easily identified by modeling the SD profile using the equation, $\log\left(\frac{V_t}{V_i}\right) = \frac{-t}{RC}$. As shown in Fig. 1d, if the plot of $\log\left(\frac{V_t}{V_i}\right)$ versus the time (t) is a straight line, the main contribution to SD will be due to the ohmic leakage.

Self-discharge due to parasitic faradaic reactions.—In this type, SD takes place due to the oxidation and reduction reactions on the charged electrode surface that lead to the discharge of the electrode and the overall cell (Fig. 1b). This can be easily understood by the following reactions at positive and negative carbon electrode surfaces (C) in sulfuric acid.[24]

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Impact of Annealing Temperature on the Morphological, Optical and Photoelectrochemical Properties of Cauliflower-like $CdSe_{0.6}Te_{0.4}$ Photoelectrodes; Enhanced Solar Cell Performance

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Abstract: We are reporting on the impact of air annealing temperatures on the physicochemical properties of electrochemically synthesized cadmium selenium telluride ($CdSe_{0.6}Te_{0.4}$) samples for their application in a photoelectrochemical (PEC) solar cell. The $CdSe_{0.6}Te_{0.4}$ samples were characterized with several sophisticated techniques to understand their characteristic properties. The XRD results presented the pure phase formation of the ternary $CdSe_{0.6}Te_{0.4}$ nanocompound with a hexagonal crystal structure, indicating that the annealing temperature influences the XRD peak intensity. The XPS study confirmed the existence of Cd, Se, and Te elements, indicating the formation of ternary $CdSe_{0.6}Te_{0.4}$ compounds. The FE-SEM results showed that the morphological engineering of the $CdSe_{0.6}Te_{0.4}$ samples can be achieved simply by changing the annealing temperatures from 300 to 400 °C with intervals of 50 °C. The efficiencies (η) of the $CdSe_{0.6}Te_{0.4}$ photoelectrodes were found to be 2.0% for the non-annealed and 3.1, 3.6, and 2.5% for the annealed at 300, 350, and 400 °C, respectively. Most interestingly, the PEC cell analysis indicated that the annealing temperatures played an important role in boosting the performance of the photoelectrochemical properties of the solar cells.

Keywords: electrodeposition; $CdSe_{0.6}Te_{0.4}$; thin films; XRD; EDS; DSSC; solar cell

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1. Introduction

With the rapid increase in the world's population and environmental pollution, there is limited availability of energy sources. A worldwide demand therefore exists for new energy sources that are clean, cost-effective, and simple and that do not cause environmental pollution [1,2]. Various energy storage devices available on the electronic markets include fuel cells [3], solar cells [4,5], H_2 evolution systems [6,7], light-emitting diodes (LED) [8], capacitors [9], supercapacitors [10,11], and batteries [12]. Among these, the photoelectrochemical (PEC) cell is the best electronic device because of the easy and whole-day availability of sunlight on Earth, whereas the convenience of the other sources of materials is geographically limited. To improve the electrical properties of its solar cells, the PEC has two main principal requirements, which are related to the band gap energy and the stability of the photoelectrodes. First, the photoelectrode should provide the band gap of materials whose band gap energy is nearly matched to the extreme sunlight intensity in the visible spectrum to use the solar spectrum resourcefully (1–3 eV). Second, the semiconductor photoelectrode materials need to be stable with respect to the 1 M polysulfide ($NaOH:Na_2S:S$) liquid electrolytes during the PEC measurements.

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Review

COVID-19 Pandemic: Public Health Risk Assessment and Risk Mitigation Strategies

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Abstract: A newly emerged respiratory viral disease called severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is also known as pandemic coronavirus disease (COVID-19). This pandemic has resulted an unprecedented global health crisis and devastating impact on several sectors of human lives and economies. Fortunately, the average case fatality ratio for SARS-CoV-2 is below 2%, much lower than that estimated for MERS (34%) and SARS (11%). However, COVID-19 has a much higher transmissibility rate, as evident from the constant increase in the count of infections worldwide. This article explores the reasons behind how COVID-19 was able to cause a global pandemic crisis. The current outbreak scenario and causes of rapid global spread are examined using recent developments in the literature, epidemiological features relevant to public health awareness, and critical perspective of risk assessment and mitigation strategies. Effective pandemic risk mitigation measures have been established and amended against COVID-19 diseases, but there is still much scope for upgrading execution and coordination among authorities in terms of organizational leadership's commitment and diverse range of safety measures, including administrative control measures, engineering control measures, and personal protective equipment (PPE). The significance of containment interventions against the COVID-19 pandemic is now well established; however, there is a need for its effective execution across the globe, and for the improvement of the performance of risk mitigation practices and suppression of future pandemic crises.

Keywords: pandemic crisis; SARS-CoV-2; coronavirus; risk assessment; risk mitigation; administrative controls; engineering controls

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1. Introduction

Coronaviruses were generally not considered highly infectious to humans before 2002; however, after the occurrence of the severe acute respiratory syndrome (i.e., SARS; 2002) [1,2], Middle East respiratory syndrome (i.e., MERS; 2015) [3,4] and COVID-19 pandemic attracted serious attention of the scientific community and public health authorities. SARS-CoV-2 is the ninth known coronavirus to cause infections in humans, causes severe respiratory illness, and breathing discomfort. Its symptoms are similar to those of pneumonia and seasonal Influenza virus, as well as some other coronaviruses [5,6]. Notably, the worldwide spread of this virus was observed within a few months of its first appearance in December 2019 at Wuhan, China [7]. The SARS-CoV-2 outbreak has created a prolonged global public health and economic crisis and created confusion over the need for travel bans and border closures, the closure of educational institutions and businesses, and the implementation of preventive measures [8].

chemosensors

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Article

Histidine Functionalized Gold Nanoparticles for Screening Aminoglycosides and Nanomolar Level Detection of Streptomycin in Water, Milk, and Whey

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Abstract: Aminoglycoside (AMG) antibiotics are being applied to treat infections caused by Gram-negative bacteria, mainly in livestock, and are prescribed only in severe cases because of their adverse impacts on human health and the environment. Monitoring antibiotic residues in dairy products relies on the accessibility of portable and efficient analytical techniques. Presently, high-throughput screening techniques have been proposed to detect several antimicrobial drugs having identical structural and functional features. The L-histidine functionalized gold nanoparticles (His@AuNPs) do not form a complex with other tested antibiotic classes but show high selectivity for AMG antibiotics. We used ligand-induced aggregation of His@AuNPs as a rapid and sensitive localized surface plasmon resonance (LSPR) assay for AMG antibiotics, producing longitudinal extinction shifts at 660 nm. Herein, we explore the practical application of His@AuNPs to detect streptomycin spiked in water, milk, and whey fraction of milk with nanomolar level sensitivity. The ability of the analytical method to recognize target analytes sensitively and rapidly is of great significance to perform monitoring, thus would certainly reassure widespread use of AMG antibiotics. The biosynthesis of hybrid organic–inorganic metal nanoparticles like His@AuNPs with desired size distribution, stability, and specific host–guest recognition proficiency, would further facilitate applications in various other fields.

Keywords: histidine; gold nanoparticles; aminoglycoside; antibiotics; colorimetric changes; spectral shift; real samples; milk samples; whey fraction

1. Introduction

Antibacterial drugs have been commonly applied as human and veterinary medicine to treat a wide range of infectious diseases [1–3]. Aminoglycosides (AMG) are broad-spectrum antibiotics, are commonly prescribed for humans and a range of livestock, mainly for infections caused by Gram-negative bacteria. Thus, there is an ever-growing concern of direct exposure of residual drugs [4] and adulteration of the food chains [4–6]. Besides this, AMG antibiotics induce adverse effects on human health include allergic reactions [7], cytotoxicity [8,9], nephrotoxicity [10], as well as negative impacts on the environment and risk of antibiotic resistance [11–13]. In this account, we target the development of an

polymers

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Review

MOFs-Graphene Composites Synthesis and Application for Electrochemical Supercapacitor: A Review

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Abstract: Today's world requires high-performance energy storage devices such as hybrid supercapacitors (HSc), which play an important role in the modern electronic market because supercapacitors (Sc) show better electrical properties for electronics devices. In the last few years, the scientific community has focused on the coupling of Sc and battery-type materials to improve energy and power density. Recently, various hybrid electrode materials have been reported in the literature; out of these, coordination polymers such as metal-organic frameworks (MOFs) are highly porous, stable, and widely explored for various applications. The poor conductivity of classical MOFs restricts their applications. The composite of MOFs with highly porous graphene (G), graphene oxide (GO), or reduced graphene oxide (rGO) nanomaterials is a promising strategy in the field of electrochemical applications. In this review, we have discussed the strategy, device structure, and function of the MOFs/G, MOFs/GO, and MOFs/rGO nanocomposites on Sc. The structural, morphological, and electrochemical performance of coordination polymers composites towards Sc application has been discussed. The reported results indicate the considerable improvement in the structural, surface morphological, and electrochemical performance of the Sc due to their positive synergistic effect. Finally, we focused on the recent development in preparation methods optimization, and the opportunities for MOFs/G based nanomaterials as electrode materials for energy storage applications have been discussed in detail.

Keywords: coordination polymers MOFs; graphene; supercapacitors; chemical method; nanomaterials; porous nanostructures

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1. Introduction

Restrictions in renewable energy resources and the rising air pollution have catalyzed the request for green and clean sustainable energy. To solve this problem, researchers from around the globe have been actively working on the development of a novel composite electrode material for the efficient environmental remediation, conversion, and storage of electrical energy in the form of electrochemical energy [1]. In the electric market, the main two systems are available batteries and supercapacitors (Scs). Among these electrochemical energy storage devices, batteries store charge via the oxidation/reduction of electrode-active materials and/or intercalation/de-intercalation of the ions into/out of the electrode

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Review

Significance of Immune Status of SARS-CoV-2 Infected Patients in Determining the Efficacy of Therapeutic Interventions

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Abstract: Coronavirus disease 2019 (COVID-19) is now being investigated for its distinctive patterns in the course of disease development which can be indicated with miscellaneous immune responses in infected individuals. Besides this series of investigations on the pathophysiology of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), significant fundamental immunological and physiological processes are indispensable to address clinical markers of COVID-19 disease and essential to identify or design effective therapeutics. Recent developments in the literature suggest that deficiency of type I interferon (IFN) in serum samples can be used to represent a severe progression of COVID-19 disease and can be used as the basis to develop combined immunotherapeutic strategies. Precise control over inflammatory response is a significant aspect of targeting viral infections. This account presents a brief review of the pathophysiological characteristics of the SARS-CoV-2 virus and the understanding of the immune status of infected patients. We further discuss the immune system's interaction with the SARS-CoV-2 virus and their subsequent involvement of dysfunctional immune responses during the progression of the disease. Finally, we highlight some of the implications of the different approaches applicable in developing promising therapeutic interventions that redirect immunoregulation and viral infection.

Keywords: coronavirus; SARS-CoV-2; immune response; therapeutic interventions; immunopathogenesis

1. Introduction

In consideration of public health emergency and global reach, on 11 March 2020, the World Health Organization (WHO) specified coronavirus disease 2019 (COVID-19) as a global pandemic outbreak of international public health concern [1]. A novel, highly transmissible enveloped RNA betacoronavirus unexpectedly emerged in December 2019 in Wuhan, China, and then was formally named as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2. The most common clinical symptoms and manifestations of SARS-CoV-2 infection are pneumonia-like, including fever, hypoxia, dyspnea (labored breathing), headache, myalgia, cough, and in some cases, intestinal symptoms [2,3]. COVID-19 is now characterized as a mild to severe respiratory disease, and its clinical presentation

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Effect of Customized Training Programme on Selected Physical Fitness Variables of College Female Students

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Abstract:

The primary purpose of the study was to find out the effect of Customized training on selected physical fitness variables among college female students. The study was hypothesized that there would be significant difference in improving muscular strength and muscular endurance due to the effect of training programmes among college female students. To achieve the purpose of this study convenient, available and interested (N=75) female students will be randomly selected from Girls Hostel of Arts, Science and Commerce College, Indapur affiliated to the Savitribai Phule Pune University of Pune, Maharashtra. Their age ranged from 18 to 22 years. Non-equivalent control group design with repeated measures was used for this study. They will be assigned into three equal groups with (N=25) female students by lottery technique. Two experimental groups, namely Functional exercise Training Group I and Yogic Exercise Training Group II and one act as Control Group III. Customized training programme of 12 weeks 3 alternate days a week was applied on experimental groups. Taking consideration of the feasibility criteria availability of instrument and the relevance of the variable to the study, selected variables upper and lower body muscular strength and endurance were measured by using standard testing procedure of muscular strength of upper body by modified push ups, for abdominal strength by modified Sit-ups and muscular strength of lower body by Squats. The data was collected before training, during training and end of the training. The data was analysed by applying repeated measure ANOVA test and post Hoc test. The level of significance was set at 0.05. The result of the study reveals that, there is significant effect of functional exercise training as well as Yogic exercise training on dependent variables.

Key words: Functional exercise and Yogic exercise training, Muscular strength and endurance

Introduction:

Muscular strength and muscular endurance is one of the most important factors of physical fitness. It is important for daily life to do activities like lifting, pushing. Daily exercise and physical activities enhance muscles strength and endurance. Exercises are done by turning, bending and stretching the body. The movement of each and every part of the body is an ideal exercise. Walking, Running, Cycling, Playing, Skipping, as well as Yoga are common exercises which keep people Fit. (Namita Jain., 2013.)

Normally in India scenario girls are restricted and threatened by the parents, family member, and close relatives. They are under psychological pressure that they should come back to their own home in a stipulated time. Indirectly this restricts their movements. As they are not allowed move to side and there is no house hold work there remains no exercise to them in seating in front of T.V. for watching programs or using smart phones continuous. In rural area only 11.6% students are participating in physical activities conducting by college. (Ravi Shekhar. 2016)

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Sports participation of girls at higher secondary school and College level

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Abstract:

Participating in sports and games has a positive impact in many areas. It supports improves social skills along with promoting physical health and positive mental health. Participating in games and sports develops healthy living habits that beneficial for developing self-confidence, coordination, strength and promotes physical fitness.

The study was carried out in two co-education institutions.The data for the paper comes from twenty seven in-depth interviews with higher secondary school girls and college girls students aged between 17 to 22 years. The respondents belonged to rural areas as well as from urban areas. The sample size was carrying out with the help of theoretical sampling technique. The interview consisted of open-ended questions. When the college girls' students were asked about their participation in sports, based on the information they provide conclusions have been drawn. The data were analysed in accordance with the principles of qualitative data analysis.

Key words: Participation in sports, Higher Secondary School, College Girls Students, physical fitness

Introduction:

The culture of sport itself presents a problem.Women were allowed to participate for the first time at the 1900 Paris Olympic Games with the inclusion of women's events in lawn tennis and golf only. Women participate in swimming events for the first time in 1912, but none of them was from America. In 1992 Olympic they did not allow its female athletes to compete in events without long skirts. In swimming the first women gold medal was won by the Australian Sarah 'Fanny' Durack, who won the 100m freestyle in 1912. In 1928, women allowed to participate in track and field events for the first time. In 1984 Women's shooting events were first included in the Olympics.Women's athletics and gymnastics introduced at the 1928 Olympics. The 2000 Olympics was the first time weightlifting was allowed to compete in the Olympics for women. A women's wrestling competition was introduced in 2004.

Games and sports have greatly strengthens the body, improving the body's defensive system to hold any of the diseases alone. Many studies highlight that with constant involvement of the students in the games and sports they tend to increase their immune system and thus are better able to fight against the diseases. Playing indoor games or outdoor games have huge impact on holistic development of child.

Resistance towards sports and games of school and college younger generation is often affected by modern forms of entertainment like online gaming, videos, what's up and instagram etc. Therefore, the younger generation tends to lean more towards virtual online gaming worlds so the drive for sports activities has lost its entertaining attraction. Developing entertainment outlets like social media has only made sports events much less popular. Importance of sports and games is repeatedly undecided by the parents as well as the students. Playing indoor games or outdoor have huge impact on holistic development of child. Indoor or outdoor games and sports not only involve the development of skills but it also stimulates competitive behaviour among students. It makes confidence in the minds of the students. It not only strengthens the physical development but it also contributes towards the mental growth.

04

Impact of Inculcating Sports Culture in Higher Education through Best Practices

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Abstract:

Inculcating sports temperament amongst the students was a challenging task. It has been seen that there is always poor response in sports activities at UG & PG level. In a sustainability of sports culture amongst the youth, we have adopted various innovative practices since past few years. The activities like 'karke to dekho', 'sports week' IPL enhanced sports activities in college and helps to grow the continuous participation and achievement of students through various games at the college, university, state and national levels. Also it was observed that the students who were toppers improved their academic records involving in either sport.

Keywords: Karke to dekho, Sports, Academic, Strength, Physical Activity etc.

Introduction:

The intention of the present investigation was to determine and check the impact of best innovative practice in higher education through improving sports culture. It has been seen that the independent contributions of physical activity not associated with structured physical education and school based physical education participation to academic Early research shown that, educators should recognize that activity- based physical education is not negatively associated with achievement, but provides a great potential avenue for improving cognitive functioning indices that should translate into improved academic performance.[1]

According to WHO report, physical activity and healthy sports are essential for our health and wellbeing. Appropriate physical activity and sports for all constitute one of the major components of a healthy lifestyle, along with healthy diet, tobacco free life and avoidance of other substances harmful to health. The recent research shown that the regular practice of appropriate physical activity and sports provides people, male and female, of all ages and conditions, including persons with disability, with wide range of physical, social and mental health benefits.[2]

There has been three step search method adopted by the researchers to identify studies that used measures of physical activity or fitness to assess either degree of association with or effect on academic achievement and cognitive performance.[3] Researchers introduced a novel framework for understanding the relationships between physical activity (and specific forms of activity like sports) and different aspects of human development. It was proposed that the outcomes of physical activity can be framed as differential 'capitals' that represent investments in domain-specific assets- Emotional, Financial, Individual, Intellectual, Physical, and Social.[4]

The further study emphasized on moderate physical activity and the focus on integration of physical activity into one's lifestyle which offers additional opportunities for sedentary individuals to improve their health through participation in physical activities that are enjoyable, personally meaningful and fit more easily into daily schedules.[5]

There had been examined the association between physical activity (PA), physical fitness, and health-related quality of life (HRQOL) among school-aged children; that were posi-

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Rainfall Runoff in the Indapur Tahsil

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Abstract: General hydrological equation to compute runoff has been estimated. The average surface water village wise runoff of the study area is estimated. There is great deal of variations in terms of volume of runoff by different villages. The entire tahsil is drought prone and faces the problem of water scarcity throughout the year. Observing these outcomes in the present context, this paper calculates the rainfall runoff in the Indapur tahsil. The outcomes of these studies are briefly presented in this paper. It has been observed that the very high runoff found in the study area.
Key words: Rainfall, runoff, surface water, groundwater

Introduction

The nature and distribution of rainfall of the study area discussed earlier indicates that about 90 percent rainfall takes place during the short period of four months from June to September. There is a great variation in the number of rainy days. The maximum water holding capacity of soils is the basic controlling elements of runoff. Outputs are the processes that remove water from the system; these include evapotranspiration, the various uses of water by humans, and outflow from surface water and groundwater. In the present study examined the rainfall runoff in the Indapur tahsil.

Objectives

1. To calculate the runoff of the study area.
2. To make favourable suggestions to low runoff and sufficient water available

Study area

The area extends from 17° 53′ 42" to 18° 19′ 58" North latitudes and 74° 39′ 16" to 75° 09′ 39" East longitudes (Fig. 1). The area is drained by the river Bhima on north and east both sides. Nira River flows south of Indapur tahsil. Total geographical area of the tahsil is 1575.38km^2 (Census 2011), out of which Nira river catchment area compress about 586.8 km^2 and Bhima river catchment covers an area of 902.43km^2. Nira River joins the Bhima River at famous tourist place i.e. Narsinhapur village after travelling a course of 209 Kms from origin. The slope of region is towards east. There are three soil types, namely, coarse shallow, medium black and deep black soils occupying 30, 40 and 30 percent respectively.

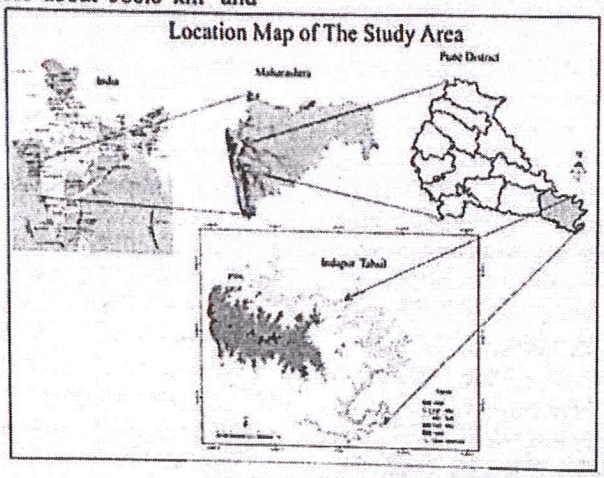

Fig. 1 Location map

Database and methodology

For the present research work secondary data source are used. This work is to develop digital database at large scale using spatial and attribute data All the supported data is collected from survey of India, Maharashtra Governments department of irrigation, department of water conservation. The Dickens, Inglis and Nawab Ali Jung Bahadur formula was used to estimate the runoff. These data base converted to Microsoft access format to suit to the link up for processing through Arc View 9.3, Global Mapper version 11.

Water Estimation of the Indapur Tahsil

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Abstract

A water estimate commonly provides the info of quantity and place of it. Water estimate studies consider the volumes of water within the various reservoirs of the hydrologic cycle and the flow paths from recharge to discharge. The reservoirs of surface and underground water are about 1542.695 MCM; Out of this only 601.38 MCM water is required for use. Water estimate are developed by measuring or estimating the inputs and outputs of a hydrologic system. Inputs are the processes that add water to the system; these include precipitation and inflow from surface water and groundwater. Outputs are the processes that remove water from the system; these include evapotranspiration, the various uses of water by humans, and outflow from surface water and groundwater. General hydrological equation to compute water balance and runoff has been estimated. The average surface water village wise runoff of the study area is estimated. There is great deal of variations in terms of volume of runoff by different villages. The entire tahsil is drought prone and faces the problem of water scarcity throughout the year. Observing these outcomes in the present context, this paper calculates the water budget of the Indapur tahsil. The outcomes of these studies are briefly presented in this paper. It has been observed that the water resources are not uniformly available in the study area.

Key words: Precipitation, evapotranspiration, runoff, surface water, groundwater water balance, water estimation.

Introduction

A water estimate is a basic tool that can be used to evaluate the occurrence and movement of water through the natural environment. Water estimate provide a foundation for evaluating its use in relationship to other important influencing conditions such as other ecological systems and features, as well as social and economic components – how much water is being used by agriculture, industry and residents etc. The water estimate process can encompass various levels of assessment which start simple and grow more complex if there are concerns about how much water is available at any level. Water estimate commonly provides the info of quantity and place of it. Water estimate studies consider the volumes of water within the various reservoirs of the hydrologic cycle and the flow paths from recharge to discharge. Water budgets need to consider this information on a variety of spatial and temporal scales (Hazel Breton 2010). The maximum water holding capacity of soils, rainfall and potential evapotranspiration are the basic controlling elements of water balance. The distribution of these elements decides droughts or water surplus condition. Therefore rainfall, potential evapotranspiration, aridity, humidity and soil moisture are become primary controlling factors of agriculture (Saikia 1994). In the present study water balance technique is used to estimate the availability of rainwater resource in the study area. The nature and distribution of rainfall of the study area discussed earlier indicates that about 90 percent rainfall takes place during the short period of four months from June to September. There is a great variation in the number of rainy days.

Objectives

1. To identify inputs and outputs of a hydrologic system
2. To identify place and quantity of water.
3. To calculate the runoff of the study area.
4. To make favourable suggestions to low runoff and sufficient water available.

Study area

Indapur tahsil is one of the tahsils in the Pune district consisting of 142 villages along with one urban centre in the study area. There are eight revenue circles in the tahsil. The area extends from 17° 53′ 42" to 18° 19′ 58" North latitudes and 74° 39′ 16" to 75° 09′ 39" East longitudes (Fig. 1). The area is drained by the river Bhima on north and east both sides. Nira River flows south of Indapur tahsil. Total geographical area of the tahsil is 1575.38km^2 (Census 2011), out of which Nira river catchment area compress about 586.8 km^2 and Bhima river catchment covers an area of 902.43km^2. Nira River joins the Bhima River at famous tourist place i.e. Narsinhapur village after travelling a course of 209 Kms from origin. The slope of region is towards east. There are three soil types, namely, coarse shallow, medium black and deep black soils occupying 30, 40 and 30 percent respectively.

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Socioeconomic Impact and Environmental Status in Ujjani Dam Affected Area of Indapur Tehsil, Dist - Pune (MH)

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Abstract: ***Ujjani dam project provides the opportunity to study the current status of livelihoods of the people affected by the dam, and the aftermath of displacement and rehabilitation. The livelihoods of project - affected people (PAP) are still at risk from the development of the ujjani dam. In the case of the dam many studies that have been done on the resettlement and rehabilitation policy. Due to a large submersion of forest and agriculture land by the reservoir, over 4, 000 families were classified as affected according to the Government of India. Those who received official designation as Project Affected People (PAP) some studies estimate that the number of families and people affected is much greater than the number accounted for by the Indian government's policies. Some estimates project that nearly 10, 000 people have been affected by this phase of the dam development. The numbers of families living around the dam and reservoir who require compensation due to impacts of the dam. Some of the major's issues and conclusions that emerge from this review. It has invariably led to dispersal of communities, breakdown of traditional support systems and devaluation of their cultural identity and curtailed their access to natural resource base, affecting their mental and physical wellbeing. The resettlement and rehabilitation process is largely dependent and affected by the lifestyle of the families before displacement.***

Keywords: Questionnaires Method, Physico-chemical parameters of soil water

1. Introduction

Project affected persons (PAP) is a broad term which includes all those who are adversely affected by Dam project. To focuses on Socio - economic status of these populations with the help of questionnaire and interview methods due to which to understand the present status of the project affected families. For the rehabilitation of families who have lost their houses and land in ujjani irrigation project, the authorities have selected some sites near Pandharpur for their rehabilitation. Environmental Assessment (EA) is a comprehensive process to identify and evaluate the potential effects of a proposed major project and ways to avoid adverse effects and led to dispersal of communities.

Hydrology is the study of the movement distribution and quality of water throughout the earth. The study of the distribution and movement of groundwater is hydrogeology. Climate change causes unpredictable fluctuations in rainfall and hydrology [1]The study of glaciers is glaciology and distribution of oceans is oceanography. The collective mass of water found on under and over the over a surface of a planet is called hydrosphere. Earth's approximate water volume is 1360, 000, 000 km³ of this volume.

a) Effects of dams on the atmospheric system
Variations in moisture percentage, temperature and air body movement caused by the water bodies differentiate the climatic conditions related to topography. Regional scaled climatic changes can be observed by these effects. As climate change increases, effective planning to avoid cost overrun will become nearly impossible. Climate change causes unpredictable fluctuations in rainfall and hydrology such alterations don't affect human health directly, but they are notable from many plants and animals. Their secondary effects influence human being.

b) Effects of dams on territorial biological system
Biological life of the river changes fast both in the reservoir and in downstream. During the filling works of the dam, while the land remains under water the land part of the region decreases. However, the water - land boundary extends. Thus plant, animal or human being settlement areas changes. Forests, agricultural areas may come under water. Compulsory changes occur in flora, fauna and the algae and the agricultural traditions of people in the region. This effect can extend for kilometers.

c) Effects of dams on aquatic ecosystem
The decomposing of organism causes increase in the nutrient substance in water body in a short period of time. Therefore, BOD (biological oxygen demand) value of water increases. The plants covering the water surface as large green–dark bodies, macro flora grow upon the water surface.

d) Effects of dams on human life
The dams are an important for development; they are not easily acceptable for the people whose agricultural areas, houses on the environment they are living in go under water. For example, when the ujjini dam was created in Solapur district in ujjini village, although a much better settlement area was provided for 20, 000 people in another location. the new settlement improve by this way and result in second ecological needs and changes. For example, drinking water, domestic water waste, water waste treatment etc. moreover, the social life becomes active, trade increases, cultural activities rise. Dams decrease the flood risk in the downstream, by their storing opportunity in their reservoir.

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Assesment of Soil Quality Parameters of Ujjani Dam Affected Areain Indapur Tehsil (MH)

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ABSTRACT:
Soil is the essential medium on which agriculture is supported. Water is equally important resource for agriculture. Soil is composed for four major constituents as inorganic particles, organic matter, water and air.Conservation of water has got special importance in increasing the agricultural productivity and maintaining nature and quality of soils. The soil samples were collected in the study area are sampling sites as Palasadev, Kalthan, Shaha, Kuroli etc. Physicochemical parameter analysis of soil of study area should be extensively monitored since deterioration of soil and water quality was clearly observed.

KEY WORDS: Physicochemical parameter of soil, Questionnaire Survey, Occupation Status.

I. INTRODUCTION:

The most challenging social impact of dam is the displacement of native people. After resettlement, the displacement of native people have faced many social problem such as disturb family relationship, poor drinking water facilities, lack of infrastructure amenities, lack of educational, medical, road and transportation, electrical facilities, absence of public toilet facilities, deficiency of market Centre.[1]The Irrigation has played an important role in changing the agricultural scenario and brought about lot of change in the social,political and economic factor .However introduction of large scale irrigation coupled with overuse of chemical ,fertilizers and practicing of monoculture type of cropping pattern have accelerated the process of soil and water degradation in the study area This degradation includes water logging soil salinity and water quality deterioration. Therefore environmental regulatory bodies such as Environmental Department and Water Resources Board should be more aggressive and effective in environmental monitoring, assessment and enforcement of environmental laws and regulations so as to preserve the soil from further degradation.

A dam interrupting a river leads to unpredictable social impact. First, many communities must resettle to provide land for the dam and the reservoir [3]Over irrigation causes rise in the water levels thereby resulting in water logging of the area this leads to continuous decline in agricultural productivity The fact is that irrigation creates a certain risk of soil degradation such degradation depends upon the composition of soil to be irrigated quality of water and management practices adopted these negative impacts on soil as salinity of soil alkalization, water logging, Depletion in soil fertility, Change in soil properties.Farmer adopts cultivation of crop as traditional method. Excess use of industrial effluent, fertilizer cause calcium, magnesium ammonium ions in various amount increasing their concentration in soil and water which leads to water loggings and salinity of soil and water.Soil enzymes are the important moderator and catalysts of significant roles in soil. [4]

Soil enzymes catalyze the cycling of nutrients such as carbon, Nitrogen, Phosphate and Sulphur decomposition in soil,[6]Excessive use of fertilizers particularly in soil under intensive monoculture type of land use leads to lose organic matter and its ability to retain moisture due to this soil erosion and ultimately lose their fertility and productivity. The burning of waste in the site to reduce garbage releases toxic particulate matter and smokes that cause of respiratory complications and other health problems for people and other living organism [5]

Methods of Sampling:

A field can be sampled to estimate its fertility through soil analysis by several methods. A sampling pattern in a heterogeneous land. Analytical methods employed for the soil analysis of samples from the fourvillage area

The Physico–chemical parameters of Soil analyzed in lab by standard Techniques.[2] Soil and water resources are important for environment that is to reduce the erosion rate and the destructive effects of torrential flooding.

१७. महाराष्ट्राच्या राजकारणात मराठा जातीची भूमिका

नामदेव अशोक पवार
संशोधक विद्यार्थी, राज्यशास्त्र विभाग, हिंद सेवा मंडळाचे पेमराज सारडा महाविद्यालय, अहमदनगर.
प्रो. डॉ. दत्तात्रय वाबळे
साहेबराव शंकरराव ढमढेरे कला व वाणिज्य महाविद्यालय, तळेगाव, पुणे.

प्रस्तावना

भारताच्या लोकशाही राजकीय प्रक्रियेवर अनेक घटकांचा प्रभाव सातत्याने पडत असतो त्यामध्ये धर्म, भाषा, जात, पंथ आणि वर्ग इत्यादींचा समावेश होतो. देशाच्या आणि राज्याच्या राजकारणात जातींची भूमिका महत्वपूर्ण राहिलेली आहे. समकालीन सामाजिक शास्त्रांच्या चर्चाविश्वामध्ये जात व राजकारण यांच्या अभ्यासासंदर्भात 'जाती संघटना' (Caste Organization) आणि जातीचा आग्रही आविष्कार (Caste Assertion) यांचे अभ्यास मध्यवर्ती आहेत. प्रस्तुत संशोधनपर लेखांमध्ये महाराष्ट्रातील मराठा जातीच्या बदलत्या राजकीय पार्श्वभूमीवर मराठा सेवा संघाचा उदय कसा झाला याचा शोध घेण्याचा प्रयत्न केलेला आहे.

महाराष्ट्राच्या राजकारणात मराठा ही जात केंद्रभागी होती तसेच सुरुवातीच्या टप्प्यात मराठा जातीच्या नेतृत्वाने सर्वसमावेशक राजकारण करत मराठा जातीच्या राजकारणाला सर्वजातीय संमती मिळवली होती. परंतु १९८० नंतर मराठा जातीच्या राजकारणाचे खच्चीकरण करण्याचा प्रयत्न देशपातळीवरील काँग्रेस नेतृत्वाने पद्धतशीरपणे केला त्याचबरोबर मराठा जातीतील नेतृत्वातही फाटाफूट झालेली दिसून येते, जागतिकीकरण, मंडल आयोगाच्या पार्श्वभूमीवर इतर मागास जातीच्या अस्मिता जाग्या झाल्या व त्या राजकारणात सक्रिय सहभाग घेऊन सत्तेत वाटा मिळवू लागल्या त्याचबरोबर इतर मागास जातीमध्ये जाती संघटनांचा उदय होऊ लागला परिणामी मराठा राजकारणाला शह बसू लागला व मराठा समाजाची आपण राजकारणात डावलले जात आहोत अशी धारणा वनत गेली. या धारणेतून समाजाला एकत्र करण्यासाठी मराठा जातीतही अनेक संघटनांचा उदय होऊ लागला.

जात व राजकारण

ब्रिटिश काळातील जातिव्यवस्थेच्या पारंपरिक संघटनेमध्ये महत्वपूर्ण बदल झालेले आहेत. स्वातंत्र्यानंतरच्या काळात उदार लोकशाही, भांडवलशाही विकासाचे मॉडेल, राजकीय अर्थव्यवस्था इत्यादीच्या स्वीकारामुळे या बदलात गुंतागुंत होताना दिसते. तसेच औद्योगीकरण, शहरीकरण वाढीबरोबर समकालीन जातीचे स्वरूप गुंतागुंतीचे बनले.[1]

राजकारण व समाजातील जाती हा घटक अभ्यासकांचे लक्ष वेधून घेण्यास तीन प्रक्रिया महत्वाच्या आहेत. पहिली प्रक्रिया - आर्थिक क्षेत्रातील बलामुळे जाती व व्यवसाय यातील पारंपरिक स्वरूपाचे संबंध बदलले

Morphometric Analysis of Linear Aspects of Sina River Basin, Maharashtra

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Abstract

Watershed managers require understanding and synthesizing hydrologic response of river basin for which they have started looking into its basin characteristics or morphologic features and establish connection of fluvial geomorphology to hydrology. According to Strahler (1968), the science of geomorphology treats the origin and systematic development of all types of landforms and is a major part of Physical Geography. Drainage basin is an ideal unit of the earth surface for the study of its landform. Therefore the present study deals with the quantitative analysis of selected drainage basin. Using drainage basin as a basic unit in morphometric analysis is the most logical choice because all hydrologic and geomorphic processes occur within the drainage basin. Measurement of shape, or geometry, of any natural form- be it plant, animal, or relief feature- is termed as morphometry (Strahler, 1957). Systematic description of the geometry of a drainage basin and its stream channel system requires measurement of linear, areal and relief aspect of drainage network. In current research paper only linear aspects are analyzed such as stream order, Stream numbers, bifurcation ratio, stream length, mean stream length and stream length ratio.

Keywords : Morphometric, drainage network, linear aspects.

Introduction

Watershed and its characteristics are controlled by nature and its hydro-climatic parameters are mostly interrelated with each other. Watershed managers require understanding and synthesizing hydrologic response of such basin for which they have started looking into its basin characteristics or morphologic features and establish connection of fluvial geomorphology to hydrology. Geomorphology is the study of landforms (valley, gorge, waterfall, cavity, sand-dunes). Worcester defines geomorphology, the interpretative description of relief features. (Worcester, 1948) Drainage basin is an ideal unit of the earth surface for the study of its landform (Singh S. a., 1974). Therefore the present study deals with the quantitative analysis of selected drainage basin. (Singh S. a., 1974). Using drainage basin as a basic unit in morphometric analysis is the most logical choice because all hydrologic and geomorphic processes occur within the drainage basin. The landscape as well as relief features play a dominant role to influence source of transportation, location of cities and agriculture field so their study is great importance and interest to geomorphologist. The aim of the watershed management is to conserve the soil and water resources, so as to achieve improvement in the agriculture. So the emphasis is on the development of regional resources.

Study Area

The basin used in this study is the drainage area of the *Sina* River. It's catchment area of about 12365.3 sq. km. (approximate). Topographically the basin shows low degree of slopes, less dissection index and typical features of Western Ghats at the origin region of river. The *Sina* River basin is part of the upper Bhima river basin situated in the North part of Krishna River Basin. Actually, Sina river have two main tributaries which are arises from two opposite side, one from (West) Village Jamgaon (height 844 m) and another from (East) Village Sasewadi (height 970 m), and meet at Village Sawedi. River Bhogawati, river Upla, river Mehkari, river Kheri are the major tributaries which join Sina river. The latitudinal and longitudinal extension of the entire basin is from 17^0 21' 25.92" N to 19^0 15' 49.32" N and 74^0 28' 46.56" E to 76^0 05' 52.44" E respectively (fig. 1). The eastern part of the basin is comparatively less rugged and possesses flat rolling topography. The region experiences tropical type of climate. The rainfall pattern in the area is highly variable. About 85% of the rains occur in the months of June to September. The rainfall is below 800 mm.

The entire river basin area rather the Deccan plateau portion is mainly formed during the Late Cretaceous to Palaeogene age. The prolonged weathering of these trap rocks gave rise to residual sedimentary rock known as Laterite. Banks of stream are covered with alluvium patches. The upper part is mainly covered with red-brown soil and at places lateritic soils while the lower most portions is known for black cotton soil. The middle part of the basin mostly comprises of coarse shallow soils and alluvium. The lateritic soil is rich in Iron and Alumina.

Effectiveness of Employment Training and Development Programme at *Dudh Ganga Sahakari Dudhutpadak Sangh Limited Indapur Dist. Pune* Maharashtra State

Dr. Gajanan Kadam*

Abstract

Dudhganga Milk grown multi fold and has been known for quality of its raw milk and for offering milk & milk Products Moved by the plight of Milk Farmers being exploited by Milk Dealers, he started milk collection and packing to help reduce Farm to Consumer cycle. Being Farmer, he improvised the systems for milk collection which reduced milk contamination and delivered healthy milk at Dairy.

This project began small with a milk collection of just 12,000 liters of milk every day. Continuous Innovation at Processing and Milk Collection and a dedicated and committed staff has resulted in Dudhganga processing 70 thousand liters milk per day. Dudhganga continues to grow rapidly scaling new milestones every year. It is one of the fastest growing large Dairy units in Maharashtra.

Dudhganga Dairy is based on the traditional values of trust and Farmer welfare. It also follows industry standards that define the quality of its products. The entire process from collecting the milk to delivering the final products moves under strict hygienic conditions and maintaining exceptional work ethics to fulfill international commitments and local standards,in which process departments includes Milk & Milk Products manufacturing, & warehouse. Engineering includes mechanical, electrical, instrumentation, civil, Fire & safety, environment, and support services departments include store, commercial, accounts, canteen, administrative & human resources. In, training of employees at various level gives highest important from human resources point of view. For training of employees, identification of training needs through department head is must. On the basis of requirements human resources is arranging various training programme for employees. Indapur Dairy & Milk Products Ltd this organization selected for project, on the basis of best training practices in present corporate companies. Training improves the efficiency of employee and the ultimately of company. The apprentices working in different factories used toget vocational training when use of computers, automatic machines etc. increased and because of rapidly changing techniques the need of training is recognized as one of the most important organizational activities.

Training held at Dudhganga Sahakari Dudh Utpadak Sangh Limited Indapur is given when there is a difference between the job requirements and employees present with their specifications. Organizational efficiency, productivity, progress, development, organization viability, stability and growth to greater extent depend on training.

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8. Nationalization and Privatization Impact in the Context of Indian Banking Industry

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Abstract

The facilitation of economic transactions and friendly investor environment is undertaken through effective performance of financial systems. Mobilization of savings and funding the profitable business opportunities are essential in improving the efficiency of intermediation. The study aims to evaluate the effects of nationalization and privatization on Indian banks. Various factors have been considered to examine the effects of privatization and nationalization, including sources of public sector inefficiency, measures of firm performance, econometric issues, and the mode of privatization. The data was collected for the period of 2015 to 2020 from Indian banks. Data Envelopment Analysis (DEA) was used to evaluate the financial reports of the banks selected to evaluate the efficiency of input and output variables. Positive results were observed, concerning the efficiency and profitability of banking industry after banks privatization. Performance of private banks has been observed effective and efficient as compared to the public sector banks. Privatization of banks must be increased and maintained to sustain the efficiency of the banks and implement strategies to maintain the assets. Future studies may recruit more appropriate sample size to evaluate the privatization and nationalization effects of Indian banking industry. Greater number of banks will provide more precise results, using data envelopment analysis.

Keywords: Banks, Data Envelopment Analysis, Efficiency, Indian banking industry, Privatization, Nationalization

Introduction

The performance of financial system is a fundamental angle in the improvement of economy for any country. The presence of set up monetary framework can be utilized to advance the monetary dependability of a country. Actually, twisting can be capable by a temperamental financial framework among loan costs, monetary movement, and expansion. In this way,

ROLE OF E-BANKING IN ECONOMY DEVELOPMENT OF INDIA

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Abstract
The Indian Banks are the backbone of Indian financial sector and Indian economy. Now a day in Indian economic scenario, the Indian financial system is in a process of rapid transformation. The shift from the formal banking to E-Banking has been a remarkable 'leap change' in Indian banking history. E-banking has experienced strong and sustained growth. E-Banking, also known as net banking, online banking or internet banking, is the facility provided by banks and financial institutions which allows customers to use banking services via internet. There are scores of services like online money transfer, account opening, bill payment, tracking account activity, etc., which are made available to customers with the help of e-banking. This research paper shows the relationship between e-banking and economic development in India and helps to know the present economic scenario of e-banking. It highlights the role of e-banking in ensuring a speedy Indian economic recovery.
Keywords: E-banking, economic development, present economic scenario.

Introduction

India has arisen as the quickest developing significant economy on the planet and is relied upon to be One of the best three financial powers of the world throughout the following 10-15 years, upheld by its Solid majority rules government and associations. The public authority of India has thought of Digital India drives, which centers around three center parts: production of advanced framework, conveying administrations carefully and to build the advanced literacy. Banking through electronic channels has acquired expanding prevalence as of late. The improvement and the expanding progress experienced in the Information and Communication Innovation combined with the development of the worldwide economy prepared for the change of the Indian financial framework's job from customary exchange financing to activating and directing monetary assets all the more really in practically all features of life.

Objectives of the study

1. To examine the role of e-banking in economic development of India.
2. To highlight the role of e-banking in ensuring a speedy economic recovery of India.
3. To examine the need for e-banking among the Indian populace.

Methodology of the study

The study is mainly descriptive in nature. The data for the purpose of the study has been collected through secondary sources, which mainly include websites, various articles and journals.

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A Study of National Agricultural Insurance Scheme in Indapur Tehsil Dist. Pune Maharashtra State

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Abstract
Agricultural production and farm income in India involve several risks. Crop insurance is the only mechanism available to safeguard against production risks. Against this background, this paper has examined the features and performance of National Agricultural Insurance Scheme (NAIS) operating in Indapur tehsil Dist. Pune of Maharashtra state and has suggested some modifications to make it more effective. NAIS coverage in terms of crop area, number of farmers and value of agricultural output is very small. If crop insurance programme is to be made an important tool in agricultural risk management, the present level of coverage will have to be improved, at least by 3-4 fold. Such an expansion can occur only with improvements in and broad-basing of the insurance scheme. Every suggested improvement has financial implications and affects the concerned insurance practices. It requires renewed efforts by the government in terms of designing appropriate mechanisms and providing financial support to agricultural insurance. Providing of similar support to the private sector insurers would help in increasing the insurance coverage and improving the viability of insurance schemes over time.

Keyword: *farmer, agricultural, insurance, debt, indebt, loss, agriculture risk, remedies.*

Review of National Agricultural Insurance Scheme (NAIS)

Agricultural production and farm income in India involve several risks. These relate to natural events, weather aberrations, epidemics and manmade disasters. All these affect both crop area and yield. Further, with the growing of agricultural commercialization and climatic changes, the degree of risk due to unfavorable eventualities is increasing. Sharp fluctuations in agricultural prices are causing a wide variability in farm income. For a section of the farming community, the Minimum Support Prices (MSP) for certain crops provide a means of their income stability (Vyas and Singh, 2018). But, for most of the crops and in many of the states, MSP has not been implemented. Recently, mechanisms like 'contract farming' and 'future trades' have been introduced and these are expected to provide some risk cover against price fluctuations, directly or indirectly. It is believed that crop insurance is the only mechanism available to safeguard against production risks in agriculture. Considering this need, the Government of India had introduced a Comprehensive Crop Insurance Scheme (CCIS) in 1985 and later, a National Agricultural Insurance Scheme (NAIS) in 1999-2000. But, this scheme also has not been able to make the expected impact and acceptability. Against this background, this study has examined the features and performance of National Agricultural Insurance Scheme (NAIS), operating in the country and has suggested changes to make it more effective. The main objective of the scheme is to protect farmers against losses suffered by them due to crop failure on account of natural calamities, such as drought, flood, hailstorm, cyclone, fire, pest/ diseases, so as to restore their credit worthiness for the ensuing season. The paper has presented the results of detailed analysis of secondary data for 13 crop seasons, since the inception of NAIS, covering the period rabi 1999-2000 to rabi 2005-06. Field investigations were also conducted for the state of Maharashtra special in Indapur tehsil Dist. Pune during October, 2019 to assess the perception of loanee and non-loanee insured farmers, bankers and other functionaries of NAIS. Besides the field study, discussions were also held with experts in Agriculture Insurance Company (AIC) and agricultural departments, and bankers, academicians and farmers' representatives.

Main Features of NAIS

The National Agricultural Insurance Scheme (NAIS) was introduced in the country from the rabi season of 1999-2000. Agricultural Insurance Company of India Ltd (AIC), which was incorporated in December, 2002, and which started operating from April, 2003, took over the implementation of NAIS. This scheme is available to both loanees and non-loanees. It covers all food grains, oilseeds and annual horticultural / commercial crops for which past yield data are available for an adequate number of years.

Testing of Adulterants in Milk and Milk Products by Using Household Chemicals

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Abstract:

Milk is essential sustenance for human life. Health of human being depends on quality of milk that they consume every day. The quality of milk can be lowered by addition of some substances. Milk is declared to be adulterated when some unwanted cheaper substance is added or removal of valuable constituents partly or wholly. Sometimes the various chemicals are added in milk and milk products to improve its appearance and taste. In many countries, the main cause of adulteration is financial gain to increase the quantity of milk and milk products and to make it more attractive. Milk prepared, processed, packaged or stored in unhygienic condition is also one of the major cause of adulteration. Milk adulteration is punishable act and many rules have been imposed by government agency, but still adulteration is reported on daily basis. Awareness and knowledge of detecting common adulterant by some simple methods can prove to be a one of the most weapon to fight against adulteration. Day by day milk can be adulterated, to know the little knowledge about identification of some adulterants, which is discussed here.

Keywords- Adulterants, Household, Organoleptic, Preservatives, MST, LDL

I.INTRODUCTION

The health of mankind depends on the quality of food they consume. Milk is adulterated if its quality is lowered or affected by the addition of substances which are injurious to health or by the removal substances which are nutritious. According to Food Safety and Standard Authority of India (FSSAI), the technical definition of adulteration is addition or removal of substances to or from food substance so that natural composition and quality of food substance get affected. Purpose of adulteration is not only to increase the weight but also to improve taste, lifetime, appearance and productivity of milk and milk products. All these above mentioned practices are responsible for milk adulteration. The addition or removal of some substances, physical contamination of some metals and chemicals are added during the processing of milk and milk products beyond permissible level, affects the quality and can prove to be toxic. The microbial contamination of milk is also one of the biggest cause of health problems. Sometimes metals may also enter into milk by contamination and also proves to fatal if cross certain limits. So the milk that gets contaminated or adulterated becomes unfit for consumption. The adulteration of milk can occurs at various stages.

Producer- 1) Poor agriculture practices.

Comparative Studies on Extraction of Essential Oils from Different Medicinal Plants.

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Abstract:
Medicinal plants are considerable significance due to their special attributes. The large number of phytochemicals present may lead to the development of novel drugs.The extraction of medicinal plants with traditional methods plays an important role in the extraction outcomes. Essential oils extracted from flowers and leaves are the mixture of chemical constituents which contains less molecular weight compounds as alcohols, polyphenols, terphenols, aliphatic and carbonyl compounds, which possess various biological properties.Here in this study, a very simple method as hydrodistillation and steam distillation for extraction of oil is adopted and compared for evaluation of their properties and extraction outcomes.
Keywords:Medicinal plants,Hydrodistillation,Extraction , Essential oil.

1.INTRODUCTION:

As a traditional medicinal herb and valuable natural spice, essential oil has many significant effect[1-4]. Interest in utilizing natural sources in the development and formulation of skin products, as an alternative to conventional drugs and synthetic products, contribute to increase interest in research and industrial application of medicinal plants. High content of phenolic and flavonoids in medicinal plants have been associated with their antioxidant activities that play a role in the prevention of the development of age-related disease, particularly cause by oxidative stress. With regards to the beneficial phytochemicals in medicinal plants and the shift towards natural products in pharmaceuticals and cosmetic industry, the research on medicinal plants particularly are as important as the research on conventional drugs. The study of medicinal plants starts with the extraction procedures, which is an important step in the processing of the bioactive constituents from plant materials.

Conventionally, the essential oil is taken from plant raw material by different extraction methods [5,6] including solvent extraction and steam distillation. However these methods have drawbacks such as loss of volatile compounds, low yield and accruement of toxic solvent residues[7,8].Essential oils are lipophilic and soluble in organic solvents due to their hydrophobic nature and lower density than water. In this study, the selected plants essential oil has various applications.As a part of our investigation on evaluation of aromatic medicinal plants. The aim of this work is to provide comparative record of analysis on essential oils of Geranium, Eucalyptus and Lantana Camara.

2.MATERIALS AND METHODS:

2.1.Preparation of Plants:

The fresh,green fleshy leaves of Geranium, Eucalyptus and Lantana Camara were collected from local area and A. S. C. College campus,Indapur. Collected leaves were washed with distilled water to remove dirt and dust and dried in shade for 1 hour, chopped into fine pices and was used for further study.

2.2. Extraction of oil by Hydrodistillation method:

Hydrodistillation is an advanced method for extracting essential oils from plants because of its abilityto maintain the original quality of plants. The fresh leaves of each plant about 250 g was taken in 500 ml round bottom flask and added with 250 ml of solvent(distilled water).The reaction was heated at 100 ^{O}C for about 2 hours.The distillate was collected in conical flask. Shown in fig.1(9-12).After completion of distillation,essential oil was separated by using separated funnel and rotavapours.The collected essential oils (from different plants) were collected and stored in dark glass bottles and stored at 4 ^{O}C. The infusion will be stronger for six months to 1 year.

2.3. Extraction of oil by Autoclave method:

Autoclave method is used for large scale extraction of oils.The autoclave containing water is arranged in such a way to remove the steamfrom it using copper pipes at the top.The ratio of solvent and plant material was kept same for all plants (7 kg plant material : 5000 ml solvent) at 100 ^{O}C for 2 hours. The pressure of steam was reduced by adjusting knob and condensed by passing through circular copper tubular coil dipped in icecold water can.The distillate was collected through pipes which was fitted at the base.

In this procedure, two distinct phases were obtained: an organic phase (EO: essential oil) and an aqueous phase containing a part of the essential oil. The organic phase was separated from the aqueous phase by shaking it with 10 ml hexane (solvent) and separated by separating funnel and finally on rotavapour (13).The essential oils were collected and labelled in air tight glass bottles and stored at 4 ^{O}C.

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Biosynthesis, Characterization and Antimicrobial activity of Silver Nanoparticles using Justicia Adhatoda.

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***Abstract*: Biosynthesis is a simple, non-toxic, economical and eco-friendly approach for the synthesis of nanoparticles. In the present work, nanoparticles of silver were synthesized by using aqueous solution of *Justicia Adhatoda* leaf extract as a reducing agent. These synthesized Ag-NPs were further evaluated for antimicrobial activity against *Staphylococcus aureus*, *Escherichia coli, Pseudomonas aeruginosa* and *Bacillus subtilis.* The characteristics of silver nanoparticles were studied using UV-Visible spectroscopy and Fourier Transform Infra-red spectroscopy (FTIR). The potential applications of bio-synthesized nanoparticles showed antimicrobial efficacy against *Escherichia Coli* (12 mm) and *Bacillus subtilis* (11 mm) respectively.**

***Keywords*: Biosynthesis; *Justicia Adhatoda* extract; Silver nanoparticles; Antimicrobial activity.**

1. INTRODUCTION

Nanotechnology is an important field of modern research mainly concern with synthesis of nanoparticles of variable sizes, shapes, chemical compositions and controlled dispersity and their potential use of human benefits. Biosynthesis provides advancement over chemical and physical method as it has no need to use high pressure, energy, temperature and toxic chemicals ¤1¥. Nanomaterials are seen as a solution to many technological and environmental challenges in the field of solar energy conversion, catalysis, medicine, and water treatment. Research on the synthesis of Nano sized material is of great interest because of their unique properties like optoelectronic, magnetic and mechanical which differs from bulk.

The biosynthesis of Silver oxide nanoparticles of different sizes and shapes has been reported using bacteria, fungi and plant extract ¤2¥. Plants provide a better platform for nanoparticles synthesis as they are free from toxic chemicals as well as provide natural capping agents. Physical and chemical methods uses harmful chemicals such as sodium borohydride, sodium citrate dehydrate which are possibly hazardous and very costly to the natural settings and organic functions. Bio inspired synthesis of these particles proves to be cost effective environmental alternative to chemical and physical methods in preparing of nanoparticles, ecofriendly and helps to reduce harmful effects on environment ¤3,4¥.

In the present study Silver nanoparticles were synthesized through bio inspired synthetic approach. The applications of Silver nanoparticles (AgNPs) are a very promising, efficient and cost effective method for remediating this environmental health concern. Plant extracts have shown prospects in AgNPS synthesis which is a green chemistry synthetic approach ¤5¥. Plant extract mediated synthesis of nanoparticle is one of the stable and suitable alternatives in comparision with other conventional methods. *Justicia Adhatoda* known as Vasaka or Malabar nut belongs to *Acanthaceae* family. It has many medicinal properties such as antibacterial, antifungal, anti-inflammatory. Biologically synthesized silver nanoparticles could be of immense use in medical textiles for their efficient antibacterial and antimicrobial properties ¤6, 7¥.The synthesized silver nanoparticles were characterized by UV-Visible spectroscopy, FTIR spectroscopy and tested for their antimicrobial activity.

2. MATERIALS AND METHODS

2.1 Preparation of *Justicia Adhatoda* Leaf Extract

Fresh leaves of *Justicia Adhatoda* were collected from A.S.C College campus, Indapur. The collected leaves were thoroughly washed several times with distilled water and shade dried for a day. 10 g leaves was added in 100 mL of distilled water and heated at 80 °C for 15-20 minutes. Allowed to cool at room temperature and filtered through Whatman No. 42. The filtrate was centrifuged at 1500 rpm for 10 minutes. The supernatant filtrate was used as leaf extract for the synthesis of nanoparticles, stored for further use.

2.2 Preparation of 0.01M $AgNO_3$ solutions

0.169 gm. A.R grade $AgNO_3$ dissolved in 100 mL distilled water (DW) and stored in amber colored bottle in cool and dry place.

2.3 Preparation of Silver Nanoparticles

50 mL 0.01 M Silver nitrate were taken in beaker and stirred using a magnetic stirrer for 5 minutes. After 5 minutes, 25 mL leaf extract was added slowly into this beaker for uniform precipitation of silver nanoparticles. The solution was left undisturbed and allowed to room temperature. The yellowish brown colored precipitate get deposited at the bottom, indicates the formation of nanoparticles. The deposited nanoparticles were washed with sterile distilled water and was subjected to centrifugation at 10,000 rpm for 20 minutes. The nanoparticles was dried in hot air oven for 1 hour at 80°C and subjected for characterization. Reduction of silver ions to silver nanoparticles was confirmed by color changes from colorless to yellowish brown (figure 2).

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REMOVAL OF NICKEL (II) FROM AQUEOUS SOLUTION USING *POMEGRANATE* PEEL POWDER

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ABSTRACT

Removal of Nickel (II) from aqueous solution using *Pomegranate* peel powder as a new biosorbent was studied. Investigations have been made to study various sorption parameters such as biomass amount, contact time, pH, temperature and initial ion concentration. The selected adsorbent was effective for the removal of Nickel (II) ions in acidic medium and attained the equilibrium in 30 minutes. The adsorption process is endothermic in nature. This adopted method is quite feasible, economic, time saving and low cost.

KEYWARDS: Adsorption, *Pomegranate* peel powder, Heavy metal, Aqueous solution.

1. INTRODUCTION

Industrialization to a larger degree is responsible for the contamination of environment especially water where lakes and rivers are overwhelmed with a large number of toxic substances. Heavy metals are reaching hazardous levels when compared with the other toxic substances [1]. Heavy metals are a unique group of naturally occurring compounds. Their continuous release leads to overconsumption and accumulation. Many industries such as fertilizers, metallurgy, leather, mining, electroplating, energy and fuel production, discharge waste containing heavy metals either directly or indirectly into the water resources.[2] There are several conventional methods can be adopted for the removal of heavy metal from wastewater like chemical precipitation, electroplating, ion-exchange, reverse osmosis, chemical coagulation and adsorption. These methods are highly costly, not effective, require high energy input and non-ecofriendly in nature.[3-4] Among these, adsorption technique has gained importance due to its cost economy, high efficiency, harmless nature and ease handling.[5]

Pomegranate is a widely available fruit, belongs to *Lythraceae* family. *Pomegrante* has various properties as anti-oxidant, anti-viral, anti-tumor and many more. *Pomegranate* fruit is a good source of vitamins as well as folic acid. *Pomegranate* fruit peel is full of flavonoids and tannins.[6] The main objectives of this research is to investigate the effects of various parameters as biomass amount, contact time, pH, temperature and initial ion concentration on the adsorption efficiency of Nickel (II) ion on the *Pomegranate* fruit peel powder.

2. MATERIALS AND METHOD

2.1. Preparation of Biomass

The fruit peels of *Pomegranate* were collected and washed severally followed by distilled water to remove dirt and dust. After washing, peels were dried in shade for 6-7 days, till becomes crispy. Dried peels were grinded on grinder to obtain a desired size powder. Dried powder were further used throughout the experiment.

2.2. Preparation of Stock solution

The stock solution of Nickel (II) 1000 mg/L was prepared by dissolving 1.1343 g of $NiSO_4.6H_2O$ in distilled water. All chemicals used were of analytical grade. For working solutions, it was further diluted to desired concentration by diluting the Nickel stock solutions. The concentrations of Nickel (II) ion in the solution was determined complexometrically.

2.3. Adsorption study

In this study, adsorption experiments were conducted for the adsorption of Nickel (II) on natural *Pomegranate* fruit peel powder as a function of biomass amount, contact time, pH, temperature, and initial ion concentration. Aqueous 25 ml Nickel (II) solution of different concentrations were taken in 100 ml Erlenmeyer flask. The experiment was carried with 0.2 to 0.6 g of *Pomegranate* fruit peel powder varying with contact time. We varied the experiment for different

Cost and Return From The Cultivation Of Sugarcane: A Case Study Of Indapur Tahsil (Pune District)

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1. Introduction

Sugarcane is one of the important industry based crop in the world. About 195 countries grow sugarcane crop to produce 1324 million tonnes of sugarcane (more than six times the amount of sugar beet produced). Indian sugar industry has been playing a vital role in the socio economic transformation of the country. India is the second largest sugarcane producer and the highest sugar consumer in the world. Apart from sugar, sugarcane is grown for many other uses like fodder, paper and biofuel. In spite of its growing demand, there are a number of problems which affect the sugarcane producing farmers in their production and increasing their profit.

2. Study Area

Indapur tahsil is situated in Pune district. The northern and eastern border is demarcated by Bhima River in Pune and Solapur districts while southern boundary is confined by Nira River in Pune and Satara and Solapur districts. The west boundary is confined by Baramati and north boundary is delimited by Daund tahsil of Pune district. The region extends between 17° 53′ to 18° 15′ north latitudes and 74° 35′ to 75° 8′east longitudes. The total geographical area of this tahsil is 1552.93 square kilometres having 3, 83,183 population (2011). This tahsil consists of 142 settlements and three urban settlements.

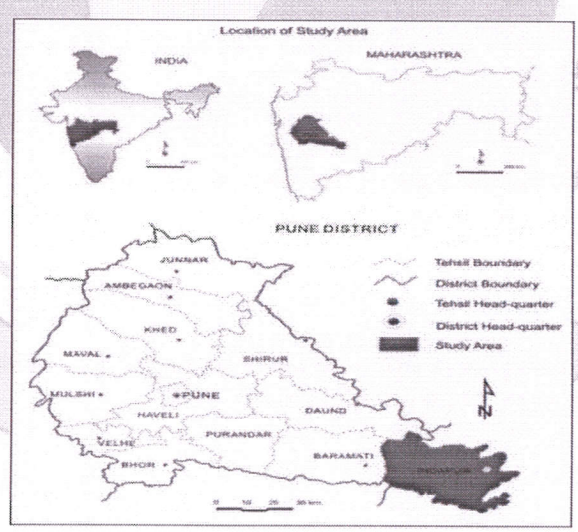

Fig-1: Location of Study Area

Review of Literature

Patil S. R., (2014) Carried out his study on "Cost benefits analysis of sugarcane cultivation of Walva tahsil, dist. - Sangali (MS). The study deals with sugarcane crop as a agricultural model to get money for utilization of natural resources present in the region and also brought outside the region. The study of cost benefit analysis is very important for any crop that can be observed the economic profitability of the farmer.

Singh Gomatee (2013) carried out his study on, 'An empirical study of economics of sugarcane cultivation and processing based farming in Uttar Pradesh'. The main objective of this study was changes in area

Spatio-Temporal Changes in Urban Landuse and Land Cover Pattern of Indapur *Tahsil*

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Introduction

Maharashtra is one of the most urbanized state in India. The proportion of population in Maharashtra is (45.23%) as per the latest census of 2011, which was (38.69%) in 1991. In absolute terms, the urban population increased from 30.5 million to 41.00 million and net addition to states urban population was 10.5 million during the 1991 to 2001 and 20.2 million additions in 2001 to 2011. The state of Maharashtra is highly urbanized in comparison to the country, as a whole (31.15%), but its urban population is mostly concentrated in few major cities. For this skewed distribution, the socio-spatial factors are responsible and this imbalanced situation needs to be corrected after investigation.In the state, the number of urban centers has increased from 336 in 1991 to 534 in 2011 and the growth of urban centers was (12.50%). During the same period the proliferation of the urban unit was from 336 to 534 with the percentage growth rate of (41.26%).The state was less than above 10%, which was much less than the growth of towns in India as whole. But the share of urban population in the total population of Maharashtra states (45.23%) was much higher than in the entire country (31.15%). Indapur has historic significance in the expansion of Mughal empires in Central-South India, and subsequent Maratha resistance. Indapur is the Jagir of Malojiraje and Shahajiraje Bhosale. The historical place where Chatrapati Shivaji Maharaj's grandfather Shri Malojiraje was living & died in a war. This place is also famous for the Shri Shantinath Digambar Jain Teerthkshetra. It is also the part of sugar belt and various industries as like paper mill, fruit processing declares product factories. Similarly agro based industries and other industries are located around Indapur town. On the basis of observations and field work it would be investigated that how far the urban center of Indapur Tahsil has been baring developed.

Objectives

1. To examine the existing landuse and plan for a proposed landuse of main urban centers of Indapur tashil.
2. To appraise the infrastructural development in urban centers.
3. To assess the impact of urban centers on their peripheries.

Data Base and Research Methodology

Exhaustive literature survey of the topic of investigation is to been undertaken. Published Literature, Census Reports have collected from various libraries, institutes; Government departments etc. Besides, relevant literature is obtained through Internet. Visiting to the study area and its fringe areas in different seasons, GPS surveys, Instrumental surveys, Photographs, Questioner survey etc. facilitated the understanding of the complexity of a dynamic phenomenon such as urban sprawl, land use changes, urban sprawl pattern.

The Study Region

Indapur tahsil is one of the administrative blocks in Pune district consisting of 142 villages and three urban settlements. It lies entirely in Bhima-Nira basin. Geographically, this region extents from 17° 53′ to 18° 15′north latitudes and 74° 35′ to 75° 8′east longitudes and located at 527m elevation from mean sea level. The region is drained by Bhima on north and east sides and the Nira River in south side. Indapur tahsil lies in southeast of Pune district, it is surrounded by Baramati tahsil in west side, to the northwest lies Daund tahsil, to the southwest lies Satara district and Solapur districts belong to east, south and north side.The geographical area of study region is 1552.93Sqkm according to 2001 Census. The Bhima River and its tributary Nira flow in study region .According to the 2011 Census, study region has 383183 persons (93.34 percent rural and 6.65 percent urban population). The density of Pune district is 603 that may be attributed to the rapid growth in the industrial and commercial sectors. Immigration due to job opportunities and educational institutes has also resulted in the influx of a large amount of persons. The urban agglomeration around the Pune city along with high level of urbanization is also an added reason for the population growth of Pune city. According to the 2001 census, total urban population of the district is 42.01 lakh and the rural population is 30.32 lakh. Higher population density in the urban area, i.e. 6,700 as against 202 in the rural area, is because of employment opportunities in the secondary and Tertiary sector, which includes the manufacturing, processing, servicing and the construction sector. The urban to rural population ratio in the district is highly imbalanced. Of the total population, urban population is 58%, which is spread over on only 4 per cent geographical area. Whereas, remaining 42% rural population is spread over on 96 per cent geographical area of the district. The urban population density indicates the degree of urbanization in the district.

Cost Benefit Analysis of Sugarcane Production under Flood and Drip Method of Irrigation

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Abstract

The Present Study deals with the cost and return of sugarcane production under drip and flood method of irrigation in the Indapurtashil of Pune district. The primary data was collected for the year 2017- 2018 from the sample respondents by conducting personal interview and pretested. 600 farmers were selected randomly from eight division of the study area.On an average, farmers received yield of sugarcane36 to 41 tonnes per acreunder flood method and53 to 60 tonnes per acre in all divisions of the study area.The net return of cultivation of sugarcane was found averagely in range of Rs.7808 to Rs.21020 per acre under flood method andRs.40235 to Rs.50020 per acre under drip method. Profit margin is the major concern of the study and found to be quite high on drip method than flood method.

Introduction

Man has developed various agriculture activities for his stable life. Agriculture is one of the most important activitieswhich help the farmers for his socio - economic development. Agriculture activity provides various employments in rural part of the country, not only foods and labour but also services, trade, industry, transportation and market etc. Farmers take production of various crops on their physical, social and economic condition. The production is variable and change according to region to region, therefore, the production of any crop is necessary to check out benefit or profit analysis.

Irrigation is basic need for crop growth. It helps in the development of agriculture as well as human life. Canal, river, well, tube well and tanks are the main sources of irrigation, developed by man from last several years. Sugarcane cultivation depends on farmer's behaviour in various operations. There are traditional and drip methods for sugarcane cultivation but farmers use traditional methods on large scale.

In last decade, input price of sugarcane in the study area has increased continuously. Sugarcane growing farmers are facing various problems, such as rate given by sugar industry, increasing transportation expenditure, diseases on sugarcane, water scarcity, irregular supply of electricity, increasing labour rate etc. Today's situation,especially in Maharashtra state and in study area, farmers are demanding to the Government to increase the FRP of sugarcane. So we can say that there are some problems in sugarcane cultivation. Therefore, it is necessary to study the economics of sugarcane production at micro level.

Study Area

Indapurtahsil is situated in Pune district. The northern and eastern border is demarcated by BhimaRiver in Pune and Solapur districts while southern boundary is confined by NiraRiver in Pune and Satara and Solapur districts. The west boundary is confined by Baramati and north boundary is delimited by Daundtahsil of Pune district. The region extends between 17° 53′ to 18° 15′ north latitudes and 74° 35′ to 75° 8′east longitudes. The total geographical area of this tahsil is 1552.93 square kilometres having 3, 83,183 population (2011). This tahsil consists of 140 rural settlements and three urban settlements.

Fig-1: Location of Study Area

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CHALLENGES BEFORE THE HIGHER EDUCATION: PRE AND POST COVID -19 IN INDIA

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Abstract
Before Covid -19 there were number of challenges in higher education Sector. But Due to pandemic challenges are increases before HE. The corona pandemic has made all the schools and colleges across the country to adapt online teaching through various apps like Zoom, Google meet, cisco WebEx meetings, team's app and many more. Institutes like IIM's and IIT's have an infrastructure to connect students but the experience shows that not all students had a good interaction due to various reasons. The present research work based on secondary data .In the present paper focus on the challenges in higher education sector before the pandemic and during covid-19.
Keywords: Pandemic, HE, Digital Infrastructure.

Introduction

Education is nation's top priority because it is a basic human right and the foundation on which to build peace and drive sustainable development. In Indian scenario access in higher education has significantly improved in the past few decades, but is still not sufficient to reach all our young citizens because number of challenges in higher education. The global health pandemic has shined a harsh light on the vulnerabilities and challenges humanity faces. It has provided a clear picture of existing inequalities—and a clearer picture of what steps forward we need to take, chief among them addressing the education of more than 1.5 billion students whose learning has been hampered due to school and colleges closures.

The corona pandemic has made all the schools and colleges across the country to adapt online teaching. The experience shows that not all students had a good interaction due to various reasons in online teaching mode.

Objectives:

1. To Study the challenges before HE in India.
2. To study the challenges during Covid -19 in Higher education.

Present Scenario of Higher Education in India: It has a large higher education sector — the third largest in the world in student numbers. There are 1043 Universities, 42343 Colleges and 11779 Stand Alone Institutions listed on AISHE web portal and out of them 1019 Universities, 39955 Colleges and 9599 Stand-alone Institutions have responded during the survey.

Challenges before higher Education:

India's colleges and universities have become large, under-funded, ungovernable institutions. Under-investment in libraries, information technology, laboratories, and classrooms makes it very difficult to provide top-quality instruction or engage in cutting-edge research. Indian Higher education facing the number of challenges such as

1. Fragmentation of the higher education system:

India has over 1043 universities and approximately 42343 colleges, reflecting the overall severe fragmentation and small size of HEIs currently in the country. Remarkably, over 40% of all colleges in the country run only a single programme, far from the multidisciplinary style of higher education that will be required in the 21st century. In fact, over 20% of colleges have enrolment below 100, while only 4% of colleges have enrolment over 3000 (AISHE 2016-17). To make matters worse, thousands of the smaller colleges hardly have any teaching faculty at all, and there is little or no education taking place - thus affecting severely the integrity of the higher education system in the country. This fragmentation of the system leads directly to severe sub optimality on various fronts: resource utilization, the range and number of programmes and disciplines, the range and number of faculty, and the ability to carry out high-quality multidisciplinary research.

2. Too many silos; too much early specialization and streaming of students into disciplines: India's

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महानगरीय कथा साहित्य में नारी विमर्श

डॉ. पवार सीताबाई नामदेव
अध्यक्ष हिंदी विभाग
कला, विज्ञान एवं वाणिज्य महाविद्यालय इंदापुर

प्रस्तुत शोध आलेख में कतिपय महानगरीय कथाओं में से स्त्री पात्रों को प्रतिनिधिक रूप में रखकर स्त्री के विविध पहलुओं को स्पर्श कर उनके सामाजिक, राजनैतिक, आर्थिक एवं पारिवारिक दृष्टि से गुणात्मक परिवर्तन का विश्लेषण करते हुए उनके जीवन में उभरकर आये हुए तरह-तरह की समस्याओं का चित्रण यथार्थ महानगरीय नारी में हमें गुणात्मक परिवर्तन होता हुआ दिखाई देता है, जिसमें उसकी एक नवीन मानसिकता और अस्तित्व उभरकर सामने आया है। भारतीय समाज के आर्थिक ,सामाजिक, पारिवारिक बदलाव के परिणाम स्वरुप नारी के विविध रूपों में भी परिवर्तन आया है । उसके बदलते रूप विमर्श निम्नलिखित कारणों के माध्यम से किया जा सकता है –

अ.सामाजिक ब. राजनैतिक क.आर्थिक ई. पारिवारिक

सामाजिक दृष्टि से महानगरीय नारी का गुणात्मक परिवर्तन :-

सामाजिक परिवेश में नारी समाज का एक अविभाज्य घटक है । हर युग में उसका बदलता हुआ रूप समाज के बदलते परिवेश को जिम्मेदार है। सामाजिक तौर पर नारी का गुणात्मक परिवर्तन महानगरीय कहानियों में होता है। डॉ.गणेश दास के मतानुसार- "समाज में संवैधानिक, आर्थिक, शैक्षणिक , नैतिक परिवर्तनों से नारी के समक्ष संबंधों का एक नए क्षितिज खुला । वह समाज में केवल पारिवारिक संबंधों को लेकर प्रतिष्ठित हुई है । सामाजिक क्षेत्र में जिससे यह स्पष्ट हुआ है कि उसका अपना अलग अस्तित्व भी है और महत्व भी है । अब वह पुरुष के साथ वैचारिक एवं भावनात्मक स्तर पर जीवन जीने लगी है । उसे शिक्षा और अर्थ से संबंध क्षेत्रों में पुरुष के साथ रहना पड़ा है"। चार दीवारों में रहनेवाली नारी घर की दहलीज पार कर पुरुषों के कंधे से कंधा लगाकर वह अलग-अलग क्षेत्रों में काम करके अपने व्यक्तित्व की तलाश करते हुए सामाजिक अस्तित्व का निर्माण करने चली । किसी पर निर्भर न रहकर पारिवारिक भूमिका संभालते हुए सामाजिक जीवन में अपनी नई छबी बनाने का प्रयास करती हुई दिखाई देती है । साथ ही वह अपने व्यक्तित्व को तलाशते हुए स्वच्छंद जीवन जीने की अभिलाषा रखती है। सामाजिक के प्रति नारी की सजगता का प्रमाण यह है कि सन 1952 से लेकर आज तक उन्होंने भारतीय संसद में प्रवेश नहीं किया बल्कि संसद में अपनी स्वतंत्र छवि को प्रस्तुत किया। अखिल भारतीय महिला सम्मेलन, भारतीय राष्ट्रीय महिला परिषद, भारतीय राष्ट्रीय महिला आयोग और अंतर्राष्ट्रीय महिला सबलीकरण वर्षा भारत में मनाना आदि इस बात का प्रमाण है कि वह पुरुष की भांति एक अस्तित्व लेकर भारतीय समाज में उभर कर आई है।

महानगरीय नारी के राजनीतिक रूप का चित्रण हमें मन्नू भंडारी की 'हार' इस कथा में दीपा के माध्यम से मिलता है। दीपा राजनीति में भाग लेती है। विवाह पूर्व और विवाह पश्चात वह राजनीति में सक्रिय रहती है और पति के विरोध में चुनाव में खड़ी रहती है। वह अपने पति से कहती है कि- "अभी तक तुम्हारी पार्टी की विरोधानी थी, अब तुम्हारा भी सामना करना पड़ेगा तुम हारो यह नहीं चाहती और तुम जीतो यह तो कभी भी नहीं चाहती.... कल हम लोगों ने बहुत बड़ी सभा का आयोजन किया है। तुम्हारी कसकर धज्जियां बिखरने वाली हूं।" इसके अलावा निर्मल वर्मा के 'डेढ़ इंच ऊपर' इस कथा में पत्नी भी हमें राजनीति जीवन में सक्रिय दिखाई देती है। महानगरीय नारियों का अपना अलग राजनीतिक अस्तित्व दिखाने का प्रयास इन कहानीकारों ने किया है।

मन्नू भंडारी कि ईसा के घर इंसान इस कहानी में एंजिला एक ऐसी महानगरीय नारी का प्रतिनिधित्व कर रही है, जो धर्म के नाम पर चलने वाले नारी शोषण के खिलाफ आवाज उठाती दिखाई देती है। मानसिक संस्कारों और आत्म शुद्धि के नाम पर चर्च के फादर युवतियों से अपनी काम तृप्ति कर उन्हें जिंदा लाश बना देते हैं। एंजिला ऐसे अन्याय के प्रति विद्रोह करती है एक राजनीति नेता की भांति वह नारी स्वतंत्रता के लिए आवाज उठाती है। समाज में होने वाले ऐसे अन्याय के खिलाफ शोषित महिलाओं में जन जागरण कर आत्म रक्षा कर फादर का भंडाफोड़ देती है।

महानगरीय नारी का आर्थिक धरातल पर परिवर्तन:-

राजनीतिक अधिकारों के साथ-साथ नारी को आर्थिक स्वाधीनता भी प्राप्त हुई। वह आत्म निर्भर बनने के साथ समाज के हर क्षेत्रों में कार्य करने लगी। जहां एक और उसमें वयक्तिक अस्तित्व की चेतना ने जन्म लेकर वह स्वावलंबी बनी, वहीं दूसरी और घर

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Novel and efficient hybrid supercapacitor of chemically synthesized quaternary 3D nanoflower-like $NiCuCo_2S_4$ electrode

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ABSTRACT

In this work, we employed a simple and cost-effective chemical route to obtain a highly stable and efficient quaternary mesoporous 3D nanoflower-like $NiCuCo_2S_4$ nanocomposite for supercapacitor applications. The $NiCuCo_2S_4$ composite exhibited a mixture of $NiCo_2S_4$ and $CuCo_2S_4$ phases, confirming the formation a quaternary $NiCuCo_2S_4$ thin film. A surface morphological analysis revealed the unique nanoflower-like nanostructure of the annealed composite. The electrochemical analysis of the $NiCuCo_2S_4$ electrode demonstrated a high specific capacity (Cs) of 414 mAh g^{-1} at a lower scan rate of 10 mV s^{-1} and a superior cycling stability up to 3000 cycles. A solid-state hybrid supercapacitor (SHS) was also constructed by the $NiCuCo_2S_4$ and AC powder as positive and negative electrodes, respectively. The $NiCuCo_2S_4$//AC hybrid cell produced a high Cs, energy density, and power density of 159 F g^{-1}, 35.19 Wh kg^{-1}, and 0.66 kW kg^{-1}, respectively at a current density of 10 mA with good cycling stability. The results demonstrated that the fabrication process is effective for the development of a novel quaternary transition metal sulfide (TMS) electrode.

1. Introduction

The expansion of a high-energy storage system has fascinated significant consideration due to the rising demand for efficient renewable energy sources. The capable energy storage systems such as supercapacitors (Sc) offer a high power density, energy density, cycling stability, lower resistance, and greater safety compared to batteries [1,2]. Electrochemical supercapacitors store energy either through ion adsorption (electrochemical double-layer capacitors, EDLCs) or fast, reversible, multi-electron surface redox reactions (pseudocapacitors). Highly reversible redox reactions are responsible for the high specific capacitance of pseudocapacitor devices [3–5]. Physicochemical properties of the selected materials strongly affect the performance of supercapacitor devices. For instance, the electrochemical performance can degrade during the cycling due to change in the morphology of selected materials. Therefore, it is important to improve the morphological stability of supercapacitive electrode materials to maximize their cycle life [6]. Materials with hierarchical pores and tabular or layered structures are well-known to increase the charge transport, ion diffusion, power density, and the cycling stability [1,7]. In addition to structural design, the electrode composition also have a crucial role in the performance of electroactive materials [8]. The electrochemical performance can be tuned by optimizing the ratio of metal ions.

Several nanomaterials with desirable properties fabricated from carbonaceous materials and metal oxides have been employed in supercapacitor applications. In particular, metal chalcogenides exhibit excellent physiochemical properties that are suitable for supercapacitor applications. Ni, Co, and Cu-based materials have attracted significant attention in various fields, the oxides and sulfides of these metals have been proven to be useful for electrochemical energy storage applications [9]. These metals are an important strategic resources which are mostly suitable in electrochemical energy storage systems, catalysis, and other fields due to their unusual structural, optical, and electronic properties [10]. Ni, Co, and Cu-based battery materials in aqueous and alkaline electrolytes have been reported to facilitate fast Faradaic reactions on or near their surface, thus offering both high energy storage and power

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Zoology

DIVERSITY OF PHYTOPLANKTONIC GROUPS IN THE RIVER KALI, WEST COAST OF INDIA.

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ABSTRACT Present study was carried out in Kali River and in all 44 genera were recorded , out of which 30 belonged to Bacillariophyceae , 6 each to Dinophyceae and Chlorophyceae and 1 each to Cyanophyceae and Rhodophyceae . In Kali River , primary peak was observed during post-monsoon and secondary during pre-monsoon . Annual percentage distribution data indicates that Bacillariophyceae was dominant (79.30%) followed by Chlorophyceae (11.09%) Dinophyceae (9.16%) while Rhodophyceae and Cyanophyceae were poor and noticed during certain period of present study. Positive correlation was observed between Cyanophyceae- pH , suspended load and nitrite while temperature and silicate showed positive correlation with Bacillariophyceae . Chlorophyceae exhibited positive correlation with dissolved Oxygen and phosphate . Negative correlation existed with air temperature and VEC with Dinophyceae members . Rhodophyceae exhibited correlation with water temperature and silicate . Phytoplankton distribution and abundance was governed by hydrological factors like Temperature , Salinity and nutrients .

KEYWORDS : Phytoplankton, Hydrological parameters, Kali river, Uttar Kannada.

INTRODUCTION

Studies on phytoplankton of different riverine systems of west coast of India have been carried out extensively projecting an ecology of phytoplankton and their role as a fin-fish diet and as an indicator of pollution and also the trophic status of water bodies (Qasim et.al., 1972, Zingde et.al.,1990,Naik and Neelkantan 1990)

Kali river is one of the major riverine system of maritime district of Uttar Kannada which originates in the western ghats at Kusavali Village in Supa Taluka after meandering nearly 165 Km and discharge the fresh water into the Arabian sea at Karwar, central west coast of india. Since a limited work was carried out on these area with an earlier works of Ramamurty (1965).Konnur (1981) and Naik And Neelkantan (1990) who have studied the distribution of phytoplankton in the Karwar Waters and in Kali river. No work has been carried out in the upper reaches of the river and hence the present investigation was carried out to study the variation in different groups of phytoplankton of this kali riverine system along with the hydrographic parameters. An attempt has also been made to correlate environmental variables and biotic entities.

MATERIALS AND METHODS

Kali river (14° 50' 21" N and 74°09' 05" E), one of the five major riverine systems of Uttara Kannada coast, located on the central West Coast of India. Kali River being the northern most riverine system of this coast is known for its fin-fish and Shell-fish fisheries. A monthly collection of water samples along with the plankton samples were made in this river from the fixed five study stations namely Kodibag (st-1), Sunkeri (st-2),Kinnar (st-3), Halga(st-4) and Kadra (st-5) for a period of 1 year(sept.2016-sept.2017).

The phytoplankton samples were collected from these study sites using a conical net of bolting nylon cloth of 0.018 mm mesh width, and mouth ring diameter of 35cms, with the help of an out trigger canoe. The net was hauled for the duration of 10 min as surface haul and volume of water filtered through it was determined by flowmeter attached to it. The net was back washed between the two stations to avoid clogging of meshes. The samples were preserved in 4% neutralized formaldehyde for further analysis in the laboratory. After diluting the sample to known volume, an aliquot of 1 ml subsample was transferred to sedgewick's counting chamber and phytoplankton identified and quantified, similarly triplicate subsamples were analyzed and their mean was taken and multiplied to the total volume of the sample. Total standing crop of phytoplankton was represented as number of cells per 1cubic meter of water and their percentage composition is calculated. Hydrographic parameters such as temperature, salinity , dissolved oxygen , pH, suspended load, VEC, phosphate- phosphorous ,Nitrate-nitrogen, nitrite –nitrogen ,silicate-silicon were also recorded at the of plankton collection. These hydrographic parameters except water temperature were analyzed by following the standard methods as suggested by strickland and parsons (1975). Water temperature was recorded by using the ordinary thermometer.

RESULTS AND DISCUSSION

Steep fall in temperature from pre-monsoon to south-west monsoon was noticed while a gradual decreasing trend noticed from pre-monsoon to post-monsoon during the present study. The impact of south-west monsoon was severe which prevailed during June to September was vigorous on salinity the Table.1 and seasonal variation in Table.2. A similar trend was noticed by Naik And Neelkantan (1990). The salinity trends to decrease with increasing distance from the river mouth to upper reaches of the river and this could be probably due to run off the land, Rainfall during the monsoon season and evaporation from the river itself. In addition to this flow of fresh water from upper reaches through reservoirs and other tributaries of Kali River could be the reason for the lowering of salt content. Temporal variation of dissolved oxygen shows maximum during post monsoon (7.58 mg/l) and minimum during june (3.76 mg/l) while spatial variation showed a minimum value (4.35 mg/l) at station 2 , while a maximum (6.34 mg/l) at station 5. The pH value fluctuated between 7.19-8.71 with slightly higher values during post and pre-monsoon. According to Perkins (1976), the range of pH of estuarine waters at normal and unpolluted conditions is 6.7-9.25. Maximum suspended load was recorded during south-west monsoon period (0.0514 gm/l). The influence of highly turbid fresh water and land run off resulting in a higher suspending load as stated by Jerlov et.al., (1978) the concentration of suspended water vary from less than 0.1 mg/l in the open oceans to many grams per liter in the estuarine and nearshore waters. The present data coincides with the findings of the earlier workers Naik and Neelkantan (1990) .

Temporal variation in VEC shows a high value of 2.85 during the month of May and low value of 1.92 in July. Temporal variation of phosphate shows a high value (3.076 µg at/l) during the post-monsoon at station Halaga and low (0.445 µg at/l) during the pre-monsoon season. Nitrate was found maximum during post-monsoon (16.66 µg at/l) while minimum (3.19µg at/l) during the south west-monsoon. Comparatively an intermediate value (11.05µg at/l) noticed during pre-monsoon. A maximum concentration of this nutrient salt was observed at Kodibag (11.88 µg at/l) and lower value (6.14 µg at/l) at Hulga. Nitrite-N concentration was found maximum during the south-west monsoon (0.441 µg at/l) while the lowest values recorded during post-monsoon (0.063 µg at/l) concentration of content varied between (21.74 µg at/l – 43.26 µg at/l) with maximum during the pre-monsoon and minimum during post monsoon season. The present study was undertaken to evaluate an abundance and distribution of phytoplankton with respect to time and space. Totally 55 planktons were identified and are categorized into 5 groups. Namely Cyanophyceae, Bacillariophyceae, Dinophyceae, Rhodophyceae and Chlorophyceae . The biomass of phytoplankton varied between 0.12 – 2.0 ml/m³. It is summarized from the results that the annual mean of

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A review on electrodeposited layered double hydroxides for energy and environmental applications

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ABSTRACT

The great demand for efficient and low-cost materials for energy and environmental applications has been inspiring researchers to develop novel and advanced materials. Recently, layered double hydroxides (LDHs) are found to be admirable materials for various applications owing to their tunable elemental composition and diverse nanostructures. The preparation of binder-free LDHs thin-film electrodes has attracted great attention in the field of supercapacitors, electrocatalysts and sensors. The electrodeposition method exhibits the capability of fabricating binder-free, uniform and well-oriented thin films with tunable elemental composition. In the present review, we provide a detailed electrodeposition mechanism behind the formation of LDHs with nucleation and growth processes. Also, we summarize the literature on electrodeposited LDHs based electrode materials for energy and environmental applications. In energy storage applications, a loading amount of active materials on the substrate is crucial to improve the areal and volumetric capacities. Therefore, the utilization of low-cost and scalable scaffold materials such as carbon nanofibers, graphene foam, etc. is highly recommended.

1. Introduction

Layered double hydroxides (LDHs), often called hydrotalcite-like systems or anionic clays have attracted great attention owing to their tunable chemical and metal-anion compositions. The general formula for LDHs can be written as $[M^{II}_{1-x}M^{III}_{x}\ (OH)_2]^{x+}[A^{n-}_{x/n}\cdot yH_2O]^{x-}$ (where M^{II} and M^{III} represent the divalent and trivalent metal cations, A^{n-} represents n-valent anions). Depending upon the nature of cations and M^{II}/M^{III} molar ratios, LDHs can be prepared with a wide range of layered structures [1]. The tunability of the molar ratio of metal cations and the nature of interlaying compensating anions lead to the formation of different nanoarchitectures with versatile physical and chemical properties, extending their applicability in diverse fields [2]. LDHs have been reported for different energy and environmental applications such as electrochemical energy storage, electrocatalyst, sensors, etc. These applications demand well-oriented, uniform and high conducting thin films [3,4]. Previously, LDHs have been prepared by different chemical methods such as co-precipitation [5], hydrothermal [6], sol-gel [7] and urea hydrolysis [8], either in thin film or powder form. These chemical methods are time-consuming and complex. Also, the powdered materials need to be combined with binders and conducting additives to be applied for many energy and environment-related applications, imposing additional inactive mass to the electrode [9]. In order to overcome these disadvantages, a binder-free LDHs can be prepared using electrodeposition method. The electrodeposition is rapid, facile, and scalable method which deposits well oriented and high quality thin film materials on the conducting support with enhanced conductivity and electrochemically active sites [10]. Recently, variety of different LDHs thin films have been prepared using electrodeposition method. Fig. 1 shows the number of publications and number of citations received by the research papers published in the field of electrodeposited LDHs, indicating the influence of the field.

Recently, some review articles have been published in the field of LDHs [1,11–13]. However, they mainly focus on general synthesis methods and their different applications. To the best of our knowledge, there is no review article published that emphasizes the detailed electrodeposition mechanism behind the formation of LDHs and review of electrodeposited LDHs for energy and environmental applications. It is important to understand the detailed electrodeposition mechanism in preparing LDHs for a variety of applications to fabricate efficient materials by overcoming present difficulties. Therefore, in this review, we have discussed the fundamentals of electrodeposition methods with

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Original Research Paper

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A CASE STUDY OF LIPID CONTENT IN THE BRAIN OF *CIRRHINA MRIGALA* AND *LABEO ROHITA* FROM RAJARAM TANK NEAR SHIVAJI UNIVERSITY KOLHAPUR, MAHARASHTRA, INDIA.

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ABSTRACT Neutral lipids (NL) and phospholipids (PL) with their constituents were studied in brain of *Cirrhina mrigala* and *Labeo rohita*, by employing TLC and Bioassay technique . The total lipid in the brain of *Labeo rohita* is 24.14 mg lipids / gm , increase to 127.9 mg lipids / gm in the brain of *Cirrhina mrigala* . The ratio of cholesterol and phosphotidylcholine in the same species is 5:1 and 4:1 respectively .

Neutral lipids consists of six components , triacylglycerol being main component . Cholesterol (CHO) , Diacylglycerol (DG) , Cholesterol-ester (CE) , and Monoacylglycerol (MG) were moderate in concentration . Free fatty acids (FFA) was low in quantity . Phospholipids exhibits seven constituents , Phosphatidylcholine (PCL) and phophatidyl - ethanolamine (PE) were major constituents , sphingomyelin (SPG) , phosphatidyl - inositol (PI) and phosphatidyl- serine (PS) were moderate in concentration . Lysophosphatidylcholine (LPC) were low in quantity .

KEYWORDS : Neutral Lipid, Phospholipid, TLC technique, Bioassay technique.

INTRODUCTION

The brain is amongst the most complex and highly evolved organ, involved with special function which has given man his unique place on the ladder of evolution. It is remarkable for its state of continuous activity as may be evidenced both by experience as well as by electrophysiological monitoring. Since it is an important organ of body it has been studied for many aspects, including the biochemical information.

From the critical review of literature on the lipids of fish brain, the following significant facts emerges especially in *Cirrhina mrigala* and *Labeo rohita*. The lipid contents in the various organs like liver, testis , ovary and accessory reproductive organs of fishes including mammals, seems to have received greater attention from the workers in the fields. However, the most important organ systems like brain are overlooked due to which there is a paucity in the information of brain lipids particularly in lower vertebrates. Some research workers studied parameters like lipid peroxidation in vivo and in vitro studies.

From the above literature indicates very scanty information is available on lipids of fish, especially in the above species. Hence in the present case study the attempt was made to find out the content and composition of lipids in the brain of *Cirrhina mrigala* and *Labeo rohita* . A few research workers have made their contribution in reporting the brain lipids in some fishes. Pravdina and Chebotareva (1974) eel, Dasiatis Pastinaca, Kreps et.al. (1976), teleost and elasmobranch fishes; Malkhede et.al. (1981), Clarias batrachus, Vadhva and Mahdi (1987) fish, Hollander (1970) goldfish and Ushkolova and Ioanidis (1985) white fish.

MATERIALS AND METHODS

For the present study two Vertebrates were selected, each one representing a class of sub phylum vertebrata, While selecting the animals, care was taken to see their evolutionary states, they are as follows;

Two species of fishes *Cirrhina mrigala* and *Labeo rohita* were collected from Rankala tank in Kolhapur city (Maharashtra, India). Fish species of each type were collected at a time and brought to the laboratory, where they were kept in plastic containers for about six hours for acclimatization. The average weight of fish was about 250gm. The fish were sacrificed to take out the brain for further studies.

METHODS

Thin layer chromatographic technique for the analysis of lipids in fish brain was used. This gives a good separation of both neutral and phospholipid components for quantification studies bioassay method is used.

Extraction of lipids

The brain tissue were homogenized with 20 volumes of chloroform methanol (2:1, v/v) at room temperature. The homogenates were allowed to stand for 4 to 6 hours at 4°C and then filtered through the sinctered funnel into glass-stoppered container. The precipitate was rehomogenised with 10ml of chloroform methanol mixture (2:1, v/v) and then filtered through the sinctered glass funnel. Both the filtrates were pooled together and the resultant mixture was shaken well with 0.2 volume of glass distilled water. Extract were allowed to partitioned into two distinct phases. The upper phase while generally contained the major part of the non-lipid contaminants were removed as completely as possible with a fine tipped pipette. The lower phase which mainly contained lipid fraction was transferred quantitatively through sodium sulphate to remove water completely from the lipid sample. The more chloroform was added to remove any lipid fraction from the sodium sulphate. Then it was transferred quantitatively into a glass stoppered container and evaporated under vacuum at 40°C.The lipid sample was weighed accurately and preserved by desiccation under vacuum at 20°C for further use.

The NL and PL were separated by thin layer chromatography (TLC) using silica gel G (about 200 mesh containing CaSO4 as a binder E Merck Germany), the TLC plates (20*20cm) were prepared according to Wagner et. al. The known quantities of sample dissolved in chloroform were applied with Hamilton's micro syringe (Number 8206.B) 2.5 to 3.0 cm from the bottom edge of the plates. For neutral lipids the plates were developed in Hexane (b.p.65° to 70°C): diethyl ether: acetic acid (85:15:2,v/v) as recommended by Gloster and Flecter. The phospholipids plates were developed in chloroform: methanol: ammonia (115:45:5,v/v) as recommended by Barval and Kalra. The standards of neutral lipid and phospholipid (Sigma, USA) were co- chromatographed in each respective run and then plates were kept in Iodine chamber for identification of individual spots of lipids.

Estimation of neutral lipid and phospholipid

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Green synthesis of novel $CuCo_2O_4$ nanocomposite for stable hybrid supercapacitors by deep eutectic solvents

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ABSTRACT

Currently, many transition metal oxides (TMOs) have been demonstrated as attractive nanomaterials for application in supercapacitors for energy storage/conversion systems. Among TMOs, $CuCo_2O_4$ has presented excellent electrochemical properties, including higher electrical behavior. Also, they are readily accessible in earth, ecofriendly and cost effective compared to other nanocompunds. In this research, we have for the first time synthesized $CuCo_2O_4$ (CCO) nanomaterials using a deep eutectic solvents (DES) method for supercapacitor (SC) applications. We systematically studied the effect of annealing temperature of CCO on its structural, morphological, and electrical properties. The CCO was annealed at different temperature of 150, 200, 250, and 300 °C for 3 h. CCO annealed at 250 °C exhibited the superior performance compared to other as-synthesized and annealed samples. The optimized CCO electrode shows outstanding supercapacitive properties with specific capacity 421 mAh g^{-1} at 10 mV s^{-1}, excellent GCD capability, and super cycling stability. This indicates that the DES-prepared CCO shows better electrochemical performance due to highly porous nanostructure providing more active sites for easy transformation of the ions.

1. Introduction

Supercapacitors (SCs) are the core component in the development of sustainable energy storage systems with high power density, high energy density, fast charge–discharge, long life, cycling stability, and low cost [1–4]. SCs can be classified into two categories based on the charge storage mechanism: electrical double layer capacitors (EDLCs), which consist of electrostatic charge accumulation at the electrode/electrolyte interfaces, and pseudocapacitors, which comprise reversible Faradic reactions. Pseudocapacitors deliver much higher specific capacitance and energy density than the EDLC [5–7] Metal oxides of copper, nickel, cobalt, and manganese have gained increasing attention in SCs research because of their electrochemical properties [8,9]. Copper oxide and cobalt oxide has many potential applications in various scientific technologies. Among numerous metal oxides, binary transition metal oxides (TMOs) of copper and cobalt showed excellent electrochemical properties, such as specific capacitance, conductivity, cycling performance, and structural stability [10].

The earth abundant spinel type cobalt oxide and its derived compounds offer a promising alternative cheap material for electrochemical energy storage application because of its high theoretical capacitance ~ 3600 F g^{-1}, electrochemical reversibility, and stability. However, the electrochemical performance was slightly lower than expected due to the internal low conductivity, morphology, surface area, chemical composition, and crystallinity [11,12]. Recently, many efforts have been devoted to overcoming these obstacles by designing mixed-metal oxides, controlling morphology, size, and structural properties. Previous reports found that the introduction of Cu in the host cobalt oxide could be beneficial towards improving conductivity and electrochemical properties. Therefore, copper cobalt-based oxides have been highlighted because of their natural abundance, excellent stability, and low cost. Furthermore, amalgamation of metal oxides is a promising way to boost electrical conductivity, electro-chemical properties, and structural stability.

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Probing the electrochemical properties of $NiMn_2O_4$ nanoparticles as prominent electrode materials for supercapacitor applications

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ABSTRACT

$NiMn_2O_4$ (NMO) powders have been prepared by facile sol–gel route, and the effect of annealing temperature and the concentration of KOH electrolyte on its electrochemical performance has been investigated. The electrochemical performance of the NMO electrodes is tested via a three electrode arrangement in KOH electrolyte. The NMO electrode (NMO1) prepared from the powder synthesized at a temperature of 500 °C with an approximate crystallite size of 10 nm exhibits maximum specific capacitance of 571 Fg^{-1} at a scan rate of 5 mVs^{-1} in 1 M KOH electrolyte. The specific capacitance of the NMO1 electrode is found to be improved from 571 Fg^{-1} in 1 M KOH to 762 Fg^{-1} in 6 M KOH electrolyte. The improvement in the specific capacitance of the NMO1 working electrode in 6 M KOH electrolyte can be attributed to good electrochemical utilization and an effective charge storage mechanism.

1. Introduction

Supercapacitors (SCs) have attracted much attention because of the fast rechargeability, higher power density over the batteries, and more energy storage ability as compared to conventional capacitors. The SCs have enormous energy storage capacity besides possessing the combined property of both conventional capacitor and battery [1]. Based on the charge-storage mechanism, electrochemical SCs can be classified into three categories: viz, pseudocapacitors, electrical double-layer capacitors (EDLCs), and hybrid capacitors. The conducting polymers and various metal oxides are utilized as the active electrode materials in pseudocapacitors, whereas in EDLCs carbon-based materials such as activated carbon, graphene, and carbon nanotubes are used as active electrodes. One more type of SCs is a mixture of both pseudocapacitors and EDLCs, known as a hybrid capacitor. To construct these types of SCs, the active electrode materials are made by combining either two or three distinct elements which give very large specific capacitance and enhanced energy density than pseudocapacitors or EDLCs [2]. However, all the above-mentioned SCs still suffer from some significant disadvantages such as poor cyclic life span of conductive polymers, the low capacitance of carbon-based materials and high cost of typical transition metal oxides like RuO_2 [3]. RuO_2 has been extensively investigated as a promising material due to its high specific capacitance and excellent cycling stability, but rareness and the high cost of ruthenium element are putting significant barriers to its commercialization [4]. To overcome these significant disadvantages, it is necessary to explore other alternative materials for the fabrication of supercapacitors.

Mixed transition metal oxides (MTMOs) are preferred to fabricate electrode materials for supercapacitor application over the single transition metal oxide component due to its enhanced chemical stability and electrochemical properties [5]. Out of the different MTMOs, considerable attention has been centered towards the synthesis of cubic spinel $NiMn_2O_4$ (NMO) as it offers high conductivity, outstanding electrochemical capacitance, high redox-active sites, and exceptional chemical

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REPRODUCTIVE CYCLES IN TWO GEOGRAPHICALLY SEPARATED POPULATIONS OF THE OYSTER *Saccostrea cucullata* FROM SINDHUDURG DISTRICT, MAHARASHTRA STATE, INDIA

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Abstract:

Two geographically separated localities at Deogad (160 23' N ; 730 23' E) and Achra (160 15' N; 780 26' E) in Sindhudurg district of Maharashtra State ,India were selected on the basis of the differences in habitat , topography ,vegetation and local market value to study the reproductive cycles of the oyster Saccostrea cucullata. The maximum sizes attained by S. cucullata in the estuaries at Deogad and Achra were 44-45 mm shell length. However, comparatively larger sized oysters are found round the year in the estuary at Deogad than at Achra.

The environmental parameters such as tidal heights, pH, temperature, dissolved oxygen and salinity existing on the oyster beds in Deogad and Achra were recorded on every new-moon and full-moon days for a period of twelve months.

The microscopic details of the gonad tissue processed on every new moon (NM) and full moon (FM) days of each month revealed following stages ; (i) Gametogenesis ; (ii) Maturing ; (iii) Mature; (iv) Partial spawning ; (v) Complete spawning ; (vi) Recovery ;(vii) Neutral . The gonads of twenty oysters were staged for males and females separately on each NM and FM days and percentage of the males and females in these different stages were calculated.

The study on reproductive cycle in male oysters of S. cucullata from Deogad showed that many oysters were in gametogenesis stage in entire June and once again on November NM. Maturing stage was seen on March NM, May FM, July NM and again on November FM and in entire December. Many oysters were in mature stage on March FM, April FM and July FM and again on January NM. Most of oysters were under spent stage on March FM, in entire August and September, and on January FM. Many oysters were under recovery stage on May NM and in entire October. Most of the samples collected in entire February and on April NM showed prominent neutral stage. The female oysters showed that the gametogenesis was dominant on March NM, in entire June and on November NM; maximum on NM of March and on November. The maturing stage was dominant in entire April and May and on July NM and December NM. Oysters under spent condition were dominant on April NM and December FM, and all the gametes were released in entire August, September and on October NM. The recovery stage was recorded in many oysters on October FM and January FM, while the neutral stage was recorded in entire February.

The male oysters from Achra showed gametogenesis stage on March NM, April FM and June NM. The maturing stage was seen in most oysters on April FM, June FM, July NM, September NM and FM. The mature stage was very conspicuous on July FM and November NM. Most oysters were in the spent stage on May FM , August NM ,October NM and December FM. Oysters under recovery stage were in high percentage on December NM , January NM and February FM. The neutral condition was most prominent in many oysters on March NM and January FM. The female oysters at Achra showed that many oysters under the gametogenesis appeared on April NM, June NM and December FM. The maturing condition in oysters was dominant on April FM, June FM, August FM, entire September and on February NM. Many oysters in mature stage occurred on October NM and November NM. The spent stage in oysters was dominant on December NM, In entire May and on July FM. The recovery stage was recorded in December NM, while the neutral stage in oysters was dominant on January FM and March NM. These different stages of the gonads have been correlated with the changes in environmental conditions over the oyster beds from the two localities. The results are discussed in the light of possible impact of the environment on reproductive events.

Keywords: S. cucullata, Deogad, Achra, FM, NM, gametogenesis.

Introduction:

Along the west coast of India the backwaters and estuaries are very extensive and play an important role for food production. These are widely scattered and have an area of 30.7 lakhs acres (Mitra, 1970) from which Maharashtra coast constitutes 3.0 lakhs acres

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LIFE TABLE AND INTRINSIC RATE OF INCREASE IN LEPIDOPTERAN PEST *Hypsa producta*

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Abstract:
Hipsa producta is the Lepidopteran insect pest is forest pest which acts as defoliator of *A. excelsa.* Therefore life table and intrinsic rate increase have been studied. The first adult mortality was noted on 5th day. Average period of immature stages was 30 days. Maximum mean progeny production per day, mx was 26 on the 3rd day. The immate capacity for increase was found to be 0.141 per female per day and population of *H. producta* multiplied 76.76 times in generation 'T' of 30.78 days.
Keywords: *Alianthus excelsa, H. producta,* life table, intrinsic rate of increase.

Introduction:
The estimate of rate of growth of the pest have tremendous importance in pest management. The estimates of the rate of growth of the pests have tremandous importance in pest management (Howe, 1953). In a given environment an individual living animal shows its own characteristics qualitatively and quantitatively at longevity and fecundity. The value of development, are determined in part by the environment and in part by inherent characteristics of the living animal itself. According to Thompson (1924) the inherent characteristics of the animals are collectively called the 'innate capacity for increase". He visualised the first mathematical method for population dynamics. Later, Lotka (1925) derived the function for "the intrinsic rate of natural increase' and then Birch (1948) used the same for animal ecology and for the insect populations. In the present study the life tables were constructed according to Birch (1948) as elaborated by Howe (1952) and Watson (1964) .

Review of literature indicates that life table studies have been attempted in different orders of insects by several workers, noteworthy amongst them refers to Morris & Miller (1954) on Choristoneura fumiferana (Lepidoptera), Stark (1959) on Recurvaia starki (Lepidoptera), Richards & Waloff (1961) on Phytodecta olivacea (Coleoptera), Le Roux et al.,(1963) on Spilonota ocellana (Lepidoptera); Waloff (1968) on Sitona recansteinansis Herbst (Coleoptera) and on Arytacina cenistae (Homoptera), Mcleod (1972) on Neodiprion swainei Midd. (Hymenoptera), Tamaki et al.,(1972) on Zebra caterpillar (Lepidoptera), Bains & Shukla (1976) on Chilo partellus (Swinh.) (Lepidoptera), Bilapate & Pawar (1980) and Reddy & Bhattacharya (1988) on Helicoverpa armigera.

Material and methods:
Intrinsic rates of increase-

Birch (1948) visualized the following equation to study intrinsic rate of natural increase.

$$\sum e^{-r} m^x l_x m_x = 1$$

Where
'e' is the base of the natural logarithms,
'x' the age of the individual in days,
*l*x the number of individual alive at age, 'x' as a portion of one, and m_x the number of female offsprings produced per female in the age interval 'x'.
The sum of the products 1x mx is the net reproductive rate,
'R_0' which is the rate of multiplication of the population in each generation measured in terms of females produced per generation.

$$T_c = \frac{l_x m_x X}{l_x m_x}$$

The approximate value of cohort generation time 'Tc' was calculated as follows:

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CHEMNANOMAT
Minireview

Materials Development in Hybrid Zinc-Ion Capacitors

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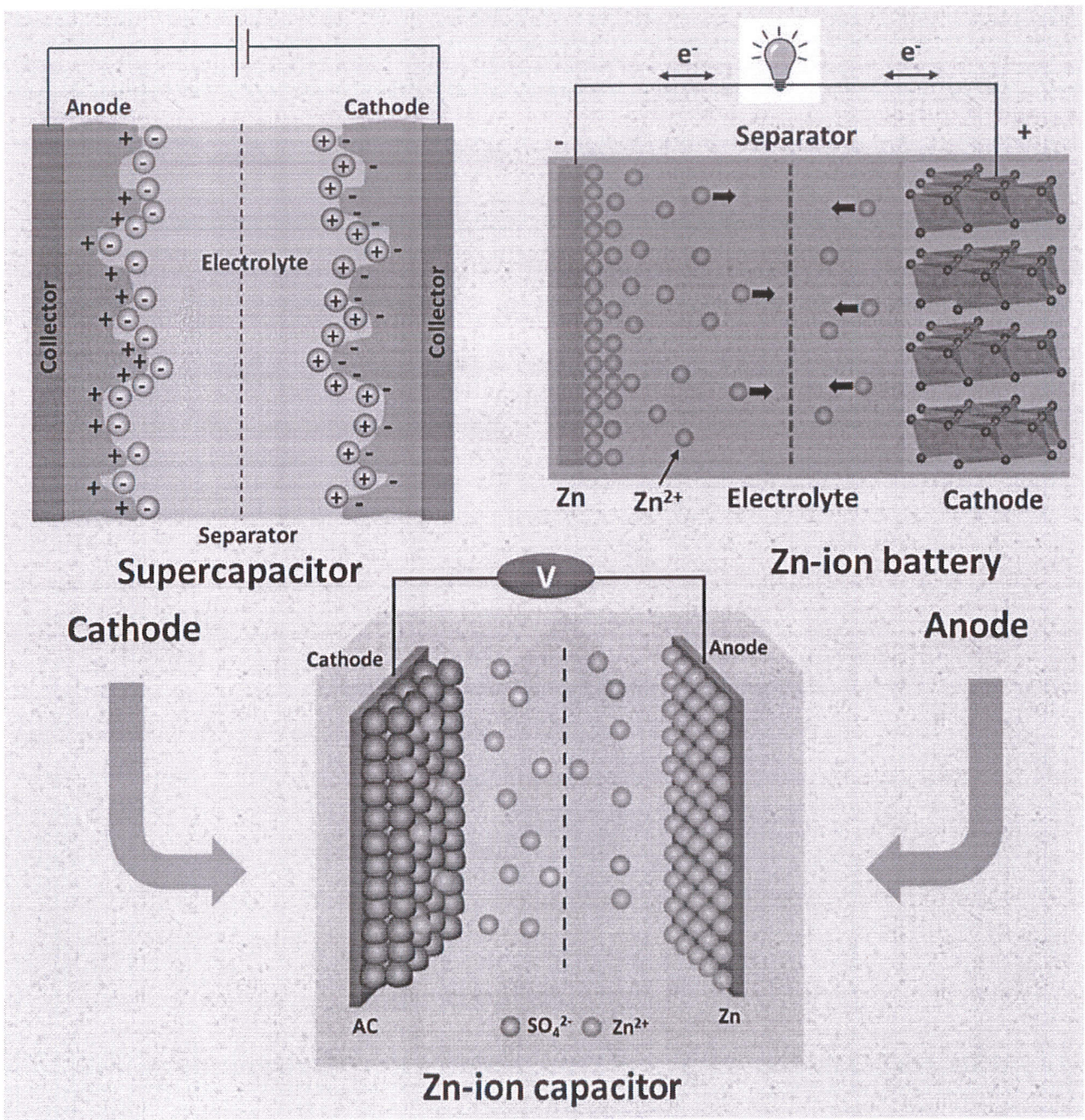

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HISTOPATHOLOGY OF PROSTATE GLAND IN TERRESTRIAL SLUG *Semperula Maculata* AFTER ACUTE EXPOSURE OF ZINC CHLORIDE

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Abstract:
This study enlights on terrestrial molluscan slug, *Semperula maculata*, against acute exposure of Zinc chloride ($ZnCl_2$). Histopathological changes were observed in the cellular arrangement of prostate gland. Prostate gland showed increased dilated secretory cells and damaged connective tissues were observed in the sectional view. These alterations found directly proportional to the time of exposure period. Evidence indicates that Zn degeneration and impact over the normal function and structure of prostate gland.
Keywords: *Semperula, maculate*, *Morus, indica*, alcohol, prostate gland

Introduction:

Molluscan species can also represent hazards or pests for human activities. Snails and slugs can also be serious agriculture pests, and accidental or deliberate introduction of some snail species into new environments has seriously damaged some ecosystems (Kadam *et al.* 2021). Terrestrial gastropods are highly sensitive to toxic chemicals producing alterations at the cellular level (Hernadi *et al.* 1992). He also reported the mussel *Elliptio complanata*, exposure to Cu had a significant effect on the mean percentage of destabilized lysosomes in different concentration. Now a day rapid industrial development in agricultural field leads to organic and inorganic contamination from hazardous chemicals and heavy metals of aquatic and terrestrial ecosystems. These form a major group of aquatic and terrestrial contaminants showing deleterious impact on terrestrial and aquatic media (Sanchez, 2008; Davidson *et al.* 2011; pack *et al.* 2014). Heavy metals are enter in the environment through anthropogenic sources, such as industrial effluent, traffic, smelting, combustion of fossil fuels, and certain agricultural practices (Uyear *et al.* (2009).

From above review it is clear that there is scanty information available on the effect of heavy metal on the reproductive organs i.e. on the prostate gland. Thus, the present study designed to study the effect of zinc chloride on the prostate gland of terrestrial slug.

Materials and Methods:

Experimental animals-

Adult herbivorous, hermaphrodite, terrestrial slugs *S. maculata* (Approximately of 67 cm length, 11.5 cm width and 34 g wt.) were collected from natural habitats from the village Panmala at Bedug, Miraj, district Sangli, Maharashtra, India. Animals were carried in aerated plastic bottles to the laboratory. Experimental animals were kept in open-air trough covered with aerated plastic lead covering to provide proper ventilation. Experimental animals were allowed to feed on fresh leaves of mulberry plant (*Morus indica*). All the animals were kept under controlled lab conditions of water, temperature, and fresh air for better acclimatization (Kadam *et al.* 2021).

Induction and tissue preparation-

Experimental animals, *S. maculata*, were acutely exposed to previously determined mean LC50 (377.7 ppm) concentration of $ZnCl_2$ (Londhe, 2013).Control and experimental animal were dissected after 24, 48, 72, or 96 hr., respectively, for prostate gland and fixed in Bouin's solution (75 ml picric acid + 25 ml formalin + 5 ml acetic acid) for 6-7 hr. at room temperature followed by washing with 70% ethanol for three days, dehydrated with ethanol-graded series, cleaned with xylene, and embedded in paraplast. Tissue blocks were prepared and sectioned with a rotary microtome at 6 mm thickness and for histological study (Londhe, 2013).

Histological study-

WATER REQUIREMENT IN THE INDAPUR TAHSIL DISTRICT PUNE MAHARASHTRA

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Abstract

The requirement of water is essential for every inhabitant and for a wide range of economic and informal sector activities. India accounts for about 17.5 % of the world's population and roughly 4% of the total available fresh water resources. With increasing population and growing demand from industrial and agricultural sectors the water consumption is set to jump up tremendously in the near future. Present study attempts to highlight the requirement of water resources in the Indapur tahsil Pune district of Maharashtra.

The proportion of water requirement is in three different activities i.e. domestic purpose, agriculture purpose and industrial purpose in Indapur tahsil are also discussed in the paper. The water requirement statistics has also been worked out through secondary data and personal interviews conducted during the field visits. For this purpose a questionnaire was framed. Questions are related to domestic, agriculture, livestock and industrial water requirement has also been incorporated accordingly. These data base converted to Microsoft access format to suit to the link up for processing through Arc View 9.3, Surfer version 10, Global Mapper version 11. The outcomes of these studies are briefly presented in the paper. It has been observed that the requirements of water resources are not uniform over the study area. The total water requirement for domestic, agricultural and Industrial purpose claims to 601.38MCM.

Key words: domestic, agriculture, industrial, requirement of water.

Introduction

A given water requirement is the amount of water which is necessary for the undisturbed course of any natural or technological process. It includes water consumption (consumed flow), i. e. the difference between water withdrawal and the net return flow that consists of consumptive use and losses. The water loss represents that part of the water requirement, water consumption, water withdrawal or water resource which returns into the hydrologic cycle in the form of seepage, leakage, percolation, evaporation etc. losses may be either ways. Water requirements and water consumption in the course of agricultural and industrial processes may be distinguished as

(a) Minimum,

(b) Optimum,

(c) Non-Economic.

Minimum water requirement or minimum water consumption during a specific production process can be achieved under special conditions, e.g. in

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STUDY OF REPRODUCTIVE BIOLOGY OF A MOTH *EUTECTONA MACHAERALIS WALKER*

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ABSTRACT:

*Eutectonamachaeralis Walker*Lepidopteran moth and is pest for *T. grandis.* Biology of the *Eutectonamachaeralis Walker*have been studied. In ten individuals, preoviposition period ranges from 2 to 3 days with an average of 2.6 ± 0.52 days. and post oviposition period ranged from 1.0 to 2.1 to 2 days with an average of 1.4 ± 0.52 days.Average egg hatching percentage was 75 78.5 ± 9.88. The developmental period of larval instars ranged from 15 to 18 days with an average of 17.0 ± 1.12 days. Instars of *Eutectonamachaeralis Walker*showed head capsule, body width and body length.

KEY WORDS: *Eutectonamachaeralis Walker,*preoviposition, oviposition and postoviposition.

INTRODUCTION:

Pachauri and Sridharan, 1998 reported that much damage is done to our natural resources and wealth.Beeson (1913) reported that *H. puera* and several species of Arctiids such as *Aularchesmiliaris*, *Teratodesmonticollis* Grey and *Spilosomaobliqua* defoliate teak forests. Garthwaite (1939) reported that *Calopeplaleayana* was a serious defoliator of *Gmelinaarborea* in Assam, Bengal, Mumbai and Chennai. *Celosternascabrator* was a most notorius pests of babul, *Acacia arabica* and teak plantations (Beeson, 1941). Khan *et al,*(1988) studied the seasonal activity and abundance of *H. purea*, *Euproctis* sp. and *E. machaeralis* in forest. listed various insect pests of teak, including lepidopterous such as *S.* Sensharma and Thakur (1988) *malabaricus*Moore, *H. puera,* and *E. machaeralis.* Beeson (1941) studied the biology of teak skeletoniser, *E. machaeralis.* David andKumarswami (1982) reported that female of *E. machaeralis* lays 250 to 500 eggs on leaves and as many as 10-12 generations were completed in a year.

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MORPHOLOGICAL CHANGES IN CHICK EMBRYO NEURAL TISSUE ASSOCIATED WITH WARFARIN USE DURING PRENATAL DEVELOPMENT

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ABSTRACT:

Warfarin is generally called as blood thinner that inhibits the clotting of blood by reducing the production of factors by the liver that promotes clotting. It is anticoagulant drug due to this it helps to keep blood flowing smoothly in our body. The liver is dependent on a good enough amount of vitamin K due to the production of these factors by the liver. Warfarin is responsible for reducing the production of the factors. The aim of this study was to determine the effect of prenatal warfarin exposure on cell viability and cell morphology in chick embryonic neurons; specifically, to identify areas of the hindbrain that may be affected, to an extent contributing to Dandy-Walker Syndrome (DWS). histological staining technique namely Haematoxylin and Eosin (H&E) staining was used to evaluate chick embryonic neural tissue exposed to 4.865mM and 5.838mM warfarin on day 5 (Carnegie stage 17) and day 7 (Carnegie stage 20) of development. For further analysis of cell viability, primary chick embryonic Neuronal Cultures were prepared and increasing concentrations of warfarin (1.625mM, 2.435mM, 3.25mM, 4.865mM, and 5.838mM) were added. The percentage of cell viability was determined by the MTT assay method. We observed that warfarin indicated neurotoxicity at high concentrations of exposure. Although cell death could be detected, the exact mechanism needs to be yet investigated. Since the developing brain is so susceptible to chemical toxicity, care must be taken while administering warfarin to pregnant mothers or young children.

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HYDROBIOLOGY OF THE SHELF WATERS OFF KARNATAKA COAST, INDIA

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ABSTRACT:

Results of a comprehensive hydrological sampling programme of the shelf waters off Karnataka coast was conducted on the R.V.Gaveshani Cruise No. 208. Eight transects across the shelf, covering 25 stations were studied. Depth of stations varied from 17 to 1650 m. Findings of study described the hydrographical parameters as temperature, salinity, pH, dissolved oxygen, phosphate, nitrate, nitrite of surface and bottom waters.

Results presented were on the basis of a sampling trip conducted during the end of Post-monsoon period, thus providing information on the spatial pattern of various parameters. Information on temporal (seasonal) variation is essential in order to define the hydrographic dynamics of shelf waters of the region over the temporal sequence.

Key words: Temperature, salinity, pH, dissolved oxygen, phosphate, nitrate and nitrite.

INTRODUCTION:

Research vessel Gaveshani Cruise No.208 was carried to investigate the hydrography of the shelf waters off Karanataka coast. With the existence of six major estuarine systems namely, Kali at northmost, Gangavali, Aghanashini, Sharavati, Bhatkal, Koondapur and at southern Netravati (**Fig. 1**). Though the influence of the these on the fairly high fish production of Karnataka is understood, a systematic study to investigate the different abiotic and biotic factors was lacking long since. The present work is an effort to fill the lacuna besides to obtain a baseline data exclusively for the shelf and deep waters of Karnataka coast (from Netravati to Karwar). Environmental factors play a vital role in the productivity of the sea. Prevalence of the favourable hydrographical conditions is a prerequisite for optimum primary and secondary productions on which depends the fish production. The role of nutrients in limiting the distribution and abundance of plankton on which the fish thrive is also well understood. Since the coastal waters of North Kanara support an important fishery for the Indian mackerel. Earlier investigation at Karwar [1][2][4] and Mangalore [13] have contributed to our knowledge of the hydrological conditions of Karnataka coast. According to Shenoi *et al.* [11] the surface hydrography during March–April was dominated by the intrusion of low-salinity waters from the south; during May–June, the low-salinity waters were beginning to be replaced by the high salinity waters from the north.

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DISSOLUTION AND REFORMATION OF CRYSTALLINE STYLEOF THE EDIBLEOYSTER*SACCOSTREACUCULLATA*FRO M SINDHUDURGDISTRICT, MAHARASHTRA STATE

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ABSTRACT:

Two geographically separated estuarine localities at Deogad (16^0 23' N; 73^0 23' E) and Achra (16^0 15' N; 78^0 26' E) in Sindhudurg district of Maharashtra State,India were selected on the basis of the differences in habitat, topography,vegetation and local market value to study the dissolution and reformation of the crystalline style of the oyster *Saccostrea cucullata*. The maximum sizes observed by S. *cucullata* in the estuaries at Deogad and Achra were 44-45 mm shell length. Comparatively large sized oysters are found round the year in the estuary at Deogad than at Achra.

The environmental parameters such as pH, temperature, dissolved oxygen and salinity existing on the oyster beds in Deogad and Achra were recorded at the time of the experiment. The oyster beds in Deogad gets exposed to atmospheric air for comparatively a long time than those at Achra and with the commencement of high tide oyster bed at Achra gets reimmersed to the sea water earlier than the bed at Deogad. The time required for dissolution of crystalline style from the oysters of estuary at Achra is less than those from the estuary at Deogad. Further, time required for the reformation of style after immersion in sea water was less in the oysters from the estuary atAchra than at Deogad.

Key words:*S. cucullata*, Deogad, Achra, estuary,oyster, dissolution and reformation.

INTRODUCTION:

[15] Along the west coast of India the backwaters and estuaries are very extensive and play an important role for food production. These are widely scattered, have an area of 30.7 lakhs acres from which Maharashtra coast constitutes 3.0 lakhs acres combining together 2.0 lakh acres for brackish water and one lakhs acre for estuaries. [9] The backwater and estuaries are very productive along the coast and are being used for various purposes. They are the breeding grounds of various species of marine and estuarine fauna.

Two geographically separated localities at Deogad (16^0 23' N; 73^0 23' E) and Achra (16^0 15' N; 78^0 26' E) in Sindhudurg district of Maharashtra State were selected on the basis of the differences in habitat, topography, vegetation and local market value to study the dissolution and reformation of the crystalline style of the oyster

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RECAPITULATION OF GERONTOLOGY AND FRAILTY; DISCOVERING A CURRENT REVIEW

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ABSTRACT:

Gerontology is the study of the social, cultural, psychological, cognitive, and biological aspects of ageing. Due to the advancements in technology the studies concerning ageing has grown impressively. One of the most important fields of study under ageing is frailty, which is the main highlight of this article. Frailty is a dynamic syndrome which affects an individual not just physically but also mentally, socially and psychologically. Each of the mentioned domains has copious factors which lead to frailty. Finding out these factors in an individual can be helpful as it will aid in recognizing the correct interventions with the help of which frailty can be somewhat reversed and prevented. According to the several amount of research it has been found that the onset of frailty is not just because of ageing but also due to several environmental factors, chronic diseases and genetics, which further tells us that frailty is not just common to old adults but can be developed at a younger age as well. Some well-known models for instance, Phenotype and Cumulative deficit model and various other assessment tools have been developed in order to identify frailty in old individuals. Frailty also had a major impact on Covid-19 patients. Frail individuals were more severely harmed by the Corona Virus, similar rise in Cluster of Differentiation molecules can be observed in both frail and Covid-19 patients. Also, several biomarkers have been recognized that occur in an increased level in majority of frail individuals. According to a study it was found that not all old adults who are frail will identify themselves as frail, and for almost every

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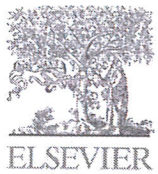

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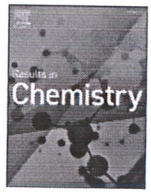

Discovery of oxazole-dehydrozingerone based hybrid molecules as potential anti-tubercular agents and their docking for M*tb* DNA gyrase

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ARTICLE INFO

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ABSTRACT

The oxazole-dehydrozingerone hybrid molecules (4a-j) and oxazole-dehydrozingerone-thiophene derivatives (6a-e) were synthesized via cyclisation, coupling and aldol condensation reactions. Final compounds were characterized by FTIR, ^{1}H and ^{13}C NMR spectroscopy. Synthesized compounds were screened against Mycobacterium tuberculosis H37Rv, MDR, and XDR strains. Compound 4f showed potential activity of 6.25 μg/mL against H37Rv, while compound 4c exhibited potential activity of 12.5 μg/mL. For the XDR strain, structure 4a, 4b demonstrated moderate efficiency of 12.5 μg/mL. All of the synthesized molecules were tested in comparison with a standard drug. Computational docking studies were performed for the active compound 4f against the enzyme M*tb* DNA Gyrase. The outcomes of the presented research will broadly help to the researchers working on developing antituberculosis drugs.

1. Introduction

Tuberculosis is an air-born contagious disease caused by mycobacterium tuberculosis (Mtb) [1,2]. In 2012, World Health Organization (WHO) reported 8.6 million infections, and among them, 1.3 million people died because of infectious diseases, and in 2016, 490,000 new cases of multidrug resistance were widely estimated [3]. There is a growing resistance to existing drugs resulting from deadly diseases that become more deadly and difficult to treat. MDR and extensive drug resistance (XDR) Mtb are diseases caused by bacteria that don't respond to first-line antitubercular drugs [4]. Existing treatment consists of various drugs that need to be taken for more than a year, resulting in numerous side effects and a substantial economic burden. In developing countries, pollution is the primary reason as Mtb can increase through the air. In recent years the death rate was declined, but it is still a significant cause of death after AIDS [5]. The drugs used for the treatment are streptomycin, Isoniazid, Ethambutol, Rifampicin, Ethionamide, Cycloserine, and Kanamycin. Most of these drugs have been discovered and used for the last 70 years [1]. Hence, there is an alarming concern about the drug-resistant strains of Mtb [6-9]. A constant research is underway for understanding the reasons behind the evolution and existence of resistant strains of Mtb [10]. Synthesis and high-throughput screenings of different derivatives with a broad spectrum of novel and known scaffolds were carried out to obtain lead derivatives as anti-TB [11-13]. The drug discovery and role of heterocyclic nuclei well known since the early 18th century [14]. The heterocyclic compounds are five or six-member rings bearing heteroatoms like nitrogen (N), oxygen (O), or sulfur (S). They play an essential role in all living cells' biochemical processes and find in natural and synthetic forms [15,16].

The fused heterocycles, such as oxazole and oxazoline, were commonly disturbed in nature and attracted considerable interest because of their various medicinal activities [17]. They were initially isolated from a marine source [18]. These hetero cores contains nitrogen and oxygen atoms in an aromatic five-membered ring that can bind with different receptors and enzymes in the biological system through non -covalent interactions [19]. Several advantages of the oxazole ring in medicinal chemistry are that it has weak interactions with H-bond, ion–dipole, π-π stacking, and a weak hydrophobic character. These nuclei found their applications in medicinal and agrochemical chemistry [20]. The natural and synthetic 1,3-oxazole nuclei exerts diverse range of biological activities like anti-mycobacterial [21], anti-tubercular [22-24], anti-bacterial [25], glycomimetic inhibitors [26], antiviral [27],

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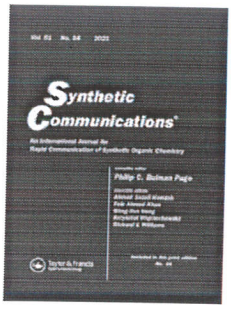

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Synthetic Communications

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A systematic appraisal on catalytic synthesis of 1,3-oxazole derivatives: A mechanistic review on metal dependent synthesis

Suraj R. Shinde, Pankaj Girase, Sanjeev Dhawan, Shaukatali N. Inamdar, Vishal Kumar, Chandrakant Pawar, Mahesh B. Palkar, Mahadev Shinde & Rajshekhar Karpoormath

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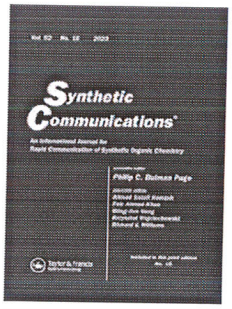

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Recent advances and approaches in the metal-free synthesis of 1,3-oxazole derivatives

Suraj Shinde, Shaukatali Inamdar, Mahadev Shinde, Narvadeshwar Kushwaha, Vincent Obakachi, Pankaj Girase, Babita Kushwaha, Sanjeev Dhawan, Vishal Kumar & Rajshekhar Karpoormath

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Water Budget of the Indapur Tahsil

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Abstract

Water budgets provide a foundation for evaluating its use in relationship to other important influencing conditions such as other ecological systems and features, as well as social and economic components – how much water is being used by agriculture, industry and residents etc. A water budget commonly provides the info of quantity and place of it. Water budget studies consider the volumes of water within the various reservoirs of the hydrologic cycle and the flow paths from recharge to discharge. The reservoirs of surface and underground water are about 1542.695 MCM; Out of this only 601.38 MCM water is required for use. Water budgets are developed by measuring or estimating the inputs and outputs of a hydrologic system. Inputs are the processes that add water to the system; these include precipitation and inflow from surface water and groundwater. Outputs are the processes that remove water from the system; these include evapotranspiration, the various uses of water by humans, and outflow from surface water and groundwater. General hydrological equation to compute water balance and runoff has been estimated. The average surface water village wise runoff of the study area is estimated. There is great deal of variations in terms of volume of runoff by different villages. The entire tahsil is drought prone and faces the problem of water scarcity throughout the year. Observing these outcomes in the present context, this paper calculates the water budget of the Indapur tahsil. The outcomes of these studies are briefly presented in this paper. It has been observed that the water resources are not uniformly available in the study area.

Key words: *Precipitation, evapotranspiration, runoff, surface water, groundwater* water balance, water budget.

Introduction

A water budget is a basic tool that can be used to evaluate the occurrence and movement of water through the natural environment. Water budgets provide a foundation for evaluating its use in relationship to other important influencing conditions such as other ecological systems and features, as well as social and economic components – how much water is being used by agriculture, industry and residents etc. The water budget process can encompass various levels of assessment which start simple and grow more complex if there are concerns about how much water is available at any level. Water budgets commonly provides the info of quantity and place of it. Water budget studies consider the volumes of water within the various reservoirs of the hydrologic cycle and the flow paths from recharge to discharge. Water budgets need to consider this information on a variety of spatial and temporal scales (Hazel Breton 2010). The maximum water holding capacity of soils, rainfall and potential evapotranspiration are the basic controlling elements of water balance. The distribution of these elements decides droughts or water surplus condition. Therefore rainfall, potential evapotranspiration, aridity, humidity and soil moisture are become primary controlling factors of agriculture (Saikia 1994). In the present study water balance technique is used to estimate the availability of rainwater resource in the study area. The nature and distribution of rainfall of the study area discussed earlier indicates that about 90 percent rainfall takes place during the short period of four months from June to September. There is a great variation in the number of rainy days.

Objectives

1. To identify inputs and outputs of a hydrologic system
2. To identify place and quantity of water.
3. To calculate the runoff of the study area.
4. To make favourable suggestions to low runoff and sufficient water available.

Study area

Indapur tahsil is one of the tahsils in the Pune district consisting of 142 villages along with one urban centre in the study area. There are eight revenue circles in the tahsil. The area extends from 17° 53′ 42" to 18° 19′ 58" North latitudes and 74° 39′ 16" to 75° 09′ 39" East longitudes (Fig. 1). The area is drained by the river Bhima on north and east both sides. Nira River flows south of Indapur tahsil. Total geographical area of the tahsil is 1575.38km^2 (Census 2011), out of which Nira river catchment area compress about 586.8 km^2 and Bhima river catchment covers an area of 902.43km^2. Nira River joins the Bhima River at famous tourist place i.e. Narsinhapur village after travelling a course of 209 Kms from origin. The slope of region is towards east. There are three soil types, namely, coarse shallow, medium black and deep black soils occupying 30, 40 and 30 percent respectively.

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FATTY ACIDS COMPOSITION OF *HYPORHAMPHUS LIMBATUS* (VALENCIENNES, 1847) FROM UJANI RESERVOIR OF MAHARASHTRA, INDIA.

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ABSTRACT

Present study was undertaken to generate information on nutrient profile of Hyporhamphus limbatus (Valenciennes, 1847). On an average, the contents of saturated, mono-unsaturated and poly-unsaturated fatty acids (SFA, MUFA and PUFA) were 123.21, 121.77 and is 290.77 mg/100gm dry tissue respectively.

Key words : Fish, Hyporhamphus limbatus, nutritional value, fatty acids, SFA MUFA, PUFA

Introduction:

For centuries, fish has been recognized as an excellent human food source, and it is preferred as a perfect diet not only because of its excellent taste and high digestibility, but also because it contains higher proportions of unsaturated fatty acids, essential amino acids, and minerals for the formation of functional and structural proteins (Kumar 1992). Fishes contain higher proportion of polyunsaturated fatty acids (PUFAs), which are supposed to be better for human health. Fish flesh contains greater concentration of n-3 PUFAs, than that found in beef and chicken. The Beloniformes fishes are abundant in rivers. Present study was undertaken to collect information on nutrient profile of *Hyporhamphus limbatus* (Valenciennes, 1847) from Ujani reservoir of Maharashtra, India.

Material and Method:

Fresh *H. limbatus* were collected from Ujani reservoir in and around Indapur, Pune, India and immediately brought to the laboratory. The visceral organs were removed and the fishes were sun dried and descaled. Sun dried samples were crushed with the help of a mixer grinder and stored in air tight container.

Lipids were extracted from dry fish samples following Folch et al. (1957). Dried lipid samples were weighed, dissolved in chloroform, and stored in graduated test tubes at 4°C. Fatty acid methyl esters (FAME) were prepared from the extracted fat as described by Metcalfe et al. (1966).

Fatty acid composition of the samples was determined by employing Gas Chromatography-Ion Trap Mass Spectrometry (GC/IT-MS), Thermo Scientific ITQ 900. The fatty acid methyl esters (FAME) were was

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Changing Perspectives of Language, Literature, Science and Social Science

Covid-19: Viral Infection, Prevalence and Consequences, Years 2020

Prof. Dr. Digambar Biradar
Head of Department, Department of Political Science, Arts, Science and Commerce, College, Indapur

Introduction

Today, the entire world, i.e. more than 188 countries, is affected by the global epidemic of Corona, i.e. covid-19. The spread of the Corona virus started in China from 17 November 2020, only then did the world become aware of this terrible virus infection, so in the future, the world The World Health Organization declared covid-19 as a global pandemic on March 11, 2020, so it had a huge impact on social, political, economic, and global affairs. A fatal effect appears to have occurred. Financial as well as life losses are seen to be huge, so I thought it important to study it, so in this research paper, the impact of the epidemic in the year 2020 has been briefly reviewed.

Origin of the research work:-

The outbreak and effects of covid-19 virus on the economic, business and life of people in different countries in all continents of the world. Based on the available information, it is collected and analyzed

medically, Analysis in doing

• interdisciplinary relevance :

This research has resulted in other different topics and areas of life. It can be seen that it has been done in the economic, social and political fields, but its studies will be of great use to the scholars of health, economics, geography, numerology, psychology, sociology, international relations and politics, i.e. political science, etc. of research and development in the subject National status:-

This research paper studies the impact of the global pandemic covid-19. How this global pandemic affects various activities as well as economically and culturally and how it has affected the development of the country. Globally, nationally, locally, we learn that this disease shows a new path. Also the world administration unsco and who administration should take what precautions and who should take steps from which point of view and the World Health Committee WHO will be used to take preventive measures to take further precautions as well as who should take which precautions in social i.e. public life, within each country and Why this certificate will be useful for travel and medical research has been done by Anupana to take care from the health point of view regarding the relationship with

the Y nation state. study:

Journal of *Personalized Medicine*

MDPI

Review

Significance of Immune Status of SARS-CoV-2 Infected Patients in Determining the Efficacy of Therapeutic Interventions

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Abstract: Coronavirus disease 2019 (COVID-19) is now being investigated for its distinctive patterns in the course of disease development which can be indicated with miscellaneous immune responses in infected individuals. Besides this series of investigations on the pathophysiology of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), significant fundamental immunological and physiological processes are indispensable to address clinical markers of COVID-19 disease and essential to identify or design effective therapeutics. Recent developments in the literature suggest that deficiency of type I interferon (IFN) in serum samples can be used to represent a severe progression of COVID-19 disease and can be used as the basis to develop combined immunotherapeutic strategies. Precise control over inflammatory response is a significant aspect of targeting viral infections. This account presents a brief review of the pathophysiological characteristics of the SARS-CoV-2 virus and the understanding of the immune status of infected patients. We further discuss the immune system's interaction with the SARS-CoV-2 virus and their subsequent involvement of dysfunctional immune responses during the progression of the disease. Finally, we highlight some of the implications of the different approaches applicable in developing promising therapeutic interventions that redirect immunoregulation and viral infection.

Keywords: coronavirus; SARS-CoV-2; immune response; therapeutic interventions; immunopathogenesis

1. Introduction

In consideration of public health emergency and global reach, on 11 March 2020, the World Health Organization (WHO) specified coronavirus disease 2019 (COVID-19) as a global pandemic outbreak of international public health concern [1]. A novel, highly transmissible enveloped RNA betacoronavirus unexpectedly emerged in December 2019 in Wuhan, China, and then was formally named as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2. The most common clinical symptoms and manifestations of SARS-CoV-2 infection are pneumonia-like, including fever, hypoxia, dyspnea (labored breathing), headache, myalgia, cough, and in some cases, intestinal symptoms [2,3]. COVID-19 is now characterized as a mild to severe respiratory disease, and its clinical presentation

materials

MDPI

Article

A Novel Synthesized 1D Nanobelt-like Cobalt Phosphate Electrode Material for Excellent Supercapacitor Applications

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Abstract: In the present report, we synthesized highly porous 1D nanobelt-like cobalt phosphate ($Co_2P_2O_7$) materials using a hydrothermal method for supercapacitor (SC) applications. The physicochemical and electrochemical properties of the synthesized 1D nanobelt-like $Co_2P_2O_7$ were investigated using X-ray diffraction (XRD), X-ray photoelectron (XPS) spectroscopy, and scanning electron microscopy (SEM). The surface morphology results indicated that the deposition temperatures affected the growth of the 1D nanobelts. The SEM revealed a significant change in morphological results of $Co_2P_2O_7$ material prepared at 150 °C deposition temperature. The 1D $Co_2P_2O_7$ nanobelt-like nanostructures provided higher electrochemical properties, because the resulting empty space promotes faster ion transfer and improves cycling stability. Moreover, the electrochemical performance indicates that the 1D nanobelt-like $Co_2P_2O_7$ electrode deposited at 150 °C deposition temperature shows the maximum specific capacitance (Cs). The $Co_2P_2O_7$ electrode prepared at a deposition temperature 150 °C provided maximum Cs of 1766 F g^{-1} at a lower scan rate of 5 mV s^{-1} in a 1 M KOH electrolyte. In addition, an asymmetric hybrid $Co_2P_2O_7$//AC supercapacitor device exhibited the highest Cs of 266 F g^{-1}, with an excellent energy density of 83.16 Wh kg^{-1}, and a power density of 9.35 kW kg^{-1}. Additionally, cycling stability results indicate that the 1D nanobelt-like $Co_2P_2O_7$ material is a better option for the electrochemical energy storage application.

Keywords: $Co_2P_2O_7$; hydrothermal method; 1D nanobelt; hybrid asymmetric supercapacitor

1. Introduction

The energy demand for industrial applications has risen steadily over the past decade [1,2], leading to the increasing exploitation of several energy sources, including solar energy, biofuels, coal, wind energy, and biomass [3,4]. However, there remain several bottlenecks in the energy industry, including limitations in the conversion and storage capacity of power plants and the transport of electricity from generation sites [2,5]. Supercapacitors (SCs) have become a vital element of the portable electronics industry to overcome these issues. Though SCs are superior to traditional batteries and capacitors in terms of their higher specific capacitance and energy

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Enhanced corrosion protection of Cu & Al in Saline media using a new PEDOT based waterborne polyurethane coating

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ABSTRACT

In the present investigation, a new nanocomposite (PGZ) viz. PEDOT (poly(3,4-ethylenedioxythiophene)/ Graphene oxide (GO)/Zirconia (ZrO_2) has been developed via in-situ chemical oxidative polymerization method. Its electrochemical response as a preventive coating for inflating the corrosion resistance of industrial alloys i.e. copper (Cu) and aluminum (Al) exposed to neutral chloride (3.5% NaCl) environment at room temperature has been analyzed using various electrochemical techniques. Both the substrates along with the nanocomposite material (PGZ) have been characterized by various surface analysis studies viz. FE-SEM, XRD, TGA, TEM, EDAX and FT-IR studies. The SEM studies showed the compact formation of coating on the substrate. Other characterization studies well established the formation of PGZ nanocomposite. The experimental electrochemical investigations on coated substrates demonstrated a significant reduction in the corrosion current density (i_{corr}) and a fascinating increase in the charge transfer resistance (R_{ct}) values in comparison to the bare metal specimens.

1. Introduction

Corrosion of industrial alloys specifically copper (Cu) and aluminum (Al) is a subject of huge concern for various industries. Their gradual depletion after coming in contact with the aggressive environment, during various industrial processes results in enormous economic loss of both direct and indirect type (Liu et al., 2015; Lokesh et al., 2012; Rickerby and Steinke, 2002; Liu et al., 2016; Kinsella et al., 2003; Lamaka et al., 2007; Zhao et al., 2001). The extensive use of aggressive electrolytes in these industrial processes triggers the destructive electrochemical corrosion reactions on the surface of these important metals (Steppan et al., 1987; Fenelon and Breslin, 2002; Cascalheira et al., 2003; Brusic et al., 1997; Beccaria and Chiaruttini, 1999). Several strategies including the use of cathodic/anodic protection (Kear et al., 2005; Li et al., 2018; Simões et al., 2007; Cecchetto et al., 2007), inhibitors (Fatch et al., 2017; Xhanari and Finšgar, 2016), paints, coatings (Kowalczyk and Luczka, 2015; Stankiewicz et al., 2013) etc. have been adopted to minimize this destructive force of corrosion. Among all these methods the most convenient and promising way to combat corrosion is the use of barrier coatings. Chromate-based anti-corrosion coatings are proven to be very effective but their toxic nature is a huge drawback for the concerned industries (Kendig et al., 1993; Bastos et al., 2005; Shi and Dalal, 1994). The organic/inorganic nanocomposite coatings comprising of sustainable components are the ideal substitute for these chromate based coating materials, which provides significant corrosion deterrence for a prolonged period of time (Nguyen-Tri et al., 2018).

Several researchers have reported the use of polymeric nanomaterials as anti-corrosion coating, R. Hasanov et al. (Hasanov and Bilgiç, 2009) explored the use of monolayer and bilayer polymer coatings, including polypyrrole (PPY) and polyaniline (PANI), on steel electrodes for corrosion protection. The coatings were deposited via electro-polymerization in oxalic acid solution, and their effectiveness in inhibiting corrosion was evaluated in 1 M H_2SO_4 solution. The study found that the bilayer coatings showed better corrosion inhibition than the monolayer coatings, with PPY/PANI offering the highest level of protection. The coatings were characterized by FTIR spectroscopy and SEM. C.K. Tan et al. (Tan and Blackwood, 2003) investigated the effectiveness of multilayered coatings consisting of polyaniline (PANI) and polypyrrole (Ppy) in providing a barrier against corrosion in chloride environments. The coatings were galvanostatically deposited on carbon steel and stainless steel, and their performance was evaluated using potentiodynamic polarization. The results showed that the multilayered coatings were significantly better at protecting against pitting corrosion than single Pani coatings on stainless steel, with films consisting of

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IMPACT OF INFLATION ON FDI INFLOWS IN G7 COUNTRIES AND INDIA

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Abstract

Recent invitation by G7 countries to India to attend G7 summit highlights strengthening ties between the developed nations (G7 countries) and the fastest emerging economy in the world (India). In the era of globalization, strengthening relationship between two or more economies results not only economic growth but also economic development. However, there are various factors that play a vital role in the strengthening of such relations such as cultural barrier, economic freedom, democracy, etc. One of such important factor is inflation. Some researchers have concluded that inflation is detriment to the nation's growth while some highlights the importance of inflation in the economy. Hence, it is still unclear about the impact of the inflation on the economy (whether it is developed or developing economies). The paper attempts to study the impact of inflation on FDI inflows in G7 Countries (developed economies) and India (emerging economy) by adopting Correlation technique for the period of 20 years from 2000-2020, the data of which has been gathered from the authorized source such as World Bank. The findings indicate that inflation has positive impact on FDI inflow in G7 countries and India. The finding is important for policy making as well private individuals or company/institutions who are interested in investment or establishing the business in G7 countries and /or India.

Introduction

According to UNCTAD, FDI is defined as an investment done by individuals or enterprises in a country other than one's own and having long-term commitment or interests. For long lasting interests, the investor must possess at least 10% of the voting power in the business established in foreign country. Equity capitals, reinvested earnings and intra-company loans are the 3 main components of FDI. When an investor purchases the share of foreign firm or enterprises, then it is known as equity capitals. When the dividends are not shared among the investors and the profits are reinvested in the business, then it is known as reinvested earnings. When there is short term and long term borrowings and fundings between an investors and its affiliate enterprises, then it is called as intra-company loans. Besides this, there are 3 types of FDI, namely, Horizontal FDI , where an investor invest in the product which are similar or belong to the same industry; Vertical FDI, where investors invest in the supply chain of the same industry, and Conglomerate FDI, where investors invest their money in different industry.

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ROLE OF E-BANKING IN ECONOMY DEVELOPMENT OF INDIA

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Abstract
The Indian Banks are the backbone of Indian financial sector and Indian economy. Now a day in Indian economic scenario, the Indian financial system is in a process of rapid transformation. The shift from the formal banking to E-Banking has been a remarkable 'leap change' in Indian banking history. E-banking has experienced strong and sustained growth. E-Banking, also known as net banking, online banking or internet banking, is the facility provided by banks and financial institutions which allows customers to use banking services via internet. There are scores of services like online money transfer, account opening, bill payment, tracking account activity, etc., which are made available to customers with the help of e-banking. This research paper shows the relationship between e-banking and economic development in India and helps to know the present economic scenario of e-banking. It highlights the role of e-banking in ensuring a speedy Indian economic recovery.
Keywords: E-banking, economic development, present economic scenario.

Introduction
India has arisen as the quickest developing significant economy on the planet and is relied upon to be One of the best three financial powers of the world throughout the following 10-15 years, upheld by its Solid majority rules government and associations. The public authority of India has thought of Digital India drives, which centers around three center parts: production of advanced framework, conveying administrations carefully and to build the advanced literacy. Banking through electronic channels has acquired expanding prevalence as of late. The improvement and the expanding progress experienced in the Information and Communication Innovation combined with the development of the worldwide economy prepared for the change of the Indian financial framework's job from customary exchange financing to activating and directing monetary assets all the more really in practically all features of life.

Objectives of the study
1. To examine the role of e-banking in economic development of India.
2. To highlight the role of e-banking in ensuring a speedy economic recovery of India.
3. To examine the need for e-banking among the Indian populace.

Methodology of the study
The study is mainly descriptive in nature. The data for the purpose of the study has been collected through secondary sources, which mainly include websites, various articles and journals.

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SOIL SALINITY ASSESSMENT AND MAPPING USING REMOTE SENSING AND GIS TECHNIQUES IN THE LOWER PART OF MULA-MUTHA RIVER BASIN, WESTERN MAHARASHTRA, INDIA.

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Abstract: Soil salinity is a global problem. Soil salinization badly affects agricultural lands. It is negatively affecting plant growth, crop yields due to over-irrigation, monoculture of sugarcane, using polluted water of the river leading the further land degradation. It is also a major concern in the lower Mula-Mutha River basin in western Maharashtra, where the climate is arid and semi-arid. The objectives of this study were to estimate the salt affected area and delineate mapping variations in the study area using RS data. Traditional soil salinity assessments have been done by collecting soil samples and laboratory analyzing of collected samples for determining soil pH and electroconductivity (EC). Geographical Informatics Systems (GIS) and Remote Sensing (RS) technologies are used to provide more efficient, economic, and rapid tools and techniques for soil salinity assessment and soil salinity mapping. Using Landsat-8 OLI/TIRS satellite images, Soil Adjusted Vegetation Index (SAVI) and Normalized Difference Salinity Index (NDSI) are studied for finding out the soil saline area of the basin. It is found that more than 65% of the soil in the study area is moderate to highly saline as per SAVI while more than 50% area is covered by moderately to highly saline areas according to NDSI. The results support that geoinformatics techniques using RS data and technologies constitute an effective tool for detecting soil salinity by modeling and mapping the spatial distribution of saline soils. Use of gypsum, no use of polluted river water for agriculture, and avoid of over-irrigation are suggested to reduce the soil salinity problem in the lower Mula-Mutha River basin. Similar methodology can be used for the evaluation and mapping of soil salinity-affected areas in the arid and semi-arid parts of India.
Keywords: Soil salinity, land degradation, Remote Sensing, GIS, Salinity Index, Satelliteimage, Landsat-

Introduction

In recent times, the problem of land degradation has been increasing in many arid and semi – arid regions due to soil salinization. Soil salinization is the process of salts accumulation in the soil surface and in the root zone which causes harmful effects on plants and soil; it follows a decrease in yields, ultimately, soil sterilization. It reduces the area of farmland land 1 to 2% per year and continues to increase. Richards (1954), classified salt affected soils on the basis of its physical and chemical properties in three types: saline soils, saline alkaline soils and sodic soils. In the present study an effort has been made to delineate the salt affected area occurring in the lower Mula-Mutha river basin and suggesting some reclamation methods with the help of geographic information system and remote sensing data. Soil salinity mapping is also done by calculating salinity indices like NDSI (Normalized Difference Salinity Index) and SAVI (Soil Adjusted Vegetation Index) are used for mapping soil salinity in the study area. Physicochemical parameters of soil like pH, EC, various cations and anions are also studied. Integration of remote sensing and geographic information system techniques helps in achieving better and fast results related to salt affected soils and its reclamation methods for effective use of agricultural land.

Study area

For the present research work, lower Mula-Mutha River basin is selected as the study area which comprises some part of Daund tehsil and some part of Haveli tehsil. Gandharv and Sangam Bridge is the area where Mula and Mutha rivers are joined together. Daund tehsil lies on the east side of Pune district and Haveli tehsil lies on the west side of Pune district. The latitudinal extent of the study area is 18◦24'19.21" N to 18◦36'40.03" N and longitudinal extent is from 73◦54'04.07" E to 74◦20'49.41" E. The study area covers about 756.44 sq.km total geographical area. Sugarcane is a major irrigated crop in the study area, where due to its intensive cultivation, water logging and soil salinization problems have engraved. The study area is known as

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DFT-based theoretical model for predicting the loading and release of pH-responsive paracetamol drug

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ABSTRACT

Here, we provide a theoretical framework that integrates quantum mechanical calculations with classical pKa theory to forecast the degree of interaction of drug molecules with carrier surfaces across the whole pH range. The drug loading and release of a pH-responsive drug delivery system is demonstrated using paracetamol drug carried using mesoporous silica surface with and without trimethylammonium (TA) functional group. The model is explained on the basis of possible combinations of surface (S) and drug (D) molecules as neutral (0) and deprotonated (1) pH-dependent states. The relative probabilities of these states depend on the pKa values of the drug as well as surface and the desired pH. Paracetamol, an analgesic and antipyretic drug, is required to be absorbed in small intestine and not in the stomach. It's seen that Paracetamol is caught in the MSN-TA nano-vehicle when it goes through the acidic environment of the stomach and then released in the slightly basic pH of the intestine. The reported model from the literature is used for forecasting the loading and release pH for the Paracetamol using mesoporous silica surface.

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1. Introduction

The drug, the way it's delivered and the target location where it's delivered are of utmost importance factors in the treatment of various diseases. If the drug delivery mechanism is ineffective, even the therapeutic molecule itself may fail during the clinical trial in such circumstances. [1–2]. The process of discovering a new medicine and obtaining clinical approval is expensive and time-consuming. Numerous drug carrier molecules, including liposomes, micelles, dendrimers, polymers, microspheres and nanoparticles were reported, which were purposely developed utilising organic and inorganic compounds to avoid these issues. The intended effects of the medication molecules are obtained similarly to wearing new clothing or coating on an old medicine. Low toxicity, biodegradability, biocompatibility, good cellular absorption, sustained, and targeted distribution are requirements for an effective drug delivery system. Efficient use of drug delivery system, diseases can be prevented with little to no side effects, a low dose, and a low dosage frequency [1–2].

Nanoparticles (NPs) are one of the best candidates for the development of improved drug delivery systems because they have special qualities like being small enough to pass through cell membranes, being able to pass through tiny arterioles and endothelial without causing clotting, and stabilising the drugs [3–5]. The utilisation of liposomes, co-polymers, micelles, SiO_2, Carbon, and maghemite nanoparticles for the trapping of pharmaceutical drugs has already been extensively studied and reported for the enhancement of drug delivery [6]. Meso-porous SiO2 NPs (MSNs) (2–50 nm) have garnered a great deal of interest recently as potential drug delivery systems due to their numerous advantages, including good biocompatibility, low apparent cytotoxicity, biodegradability, good excretion, ordered and uniform size, high

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Discovery of oxazoline-triazole based hybrid molecules as DNA gyrase inhibitors: A new class of potential Anti-tubercular agents

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ABSTRACT

A library of novel oxazoline-triazole hybrid analogues (**6a-6 g** and **7a-7 m**)was designed using a molecular hybridization approach and synthesized from commercially available ethyl 2/3/4-hydroxybenzoate. The synthesized compounds were characterized by modern art instrumentation, including IR and NMR (^{1}H, ^{13}C). All the final compounds were evaluated for their *in-vitro* antibacterial (*S. aureus, B. subtilis, E. coli* and *P. aeruginosa*), antifungal (*C. neoformans, C. albicans* and *A. niger*) and anti-tubercular (*Mycobacterium tuberculosis* $H_{37}Rv$, MDR and XDR strains) activities. Among the series, compound **7a-7i** exhibited excellent activity (**MIC** = 1.6 µM) against $H_{37}Rv$ strain of *M.tuberculosis*. However, antibacterial screening data (in vitro) revealed a moderate inhibition for **6e-6 g** and **7f-7 h** against gram-positive bacteria (*Bacillus subtilis*) and **7a-7i** against gram-negative bacteria with a **MIC** value of 25 µg/ml. While moderate activity was observed against fungal (*C. neoformns* and *C. albicans*) strains with **MIC** value of 25–200 µg/mL. Additionally, five compounds (**7a, 7d-7f** and **7 h**) were further evaluated for their in vitro inhibitory activity against *E-coli* DNA gyrase. These compounds displayed significant inhibitory activity against the DNA gyrase enzyme with an IC_{50} value of 0.08 – 0.5 µM.

1. Introduction

The research on antimicrobial agents is a continuing process as there are many reasons like prolonged and excessive use of antibiotics resulting in drug resistance. Since the early stages of childhood, antibiotics have often been used to develop new strains of microorganisms having resistance to the antibiotic used. Therefore, continuous research would help for the development of better and more effective antimicrobial drug molecules [1,2].

Tuberculosis is an air-born contagious disease caused by mycobacterium tuberculosis (*Mtb*). In 2012, World Health Organization (WHO) reported 8.6 million infections, and among them, 1.3 million people died because of infectious diseases, and in 2016, 490,000 new cases of multidrug resistance were widely estimated. There is a growing resistance to existing drugs resulting from deadly diseases that become more deadly and difficult to treat. MDR and extensive drug resistance (XDR) *Mtb* are diseases caused by bacteria that don't respond to first-line anti-tubercular drugs. Existing treatment consists of various drugs that need to be taken for more than a year, resulting in numerous side effects and a substantial economic burden. In developing countries, pollution is the primary concern as *Mtb* can be gained through the air. In recent years the death rate was declined, but it is still a significant cause of death after AIDS. Streptomycin, Isoniazid, Ethambutol, Rifampicin, Ethionamide, Cycloserine and Kanamycin, etc., are the drugs used for the treatment. Most of these drugs have been discovered and used for the last 70 years. Hence, there is an alarming concern about the drug-resistant strains of *Mtb* [3–8]. A constant research is underway for understanding the reasons behind the evolution and existence of resistant strains of *Mtb*. Synthesis and high-throughput screenings of different derivatives with a broad spectrum of novel and known scaffolds have been carried out to obtain lead derivatives as anti-TB [9–11].

Fused oxazole and oxazoline were widely distributed in nature, and these attracted much attention due to their diverse pharmaceutical activities. These scaffolds consist of nitrogen and oxygen atoms in an aromatic five-membered ring. These heteroatoms bind with different receptors and enzymes in the body mechanism's biological system through non-covalent interactions. The structure

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Insights into the formation of multiwall carbon nanotubes using simple flame pyrolysis method

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ABSTRACT

Herein, we discuss the formation of multiwall carbon nanotubes (MWCNTs) during the simple and effective flame pyrolysis of ferrocene solution in ethanol with the help of alcohol lamp. The method is unique and simple one to prepare impure MWCNTs in the best possible way. Systematic investigations showed that the in-situ generated maghemite plays an important role in the formation and development of the MWCNTs. The growth of the maghemite impregnated MWCNTs were thoroughly studied using sophisticated instruments viz. XRD, BET, HR-SEM, and TEM analysis in details and on the basis of these, the growth mechanism is discussed.

Selection and peer-review under responsibility of the scientific committee of the 2nd International Conference on Multifunctional Materials.

1. Introduction

Carbon nanotubes were extensively studied for diversified applications and were in main focus since their discovery by Ijima [1]. Carbon nanotubes possess unique structural and physical properties including high tensile strength coupled with high surface area, high electric as well as thermal conductivity [2,3], These properties made them ideal candidate for the numerous applications viz. electronic devices [4], composite materials [5–7], sensors [8], gas storing [9], catalytical supports [10–12], etc. For these extensive uses, their low cost and simple synthesis became essential. Various methods were developed to synthesis of carbon nanotubes which includes but not limited to either arc discharge [13–15] and high temperature furnaces [16–19]. Besides these methods, flame method emerged as energy efficient and is readily scalable for bulk synthesis of carbon nanotubes.

The synthesis of carbon nanotubes required three essential components, catalyst material, heat source and the carbon source [20]. Flame method is widely utilized for the synthesis of carbon nanotubes in the literature [20,21–23]. The commonly used catalyst materials includes Fe, Co and Ni containing compounds [11,24,25]. Firstly ferrocene, cobaltocene and nickelocene when used requires relatively low temperatures about 700 K [18,19] for their thermal decomposition than the threshold of soot formation which is approximately at 1300 K [20]. Secondly, the formation of carbon nanotubes requires fuel within the pyrolysis when using ferrocene or cobaltocene.

In recent years, Inamdar et al. gradually developed flame pyrolysis method using simple alcohol lamp [26–29]. In this the first report came in 2006 with the preparation of spherical 25 nm sized γ-Fe_2O_3 nanoparticles [26,27]. The next two reports came in 2012 and 2013 about preparation of faceted maghemite-carbon composite [28] and sulphur containing carbon nanoparticles [29] respectively. In a year another report came about flame synthesized N-containing turbostatic carbon nanoparticles in 2014 [30]. The latest report came last year in 2021, reporting electrochemical sensor using flame synthesized MWCNTs-iron oxide nanocomposite [8]. Herein, we discussed the insights into the formation of multiwall carbon nanotubes (MWCNTs) observed during the simple and effective flame pyrolysis of ferrocene solution in ethanol using an alcohol lamp [8]. In the present study carbon nanotubes were seen growing in the spirit lamp flame, where, ferrocene is utilized as both catalyst and carbon source. Ethanol, the fuel used in the lamp, acts as extra source of carbon.

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RESEARCH ARTICLE

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Bifunctional nanoparticles decorated $Ni_{1-x}Mn_xCo_2O_4$ ultrathin nanoflakes-like electrodes for supercapacitor and overall water splitting

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Summary

Synthesizing triple transition metal oxide (TTMO) is an extraordinary strategy to develop electrodes for efficient energy storage and conversion devices, owing to their unique nanostructure with high porosity and specific surface area. The cobalt-based mixed-valence oxides have attracted great attention due to their facile synthesis, low cost, and excellent electrochemical performance. However, less attention is paid to investigating the effect of different substitutions on the physico-chemical properties of TTMO. In this study, nanoparticles (NPs) decorated ultrathin $Ni_{1-x}Mn_xCo_2O_4$ nanoflakes (NPs@NFs) are synthesized by tuning the molar ratio between Mn and Ni via facile deep eutectic solvents (DESs) method. Unique and highly porous NPs@NFs nanostructures aid to increase the overall surface area of the materials, whereas Mn, Ni, and Co ions participate in their redox-active capacity, improving the electrochemical activity of the material. This $Ni_{0.8}Mn_{0.2}Co_2O_4$ hybrid nanostructure exhibited excellent supercapacitive performance with a high specific capacity (Cs) of 761 mAh g^{-1} at a higher current density of 30 mA cm^{-2} and superior cycling retention of 92.86% after 10 000 cycles. Further, a hybrid asymmetric supercapacitor ($Ni_{0.8}Mn_{0.2}Co_2O_4$//AC) device exhibited an extended potential window of 1.5 V, which results in an ultrahigh energy density of 66.2 W kg^{-1} by sustaining a power density of 1519 Wh kg^{-1}. The electrocatalytic activity of the optimized $Ni_{0.8}Mn_{0.2}Co_2O_4$ shows the outstanding performance toward hydrogen evolution reaction (HER) (150 mV/ 161 mV dec^{-1}) and oxygen evolution reaction (OER) (123 mV/47 mV dec^{-1}) with a lower voltage of 1.51 V (@10 mA cm^{-2}) for overall water splitting, with outstanding stability up to 25 hours. These results indicate that chemically synthesized ultrathin

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STUDY OF THE BIVALVE RESOURCES OF KALI ESTUARY, KARWAR, KARNATAKA STATE, INDIA

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Abstract

The Kali estuary is one of the four important estuarine complexes of Uttara Kannada, which supports good resources of bivalves especially, clams and oysters with the former being the main supporting community to the total molluscan fishery all through the year. Some of the commercially important species of clams found are Meretrix meretrix, Paphia malabarica, Villorita cyprinoides, Sunetta solandrum . Besides providing the nutritious food, the bivalves also serves as raw material for preparation of lime.

Key Words: *M. meretrix, P. malabarica, V. cyprinoides, S. solandrum, Kali estuary, Natural bivalve resource.*

Introduction:

Bivalves, by far excelled gastropods and cephalopods as a cultivable source of food (1). Generally these are the referred as poor man's food, forming nutritious food for people living in coastal areas. The meat is rich in proteins, glycogen and minerals on par with other animal foods (2-6).

An extensive work has been done on molluscan resources of both east and west coasts of India (7-11). Though some literature of Uttara Kannada coast (1,12,13) but the information regarding utilization of the harvested resources is lacking. Hence, to fill this gap an attempt was made to study the distribution and utilization of the bivalve resources landed from Kali estuary, Karwar.

Description of the Area:

The Kali estuary (14°50' N and 70°07' E), one of the four important estuarine system of Uttara Kannada, is bestowed with moderately good population of bivalves namely clams and oysters; the former being the mainstay supporting the total molluscan of oysters to the fishery is meager. The important species of clams occurring in the estuary are *Meretrix meretrix, M. casta, Paphia malabarica, Villorita cyprinoides* and *Sunetta solandrum* while the oyster is represented by backwater oyster, *Crassostrea madrasensis.*

Distribution:

The species composition, distribution, density and biomass of clams along the estuary is described by earlier workers (1, 12, 14). A peak production of these species was encountered during the postomonsoon season while a minimum occurrence always corresponded to the southwest monsoon period.

The clam beds at lower reaches of the estuary were mainly composed of *M. meretrix, M. casta, P. malabarica and S.solandrum* while at upstream, it was comprised by a single dominant species, *v.cyprinoides*. Besides, *Anadara granosa, Solen truncatus, Cardium rugosum* were also observed in good quality. At the proximity to the estuarine mouth, the *M. meretrix* was numerically dominant whereas at upper stretches of the estuary (where the fresh water regime established), *V.cyprinoides* outnumbered the other species. As stated by Bhat (14), the minimum production of bivalves occurred during the period of southwest monsoon,

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DIFFERENT MORPHS OF HOOD OF INDIAN COBRA *NAJA NAJA* FROM TAHSIL INDAPUR, DIST. PUNE, MAHARASHTRA, INDIA

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Abstract

During the period of 1991-2022, rescued 481 Indian cobra (Naja naja) snakes from the different areas of Indapur tahsil and released into the forest area at the location suggested by forest authorities at each time. Colouration of the 'spectacled cobra' or binocellate cobra is yellowish, brownish or black above, with or without a black and mark on hood, a black and white spot on the inside of the hood with one or two black crossbars below hood. In Naja naja, at rest, the ribs lie along the length of the body, the overlying skin is loosely attached.When erect the dorsal side skin is streched, making the hood more conspicuous, and the head, bent strongly at the atlas (1st) vertebra, is carried at right angles to the hood. The hood of Naja naja when dialated is diagnostic, more so when the markings are visible.

Keywords: *Naja, India, cobra, hood, Indapur, binocellate*

Asiatic cobra complex comprises 10 species (Wuster, 1998). However, only four species, namely Naja naja (Linnaeus, 1758), N. kaouthia Lesson, 1831, N. oxiana (Eichwald, 1831) and N. sagittifera Wall, 1913 occur in India; and out of them only N. naja shows a fairly wide distribution. Asiatic cobra complex comprises 10 species (Wuster, 1998). However, only four species, namely Naja naja (Linnaeus, 1758), N. kaouthia Lesson, 1831, N. oxiana (Eichwald, 1831) and N. sagittifera Wall, 1913 occur in India; and out of them only N.
naja shows a fairly wide distribution.

Introduction:

Indian cobra (*Naja naja*) of family Elapidae is also called as Spectacles cobra, binocellate cobra or asian cobra, is a cobra species found in India, Pakistan, Sri Lanka, Bangladesh, Bhutan and Nepal, and a member of 'big four' species which are responsible for the most snakebite cases (Mukherji, 2012). It is a protected species under the Indian Wildlife Protection Act (1972).

In Maharashtra state, in Pune District there is 13 taluka out of them Indapur is one of the tahsil lies between Latitude 17°53' to 18°15' N and longitude 74°35' to 75°8' E., and the average height from mean sea level is 546 m. Indapur is 135 km away from Pune, total geographical area of Indapur is 1487 sq. km (148700 hector), Bhima and Nira rivers are very close to Indapur tahsil. In Maharashtra second largest dam having catchment area

i.e. Ujani dam is located 10 km eastwards of Indapur city and backwater extends 48 km towards west upto Daund tahsil. Out of the total geographical area 80% area comes under irrigation. Under Indapur tahsil 143 villages have been included (Sensus of India, 2011). Average rainfall of tahsil is 406 mm. Indapur has enriched with te forest area of 7,361.8 hector (Maharashtra Government Socio-economic reference, 2012-13).

Materials and methods:

The work was conducted at Indapur tahsil of Pune district, Maharashtra state,

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ORIDONIN: A REVIEW OF ITS SCOPE IN ANTICANCER THERAPY

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Abstract
Cancer is one of the leading causes of death, globally and poses a significant challenge to the health sector. Resistance to the available therapies and their side effects has shifted the therapeutic paradigm to the naturally available plant components. Ordidonin, a component from a plant has been studied for years for its anti-inflammatory and anti-cancer properties. It regulates different signalling pathways such as ERK (extracellular signal-regulated kinase and Akt pathway, JAK-STAT (Janus kinase/signal transducers and activators of transcription) pathway, Wnt/β-catenin pathway and MAPK (p38 mitogen-activated protein kinase) in tumor cells eventually leading to cell death. Moreover, studies have been carried out to develop Oridonin analogues for cancer treatment. Further studies on understanding the precise action of Oridonin will unfasten the use of natural components in therapeutics. This review summarises the effect of Oridonin on different signalling pathways, its synergistic action with other chemotherapy and the development of Oridonin analogues for clinical trials.

Keywords: *Oridonin, Apoptosis, Signalling Pathways, Anticancer Therapeutics, Oridonin analogs*

Introduction:

The use of plants and herbs for the treatment of various diseases has been practised since ancient times. The written work describing the use of medicinal plants for the preparation of drugs has been found over 5000 years ago in Nagpur. [1] Traditional Chinese Medicine (TCM) and Ayurveda have been the roots of natural plant-based therapy for a lot of diseases. Various studies have been done on plants to understand their medicinal properties such as their anti-cancer, anti-diabetic, and anti-hepatotoxic effects.[1,2] For instance, *Panax ginseng* has been used for over 2000 years to treat cardiovascular diseases and diabetes.[2] Quinine isolated from the bark of Cinchona species was used by the Peruvian Indians to treat shivering since the 17th century. Furthermore, aspirin, a salicylic acid derivative obtained from the bark of a willow tree has been used in many cultures worldwide to treat inflammation and fever. Use of these traditional medicines set up the platform to develop therapeutics from plants and herbs, with lesser side effects.[3] Apart from anti-inflammatory and anti-diabetic effects, the use of plants for the treatment of cancer has been practised for a long time. Vinca alkaloids obtained from *Catharanthus roseus* (Apocynaceae) initiated an era of cancer treatment using plants.[4] It has a cytotoxic effect by disrupting the microtubule function and causing cell arrest at the metaphase stage.[5] However, a limited understanding of the molecular basis of traditional medicines has restricted the development of cancer drugs from medicinal plants. Similarly, another plant compound Oridionin also has shown anti-cancer properties. Oridionin has an apoptotic effect on cancerous cells. The mechanism of action of Oridonin is not well understood however, it promises the application to treat various cancers. This review article focuses specifically on the current advances in Oridionin for cancer therapy. It summarizes the data from various experiments that depict the anti-cancerous properties of Oridionin.

Oridonin induces apoptosis in cancer cells:

Rabdosia rubescens, also commonly known as *Don Ling Cao* in TCM, is being used by

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STUDY OF THREE TRACE METALS IN SOME FISHES OF KALI ESTUARY, KARWAR, KARNATAKA, INDIA

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Abstract

Manganese, Chromium and Copper concentration in the gill, muscle and whole body samples of four estuarine fishes, namely, *Mugil cephalus, Sillago sihama, Leiognathus brevirostris* and *Gerromorpha setifer* were determined during the period July- November, 2014. Concentration of these metals in different body parts varied from species to species. The three trace metals in *M. Cephalus, S. Sihama* and *L. brevirostris* in the whole body were in the order Mn > Cr > Cu whereas in *G. setifer* the abundance was in the order Cr > Cu > Mn . Significant correlation was observed between concentration of metals in gills and whole body in all species except *M. Cephalus*. Considering the trace metals concentration in relation to wet weight, all the metals are within safety limits in edible part.

Key words: *M. Cephalus, S. Sihama, L. brevirostris, G. setifer,* Trace Metals.

Introduction:

Trace metals are normal constituents of marine environments and traces at least are always found in marine organisms. Although at suitable concentration some trace metals are essential for enzyme activity, they also form an important group of enzyme inhibitors when normal concentrations are exceeded. Some metals such as Cu can act in either a stimulatory or inhibitory way depending on their level of availability (Engel et al., 1981). Cons frequently, most trace metals, whether essential or not, become potentially toxic at higher concentrations to living organisms, and also to human beings through the food chain. Trace metal concentrations in fishes have been studied by Bagley & Lockey (1967), Simpson et al. (1979) and Barber et al. (1972). Investigation into the interaction between trace metals and marine organisms have been intensified recently because of increased anthropogenic inputs of these metals into the aquatic systems (Patin, 1982; Moore & Ramamurthy, 1984). In the present investigation, the trace metals namely, Mn , Cr and Cu in the gills, muscles and whole body of *Mugil cephalus, Sillago sihama, Leiognathus brevirostris and Gerromorpha setifer* collected from Kali estuary were determined, keeping in view the relative biological importance of the above trace metals and also the food value of these fishes.

Materials and Methods:

Four species of fishes namely, *M. Cephalus, S. Sihama, G. setifer* and *L. Brevirostris* were caught by cast net and were immediately cleaned in sea water. They were taken to the laboratory and kept in refrigerator (at 0°C) before processing. Totally 16 fishes were collected comprising four numbers for each species. Before dissection, they were washed thoroughly with tap water and later by double distilled water. They were then aseptically dissected using clean dissection tools. Gills and muscle were dissected out and kept in clean watch glasses. They were dried in dessicator first for 10-15 days at room temperature and then dried at 65-70°C in an oven for 24 h to remove all the moisture. A known quantity (100 mg) of each dried sample was taken in a 100 ml beaker. To this 8 ml of concentrated HNO_3 and 2 ml of perchloric acid were added and then heated on a hot plate to near dryness, till about 1 ml of solution remained in the beaker. Then about 50 ml double water was added to each beaker and filtered through whatman 42 filter paper (Martin & Knauer, 1937) in case of whole body samples (gut sometimes contained sand particles) and finally made upto 100 ml using double

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JUVENILE COMMON CRANE *(GRUS GRUS)* RARELY SIGHTED AT DIKSAL, TAHSIL INDAPUR, DIST. PUNE, MAHARASHTRA

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Abstract
The distribution of Common Crane (*Grus grus*) is Europe and is also called as Eurasian crane. It is the long distance migratory bird, during its migration it passes its winter in the north India. The juvenile common crane was rarely observed at the wetland area of Diksal (Latitude 18.31045^0 N and Longitude 74.79357^0 E), Tahsil Indapur, Dist. Pune. It is IUCN Red List of threatened species as Least Concerned.

Keywords- Common Crane, *Grus,* juvenile, Bhima, Ujani

Introduction-
The male Common Crane (*Grus grus*) are slightly heavier and larger than females with weight showing the largest sexual size dimorphism, followed by wing, central toe, and head length in adults and juveniles. This species is slate-grey overall. The forehead and lores are blackish with a bare red crown and a white streak extending from behind the eyes to the upper back. The overall colour is dark on the back and rump and pale on the breast and wings. The primaries, the tips of secondaries, the tip of the tail and the edges of upper tail coverts are all black and the greater coverts droop into explosive plumes. Body feathers of juvenile has yellowish-brown tips and lacks the drooping wing feathers and the bright neck pattern of the adult, and has a fully feathered crown. Every two years before migration, the adult *Grus grus* undergoes a complete moult, remaining flightless for six weeks, until the new feathers grow (J. C. Alonso *et al.* 2019).

This *Grus grus* species is found in the northern parts of Europe and across the Palearctic to Siberia. The species of common crane is a long distance migrant predominantly wintering in northern Africa. Autumn migration occurs in August to October in the breeding areas but from late October to early December at the wintering sites. Spring migration starts in the month of February at wintering sites up to early March, but from March through May at the breeding areas (Javier, A. Alonso *et al.*,1990). Migration phenology of common cranes is changing due to the climate change. Some birds can be seen in winter in southern Europe, including Portugal, Spain and France. Most eastern common cranes winter in the river valleys of Sudan, Ethiopia, Tunisia with smaller numbers in Turkey, northern Israel, Iraq and parts of Iran. The third major wintering region is in the northern half of Indian subcontinent, including Pakistan. Minimal wintering also occurs in Burma, Vietnam and Thailand (M. Orellana-Macías *et.al.*, 2020).

Methodology-
The study was conducted during the period of September 2018 to August 2022 at the wetland area of Bhima river of Indapur tahsil, Dist. Pune, Maharashtra, India. The observations were carried out twice in aweek of each month during the time 7.00-11.00 am and 3.30-6.30 pm. The birds were observed with the help of binocular and a digital camera. The photographs of the species have been confirmed with the field guide of ornithologist Salim Ali (2002) and Satish Pande *et al.* 2011.

Results-
- **Name of species:** Common crane
- **Family:** Gruidae
- **Scientific name:** *Grus grus*
- **Status:** Winter migrant
- **Date of sighting:** 3rd February 2019
- **Time of sighting:** 10.45 am
- **Weather:** Sunny
- **Number of times sighted:** Single
- **Gender of bird:** Male
- **Locality:** Diksal (Latitude 18.31045^0 N and Longitude 74.79357^0 E), Tahsil Indapur, Dist. Pune, Maharashtra state, India

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SIGHTED RARELY THE WOOD SNIPE (*GALLINAGO NEMORICOLA*) AT WETLAND AREA OF VILLAGE KUMBHARGAON, TAHSIL INDAPUR, DIST. PUNE, MAHARASHTRA, INDIA

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Abstract

Wood snipe (*Gallinago nemoricola*) rarely occurred at marshy area of Kumbhargaon (Latitude 18.28019^{0}N and Longitude 74.76541^{0}E), Tahsil Indapur, Dist. Pune. This species is listed as a vulnerable in the IUCN Red List of threatened species (IUCN 2008). Mostly these species occur in marshy areas. Poaching threats have been the real issue in conservation of wood snipe.

Keywords- Wood snipe, *Gallinago nemoricola*, IUCN, red list

Inroduction-

Wood snipe (*Gallinago nemoricola*) is listed as a vulnerable in the IUCN red list (IUCN 2022). It breeds locally in the Himalayas of northwest and northeastern India, Nepal, Bhutan and China and in the regions of southeast Tibet, central Situan and perhaps Yunnan (Birdlife International 2001, Grimmett *et al.* 2000). In winter it occurs at lower altitudes in the Himalayas as a regular visitors in small numbers to north Vietnam as a vagrant to the hills of central and southern part of the India and Sri Lanka, Bangladesh, Myanmar, North Thailand and Laos (Birdlife International 2001). All the species were found from marshy areas (J. R. Kathiawada, 2010).

Methodology-

The study was conducted during the period of September 2018 to August 2022 at the wetland area of Bhima river of Indapur tahsil, Dist. Pune, Maharashtra, India. The observations were carried out twice in aweek of each month during the time 7.00-11.00 am and 3.30-6.30 pm. The birds were observed with the help of binocular and a digital camera. The photographs of the species have been confirmed with the field guide of ornithologist Salim Ali (2002).

Results-

- **Name of species:** Wood snipe
- **Family:** Scolopacidae
- **Scientific name:** *Gallinago nemoricola*
- **Status:** Vagrant, vulnarable
- **Date of sighting:** 27th January 2022
- **Time of sighting:** 11.15 am
- **Weather:** Sunny
- **Number of times sighted:** Single
- **Gender of bird:** Male
- **Locality:** Kumbhargaon (Latitude 18.28019^{0}N and Longitude 74.76541^{0}E), Tahsil Indapur, Dist. Pune, Maharashtra state, India
- **Habitat description:** Wetland of Bhima river
- **Distance from human civilization:** 2 km
- **Any other bird/animal associates:** Birds sighted at the muddy wetland area are- *Phalacrocorax niger, Egretta alba, Ardea cineria, Threskiomis melanocephalus, Platalea leucorodia, Anas poecilorhyncha, Fulica atra, Charadrius hiaticula, Charadrius dubius, Charadrius alexandrines, Limosa limosa, Tringa glareola and Himantopus himantopus*
- **Bird behavior:** The diet of wood snipe is mostly worms, isect larvae, snells, crustaceans. They slurp up invertebrates through nearly closed bill. Their call is a series of nasal 'check-chek-chek' sound.
- **Threats to the habitat:** Bird poaching
- **Photograph:** Attached

Recent Advances in Humanities, Commerce, Management, Engineering, Science & Technology

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SEMI VENOMOUS SNAKE, LEITH'S SAND SNAKE RARELY OCCURRED AT THE OUTSKIRT OF GOTONDI VILLAGE, TALUKA INDAPUR, DIST. PUNE, MAHARASHTRA, INDIA

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Abstract
From the desert outskirt of Gotondi village (Lat. 18.057446^{0}N Long. 74.858476^{0}E), taluka Indapur, Dist. Pune on 19th March 2004, the Leith's sand snake was rescued since it was entangled in a torned piece of fishing net, some one might have thrown that fishing net as unwanted. The investigator has rescued 1479 snakes during the period Nov. 1990-Aug.2022 and this snake rescued once only since it is rare and Least Concerned in IUCN Red List threatened species.

Keywords- Leith's sand snake, IUCN, Indapur, Gotondi, *Psammophis leithii*

Introduction-
Psammophis leithii is commonly called as Pakistan sand racer, Pakistani ribbon snake or Leith's sand snake, is a species of rear-fanged snake in the family Psammophiidae. The species is native to south Asia. It is harmless to humans. This Leith's sand snake (*Psammophis leithii*) species has been mentioned as least concerned in IUCN Red List of threatened species (Vyas, R., Srinivasulu *et.al.*; 2021).

Materials and methods-
The work was conducted at Indapur tahsil of Pune district, Maharashtra state, India, under which 143 villages have been included covering of 1,487 sq km area during the period of 1991-2022 to work on the diversity of snakes, environmental education and wild life conservation of snakes. The rural and urban habitation and also the scrubland, rocky areas, swamp areas, water bodies, etc. have been considered. Survey, collection and identification of snake species have been carried out in a tahsil area. The investigator is a skilled person to handle the various non venomous, semi venomous and venomous snakes. For safehandling of snakes, snake hooks and cotton bags have been used and for rescuing of snake from waterfilled well, the snake tongs have been used. To prevent the snake bite precautionary measures have been taken. During rescuing the Leith's sand snake, the morphological structures of the body of snake have been observed and photographs have been taken for the study purpose..

Results-
Leith's Sand Snake- *Psammophis leithii* (Gunther,1869)-
Scientific classification: From kingdom to subfamily same as Trinket snake
Genus- *Psammophis*
Species- *leithii*
Local name: Marathi- Lithicha Reti sap
Non venomous/Semi venomous/Venomous: Semi venomous
Length: 68 cm
Identification: Yellowish body has four dark brown lines from head to tail. The head has an elongated dark mark. The mouth is also elongated and the head is somewhat bigger than the neck. Big eyes with round pupils. Underside is faint yellowish-white with smooth scales.
Rescued from location: Desert outskirt of Gotondi village (Lat. 18.057446^{0}N Long. 74.858476^{0}E), taluka Indapur, Dist. Pune on 19th March 2004. I have rescued 1479 snakes during the period Nov. 1990-Aug.2022 and this snake rescued once only since it is rare.
Habitat: Grasslands and deserts.
Habit: Lizards, garden lizards and small birds (Khaire N; 2011).**Breeding behaviour:** Oviparous. Female lays around 4-10 eggs (Khaire N; 2011).
Characteristics: It is a diurnal and is found on the ground as well as trees.

Conclusion-
From the desert outskirt of Gotondi village (Lat. 18.057446^{0}N Long. 74.858476^{0}E), taluka Indapur, Dist. Pune on 19th March 2004, the Leith's sand snake was rescued

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IMPACT OF BIOPSY ON HUMAN EMBRYO CONCERN WITH PREIMPLANTATION GENETIC DIAGNOSIS (PGD): A REVIEW

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Abstract:
Pre-implantation genetic diagnosis (PGD) is generally defined as the testing of pre- implantation stage embryos or oocytes for genetic defects. PGD involves embryos which are examined prior to their transfer into uterus. Embryos are obtained by in vitro fertilization with intracytoplasmic sperm injection (ICSI), and are biopsied mostly on day 3; blastocyst biopsy is mentioned as a possible alternative. The genetic analysis is performed on one or two blastomeres, by fluorescent in situ hybridization (FISH) for cytogenetic diagnosis, or polymerase chain reaction (PCR) for molecular diagnosis PGD involves identification of sex selection, antigen compatible embryo also some extent to cancer. In this paper, techniques for the embryo biopsy and application of PGD is discussed. And new concepts for reproductive health and analysis of embryo at different stages for detecting genetic disorders is being discussed.

Keywords: PGD, IVF, FISH, PCR, SNP's, TE, PGT, ESHRE

Introduction:

Preimplantation genetic diagnosis (PGD) is a tool with which we can find whether an embryo is having any abnormalities and with the help of this technique the foetus can be implanted with correct chromosomes, without any genetic disorders. Embryo biopsy detects aneuploidy, Down's syndrome and many genetic diseases. Autopsy accounts the cause of death of foetus. Attempting conception/fertilization through IVF technique, single nucleotide polymorphism (SNPs) and microarray technique analysis can be done after biopsy to understand the chromosomal abbreviations {1}. PGD has an objective for the problems frequently occurring in prenatal diagnosis. For prenatal testing, commonly used technique is amniocentesis and

chorionic villus sampling. The evaluation of embryo is done on the basis of blastocyst degree of expansion and the quality of the inner cell mass and of the trophectoderm cells (TE). Normally

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AVIAN DIVERSITY AT WADOLI, MADHA TAHSIL, SOLAPUR DISTRICT, MAHARASHTRA, INDIA

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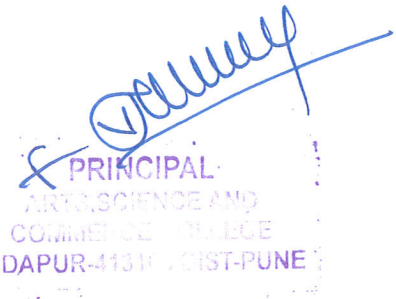
Abstract:-
Wadolivillage of Tahsil Madha has been located at the bank ofBhimaRiver.It is Perennial River,rich in aquatic vegetation and shows the appearance of several types of birds in all the seasons.In the study area various habitats such as wetland,agricultural fields,woodland,riverside and village all are rich in biodiversity.The present study was focussed to document avian diversity of Wadoli of MadhaTahsil, District Solapuras they are the tertiary consumers of the ecosystem and form important link in the food web. The present avian diversity from Wadoli are of 136 bird species from 59 families and 104 genera. There are 3 Near Threatened species. Out of the 136; 96 are resident species, 32 are migratory and 7 are local migrant and one is endemic residential species.These bird species are herbivorous, carnivorous, and omnivorous. These total species of birds shows different habitats.
Keywords: Birds, Resident, Migratory, Local Migratory, Species, Wadoli.

Introduction:-

The Indian subcontinent,a part of the vast oriental biogeographic regions is rich in biodiversity.Out of more than 9000 birds of the world,the Indian subcontinent consistsof about 1300 species or over 13% of the world's bird fauna(Grimmettet al., 1998). Wetlands of natural and manmade fresh water provide numerous ecological services. They provide habitat to aquatic fauna and flora as well as numerous species of birds including migratory species(Natural environment policy, 2006).The research area shows a characteristic vegetation of trees,climber,herbs,etc.It is being suggested that the avifauna plays a crucial role as a scavenger, pollinator,seed dispersal agent and predators of insect pest (Padmavati *et al.*, 2010).Bhima River is the tributary of Krishna river system and Ujani is the terminal dam constructed in the year 1981 on Bhima River in Maharashtra(Ranjit *et al.*, 2020). Bhima River has been enriched with several local and migratory wetland birds. As far as Wadolivillage site concern no previous study on the same line hence authors conducted the survey to prepare checklist of birds which would be helpful to develop the conservation policies of faunal diversity. This study provides the base line information on birds of Wadoli.



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RARE CASE OF A FISH *CHITALA CHITALA* FOUND IN BHIMA RIVER NEAR WATLUJ, TAHSIL DAUND, DIST. PUNE, MAHARASHTRA, INDIA

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Arts, Science & Commerce College, Indapur, Dist. Pune, Maharashtra state, India-413106.

Abstract
A single specimen of *Chitala chitala* was captured on Sepember, 10th 2022 in a gill net during the fishing activity in a Bhima river near Watluj village, taluka Daund, district Pune, Maharashtra, India (Latitude 18.4080370^0 N, Longitude 74.7746196^0 E). The fish was found having length 127 cm and weighed 6 kg and 120 gm. Previously *Chitala chitala* of this length and weight was not recorded from Bhima river of Ujani reservoir.
Keywords: *Chitala*, Bhima, Ujani, length, weight, fish, rare

Introduction:

Ujjani Dam, also known as Bhima Dam or Bhima Irrigation Project, on the Bhima River, a tributary of the Krishna River, is an earthfill cum Masonry gravity dam located near Ujjani village of Madha Taluk in Solapur district of the state of Maharashtra in India. The Bhima River, which originates in Bhimashankar of the Western Ghats, and forms the Bhima Valley with its tributary rivers and streams, has twenty-two dams built on it of which the Ujjani Dam is the terminal dam on the river and is the largest in the valley that intercepts a catchment area of 14,858 km^2 (5,737 sq mi). Total catchment lengthwise area is 48 km from Ujani village upto Daund (National register of large dams, 2011).

The name of *Notopterus chitala* has been modified as *Chitala chitala* (Hamilton,1822) which comes under family Notopteridae, also known as Indian feather or Indian knifefish found in Bangladesh, Nepal, Pakistan, India. In India it is inhabitant of Brahmaputra, Indus, Ganges, Mahanadi river basin (Froese *et al.*, 2014). Menon (1999) stated that adults inhabit freshwater reservoirs, canals and ponds. Rahman (1989) quoted that this fish feeds on aquatic insects, shrimps, molluscs and small fishes.

Materials and methods:

A single specimen of *Chitala chitala* (Plate: 1) was captured on Sepember, 10th 2022 in a gill net during the fishing activity in a Bhima river near Watluj village, taluka Daund, district

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Synthesis of cobalt oxide nanoparticles coated with carbon and its catalytic applications in organic reactions

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ABSTRACT

Cobalt oxide nanoparticles coated with carbon were prepared by the modified flame pyrolysis method. The preparation was carried out by simply exposing the cobalt nitrate salt onto a spatula to gas flame, the flame temperature converted the cobalt nitrate into cobalt oxide, which further get coated by carbon produced from the combustion of fuel gas. The obtained product from the flame pyrolysis was characterized using techniques viz. XRD, FTIR and SEM. SEM data show that the short length rod shaped nanoparticles coated with carbon ranging from 0.3 to 1 μm μm formed during the process. XRD and FTIR data also support the formation of cobalt oxide nanoparticles coated with carbon particles. Cobalt oxide NPs were utilized for the catalytic N-formylation reaction of amines at 70–80 °C. The optimization of the catalyst as well as temperature have been done carefully. The product of the reaction were characterized by various techniques viz. FTIR, HRMS and ^{1}H NMR which confirmed the formation of the product.

Selection and peer-review under responsibility of the scientific committee of the 2nd International Conference on Multifunctional Materials.

1. Introduction

Metal oxide demonstrates wide range of applications. Cobalt oxide here is the most stable phase in the Co-O system [1–4]. Cobalt oxide has been reported demonstrating wide range of applications viz. in lithium-ion batteries, heterogeneous catalysts, gas sensing, ceramic pigments, electrochemical devices etc. [5–9]. Co_3O_4 reportedly plays a vital role as selective coating material for the high-temperature solar collectors [10]. Supercapacitors are responsible for the advancement of mobile phones, digital cameras and solar cell power storage. Some electrode material which can be used in the supercapacitors is made up of metal oxides, metal sulfides etc. Co_3O_4 nanoparticles as electrode material for supercapacitors were also reported in the literature [11]. Cobalt oxide also gained very much attention in supercapacitors applications in the worldwide researchers, as it has capability to impart higher power density than normal batteries.

Various methods like sol–gel, surfactant-mediated synthesis, thermal decomposition, polymer-matrix assisted synthesis and spray-pyrolysis are well known for the synthesis of Co_3O_4 nanoparticles [12–14].

Applications of transition metal-oxide nanoparticles especially cobalt oxide are also well known in the organic reactions. Various reactions of N-formylation of aliphatic and aromatic amines have been reported. Reactions were carried out either in the broad range of solvents or under solvent free condition. Application of cobalt oxide NPs on growth of various parts of the plants are also reported in the literature [15–21]. Various biological applications of cobalt oxide have been found [22–26].

N-Formyl compounds are the main precursors as protecting groups for amines and an ideal starting material for isocynide compounds. [2–3] These compounds can also act as an intermediate for mono methylated amines from primary amines [4].

Many reports on the formylation reactions are available such as chloral,[27] activated formic acid using DCC [28] or EDCI,[29] formic esters [30–33] and ammonium formate [34]. Although these strategies have their own advantages high yield, mild reaction conditions but they are expensive and may be toxic to use. The green approach for such reactions has great importance concerning to the 'save environment campaign' run all over the world.

Here, we report a modified flame pyrolysis method to synthesis cobalt oxide nanomaterial from cobalt nitrate. We used modified

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Synthesis of cobalt oxide nanoparticles coated with carbon and its catalytic applications in organic reactions

Sachin Kharat [a,b], Shailendra Dahiwale [a], Shaukatali N. Inamdar [c,*], Mahadev P. Shinde [a,b,c,*]

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Various methods like sol–gel, surfactant-mediated synthesis, thermal decomposition, polymer-matrix assisted synthesis and spray-pyrolysis are well known for the synthesis of Co_3O_4 nanoparticles [12–14].

Applications of transition metal-oxide nanoparticles especially cobalt oxide are also well known in the organic reactions. Various reactions of N-formylation of aliphatic and aromatic amines have been reported. Reactions were carried out either in the broad range of solvents or under solvent free condition. Application of cobalt oxide NPs on growth of various parts of the plants are also reported in the literature [15–21]. Various biological applications of cobalt oxide have been found [22–26].

N-Formyl compounds are the main precursors as protecting groups for amines and an ideal starting material for isocynide compounds. [2–3] These compounds can also act as an intermediate for mono methylated amines from primary amines [4].

Many reports on the formylation reactions are available such as chloral,[27] activated formic acid using DCC [28] or EDCI,[29] formic esters [30–33] and ammonium formate [34]. Although these strategies have their own advantages high yield, mild reaction conditions but they are expensive and may be toxic to use. The green approach for such reactions has great importance concerning to the 'save environment campaign' run all over the world.

Here, we report a modified flame pyrolysis method to synthesis cobalt oxide nanomaterial from cobalt nitrate. We used modified

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CHALLENGES AND PROSPECTS OF MSME IN INDIA TOWARDS 5 TRILLION ECONOMY

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Abstract-*The present paper is an attempt to understand the various issues related to MSME*(Micro, Small and Medium Enterprises)*in India. The various challenges faced by MSME are issues like credit facility, issues of equity capital, issues of infrastructure, issues of Govt. support, issues related to technology and issues related to skill gap. The study is focusing on the expression regarding to the challenges of MSME and development of Indian economy towards five trillion dollars economy.*

Key words- MSME, Challenges of MSME and 5trillion Economy.

Introduction-

In developing country like India Micro, Small and Medium Enterprises (MSME) sector play an important role in creating employment opportunity and the use of resources. The role of MSME in the development process is very crucial to run the economy towards development of rural area. To remove the backwardness, regional imbalance, unemployment the MSMEs have great contribution. It also helps in development of agriculture sector. Definitely MSME are very much important in the socio-economic development of the country.The Micro, Small & Medium Enterprises (MSMEs) have been contributing significantly to the expansion of entrepreneurial skill development through business innovations. The MSMEs are widely expand many sectors of the economy by producingvarious range of products and services for domestic as well as global markets. By comparing to the other industry MSMEs in India provide large employment at lower capital cost. Also, MSME assuring more equitable distribution of national income and wealth.

Role of MSMEs in Indian Economy-

MSME (Micro, Small and Medium Enterprises) sector manufactures more than 8000 products. Almost 90% of total manufacturing industries rely on SMEs for semi-finished, finished and supplementary products. It is also to be noted that the MSME sector has maintained a higher growth rate than the entire industrial sector. MSME sector employs the second largest workforce just after the agriculture sector. The annual compound employment growth rate of MSMEs has been 3.63% as per the annual report of Ministry o MSME 2017-18. This sector also provides employment opportunity to unskilled and semi- skilled workers. It has also helped in increasing India's exports in value terms. About 3 million SMEs contribute to Indian foreign trade. MSME have high potential. As per the annual report of the Ministry of MSMEs 2017-18, there are around 633.92 lakhs enterprises registered as MSMEs in India and out of those only 4000 are from the category of large enterprises. Around 51% of total enterprises are from the rural sector. Now a days MSME become the engines of economic growth in India.

Challenges of MSME-

Issue of infrastructure.

The of infrastructure is a serious issue of MSME in India. Most of the MSME are either situated in rural areas in an unorganized manner. So, they, failed to get adequate support in terms of infrastructure. The basic necessity of infrastructural requirement as communication, roads, transport facility, electricity, distribution, market linkage, banking and credit facility, export orientation etc. Providing these facilities should be the primary criteria for the betterment of the industry. Therefore, the potential of this industry remains unutilized.

Support from the Government.

MSME should not get the sufficient financial support in terms of finance, capital and market from government. To compete with global market the financial support is very necessary.

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REVIEW ARTICLE

On the identification and medicinal importance of Dashmula plant 'Shalparni' *Pleurolobus gangeticus* (L.) J.St.-Hil. Ex H.Ohashi and K.Ohashi (*fam.* Fabaceae)

V. N. Patil[1]*, P. S. Kabnoorkar[2]

Abstract

Nature has been a source of divergent bioactive compounds for thousands of years. A large number of bioactive compounds valued in modern drugs have been isolated from natural resources. Traditional medicines are an important source of potentially useful new compounds for the development of chemotherapeutic agents. Therefore, there is a necessity to explore these medicinal plants in respect with their pharmacognostic and pharmacological studies to discover their therapeutic properties. *Pleurolobus gangeticus* (L.) J.St.-Hil. ex H. Ohashi & K. Ohashi (Syn. *Desmodium gangeticum* (L.) DC.) is a spreading annual herb found throughout India. It is of great therapeutic value in treating various ailments such as typhoid, piles, inflammation, asthma, bronchitis and dysentery. This review attempts to highlight the available literature on *Pleurolobus gangeticus* with respect to ethnobotany, chemical constituents and summary of various pharmacologic activities.

Keywords: Chemical constituents, Medicinal plant, *Pleurolobus gangeticus*, Therapeutic uses.

Introduction

India is known for its rich repository of medicinal plants. Ayurveda is widely practiced in India. The emphasis on development of biologically active new molecules has been gradually replaced by the use of total herbs as medicine and food supplements. Medicinal plants must be given the status of "National Resources" because their continued availability is essential to sustain one of the world's oldest medicinal traditions, a priceless legacy of the Indian people.

Pleurolobus gangeticus (L.) J.St.-Hil. ex H. Ohashi & K. Ohashi (Syn. *Desmodium gangeticum* (L.) DC.) commonly known as Shalparni, is widely used medicinal herb. It is commonly used in systems of medicine viz. Ayurveda, Sidha, Unani, Tibetan, Folk, & Homeopathy. It is used in popular 'Ayurvedic' preparation like 'Dashmularishta'. It belongs to family Fabaceae. According to Bhavaprakasha (1974), the following descriptive synonyms are given.

Prisniparni, Prthkparni, Chitraparnyahi, Parnyapi Krestuvinna, Simhapucchi, Kalasi, Dhavaniguha.

P. gangeticus is a woody herb attaining a height of between 20-120 cm, with a short woody stem and numerous irregularly angled branches covered in a fine grey pubescence. It is found throughout the tropical India into the lower portions of the Himalayan range. The meaning of its Sanskrit name 'leaves like *Sala*' suggests its leaf structure is similar to those of the tree *Shorea robusta* C.F. Gaertn. (Kirtikar and Basu, 1935 and 1974; Warrier *et al.*, 1994).

Classification

The Plant classification details are as follows:

Classification System: APG IV 2016

Superregnum	:	Eukaryota
Regnum	:	Plantae
Cladus	:	Angiosperms
Cladus	:	Eudicots
Cladus	:	Core eudicots
Cladus	:	Rosids
Cladus	:	Eurosids I Ordo : Fabales

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A Study of Tourism Development in Indapur Tahsil, Pune District (Maharashtra)

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Abstract:
Tourism is one of the largest and fastest growing industries in the world. Everyone is always drawn to nature. The geographical components play an important role in promoting tourism development. Beautiful landscapes, pleasant climate, forests, rivers, waterfalls, wild animals, birds, butterflies, waterbodies and other components are important resources to attract tourists. This article aims to study the development of tourism in Indapur tahsil, district of Pune. This article attempts to understand the development of tourism in the study area. Nira Narsingpur which is situated on the confluence of Bhima and Nira rivers and Kumbhargaon bird sanctuary, Bhigwan in the backwaters of Ujani Dam are famous destinations in Indapur tahsil. A paradise for wildlife photographers and other bird watchers, this bird sanctuary is one of the best sanctuaries in Maharashtra.

Keywords: Tourism, Tourism Development, Wildlife, Bird Sanctuary

Introduction:

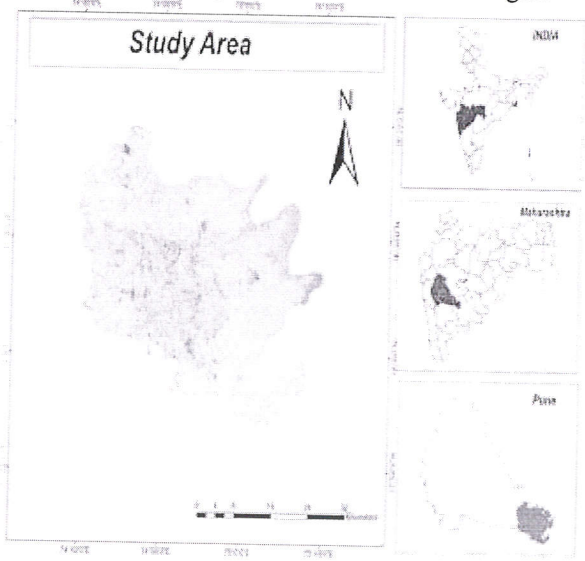
Tourism is an activity that contributes directly or indirectly to the development of the territory concerned. Tourism is one of the emerging service industries in the Indian economy. According to the Economic Survey 2022-23, the sector has the capacity to directly and indirectly create large-scale jobs for different segments of society, from the most professional to unskilled labor. The historical, religious and environmental resources of flora and fauna play an important role in the leisure activities of tourists. The game sanctuary system helps protect wildlife. Today, a day's worth of rare species has disappeared from nature. Therefore, it is necessary to protect the wild animals as well as the environment of the region. Bhigwan bird sanctuary is rich in animal wealth and attracts many tourists.

Research Methodology:

A physical survey was conducted to observe tourism resources such as flora and fauna in Kumbhargaon Bird Sanctuary, Bhigwan. Information about historical and cultural facts is collected from secondary data. Interviews and discussions with bird watchers, nature lovers and tourists who have visited the place are also held.

Study Area:

Indapur tahsil is one of the tahsils of Pune district and comprises 143 villages. Geographically, the study area extends from 17^0 53' to 18^0 15' North latitude and from 74^0 35' to 75^0 8' East longitude. The territory of Indapur tahsil is flowed by the Bhima to the north and east and the Nira River to the south. The study area is located in the southeast of Pune district, with Baramati tahsil in the west, Daund tahsil in the northwest, Satara in the southwest and Solapur district belongs to east, south and north side. The geographical area of Indapur is 1552.93^2 km. The climate if the study area is semi-arid. April, May and June are the hottest months. The average maximum temperature is 40 degrees Celsius. The lowest temperature records are recorded in December and January, with an average minimum temperature of 12 degrees Celsius. The soil in this area is medium to dark black. The population is 384,149 according to the 2011 census. Kumbhargaon Bird Sanctuary, Bhigwan, Nira-Narsingh and Palasnath Temple at Palasdeo village are major destinations in Indapur tahsil. Palasnath temple is located in the backwaters of Ujani Dam. The bird sanct uary is famous for its flamingos.



Applications of New Technologies for Enabling Library Services

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Abstract

This paper is discussing various new technologies that can be applied in Library and Information centers. Implementation of various Technologies has change the way of people to access and communicate information. Users need of easy access of information, leads Library professionals to think out of the box for meeting their information needs. Application of new technologies to provide library and information services are a significant step in this direction. In this 21st century Library professional's essentially to use various technology offering outreach technical options for librarians. Use of this technologies, provides well opportunity to extend new different types of library services to users.

***Keywords**: Mobile Technology, BlockChain, QR Code, RFID, Remote Control Technology, Library science, ICT Services, Library Services.*

Introduction

Libraries are not merely a storehouse of books but becoming a hub of information – based society. Because of increasing awareness among the users, availability of new resources and rapid advancement in Information and Communication Technology (ICT), library professionals and libraries are changing their traditional role. The web technology and Internet has changed the way of information is stored, retrieved and communicated in the libraries. As more libraries move towards traditional services to digital services to improve more advance services by adopting advance technology.

This paper discusses some advance technology that can be applied in the library and with the help of this technology the environment of the library will be upgraded and library services will fulfill the users' satisfaction.

Research Methodology:

For this paper, literature search was carried out by using secondary sources. For this study, the documents were studied online on Google Scholar, databases, N-list, seminar proceedings.

Following Technologies can be applied in libraries

Mobile Technology

Mobile is playing a vital role in enabling Digital India. Now a day, Mobile device is the integral part of every human life. From very beginning of childhood to old man and rural to urban and every corner of the world everybody use Mobile technology for accessing information. In 21st century there is revolutionary change in Information and Communication Technology. Use of nanotechnology is increased. Also this change is used in mobile technology. Now android version of mobile permit their users to access, stored, organize, retrieved information. There is a continually growing numbers in engaging mobile phone as a search tools. Smart phones, cell phones, iphones and tablets are commonly used devices for seeking information.

The invention and the use of information technologies need to meet life's basic challenges and responsibilities (Ademodi & Adepoju, 2009). Academic libraries can use several tools and techniques to fulfill the information need of their users. In the teaching and learning mobile technology is one of the better options to provide service to their remote users effectively. Libraries can play an important role to make their users self-directed and independent learning by providing access to their resources. Following is the possible mobile services that can provide –

- Mobile Apps for library

16. Assessment of Information Literacy Skills among the Senior College Students of Indapur City: A Pilot Study

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Abstract

This study is a pilot study to assess and evaluate information literacy skills among the students of senior colleges of professional and non- professional colleges of Indapur city under SPPU, Pune.

Keywords: Information literacy skills, Senior College Students, Literacy proficiency.

Introduction

Information literacy is the necessary skills which need in every aspect of every body's life. For students, who have the literacy skills can lead to independent and student – centric learning, rather than dependence on their teacher to provide answers to their problems that they needed. Information literacy skills made students critical thinker than merely gaining knowledge. Information Literacy (I. L.) skills enable students to choose best option for their problems. Becoming information literate will provide essentials skills to become a proficient learner in the college which benefitted students in their professional and personal life. Now a day's due to explosion of information internet provides billions of websites and millions of print items which are complicating access and retrieval of information by the end users. At present, information world provides multiple choices print, electronic, images, videos, sound, numeric. This leads to more challenging for users to choose appropriate format of information and get satisfied their problems. Information literate students who are knowledgeable about finding exact information, evaluate it, analysing properly, integrating and managing neatly and disseminate or conveying information to others efficiently and effectively. Information literate students lead the society and becoming successful in solving problems, providing best solutions and producing new ideas and directions for the future.

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Research Papers

Co-precipitation synthesis of pseudocapacitive λ-MnO_2 for 2D MXene ($Ti_3C_2T_x$) based asymmetric flexible supercapacitor

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$Ti_3C_2T_x$ MXene
Flexible hybrid supercapacitor

ABSTRACT

The rapid growth of wearable/portable electronics imposes a development of flexible, lightweight and highly efficient energy storage devices. In this work, we have synthesized λ-MnO_2 nanoplates through one step co-precipitation method and used for flexible asymmetric supercapacitor (SC). The structural, morphological and electrochemical properties of synthesized λ-MnO_2 were systematically investigated. The optical and electronic properties of λ-MnO_2 were studied using UV–vis spectroscopy and density functional theory (DFT) calculations. The pseudocapacitive λ-MnO_2 nanoplates-like electrode showed a maximum specific capacitance of 288.5 F g^{-1} at the scan rate of 5 mV s^{-1}. To check the practicability, symmetric (λ-MnO_2//λ-MnO_2) as well as asymmetric (λ-MnO_2//AC and λ-MnO_2//$Ti_3C_2T_x$ MXene) SCs were fabricated and their performances were compared. The asymmetric λ-MnO_2//$Ti_3C_2T_x$ MXene SC demonstrated a maximum energy density of 15.5 Wh kg^{-1} at the power density 1100 W kg^{-1} along with 86.3 % of capacitive retention after 5000 cycles. Besides, to confirm the suitability of these electrodes for flexible energy storage, a flexible λ-MnO_2//$Ti_3C_2T_x$ asymmetric SC was fabricated using PVA: Na_2SO_4 gel polymer electrolyte that operated in the potential window of 2 V and supplies high areal energy density of 39.9 μWh cm^{-2} at a power density of 8586 μW cm^{-2}. Therefore, the λ-MnO_2 prepared with a simple and scalable co-precipitation method may play a promising role in flexible energy storage.

1. Introduction

Electrical energy is prominent for technological development and its production through non-renewable resources greatly influences the world economy and ecological system [1]. Due to the expansion in the global need for energy, researchers have been focusing on exploring novel renewable energy sources and effective energy storage technologies [2]. Currently, electrochemical energy storage devices (EES) such as fuel cells, batteries and supercapacitors (SCs) have attracted great attention due to their good safety, reliability and eco-friendliness [3]. Amongst, SCs are mainly attracted due to their high power density and extended cycle life, exhibiting a wide range of applications in electric vehicles, communication technology, smart electronics, aircraft and smart grids [4]. Depending on the storage mechanism, SCs are classified into electric double-layer capacitors (EDLCs) and pseudocapacitors. EDLCs store electrical energy through ion adsorption/desorption while pseudocapacitors store charge via rapid redox reaction at the interface between electrode and electrolyte [5]. SCs are largely suffered from their poor energy density (ED), therefore, a significant amount of research is anticipated to develop novel electrodes and device configurations [6,7]. The ED of SC can be improved by enhancing capacitance and operating voltage according to the relation $E = (0.5) \times CV^2$, where C is capacitance and V is operating voltage. The operating voltage and thereby the energy performance can be effectively enlarged by fabricating asymmetric SCs (ASCs). The ASC is fabricated by combining two dissimilar electrodes mainly pseudocapacitive (positive) and EDLC

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Enhanced electrochemical performance of hybrid composite microstructure of $CuCo_2O_4$ microflowers-NiO nanosheets on 3D Ni foam as positive electrode for stable hybrid supercapacitors

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Hybrid nanocomposite
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Stability

ABSTRACT

Self-assembled composite porous structures comprising $CuCo_2O_4$ microflowers and NiO hexagonal nanosheets were synthesized on a conducting 3D Ni foam surface [CCO/NO] using a simple hydrothermal method. This unique composite assembly was further characterized and electrochemically evaluated as a binder-free positive electrode for hybrid supercapacitor application. The study showed that the CCO/NO exhibited a maximum areal capacitance of 1444 mF cm^{-2}, significantly higher than the parent $CuCo_2O_4$ and NiO electrodes, with remarkable stability of 88.5% for 10,000 galvanostatic charge-discharge cycles. Key features for the enhanced electrochemical performance of CCO/NO can be related to a lowered diffusion resistance because the hybrid nanocomposite porous assembly generates short diffusion paths for electrolyte ions and more active sites for reversible faradaic transition for charge storage. The hybrid supercapacitor was assembled using activated carbon as a negative electrode and CCO/NO as a positive electrode in alkaline electrolyte, performed at an improved potential of 1.6 V. Device showed a maximum areal capacitance of 122 mF cm^{-2}, a maximum areal energy density of 43 μWh cm^{-2}, and a maximum areal power density of 5.1 mW cm^{-2}. This hybrid supercapacitor showed remarkable cyclic stability up to 98% for 10,000 cycles. This study encourages the development of low-cost, high-performance, durable electrode designs using hybrid composite for next-generation energy storage systems.

1. Introduction

Sustainable energy storage becomes crucial for developing modern technology, such as electric vehicles, miniaturized/portable electronic devices, smart grids, and medical implants, as fossil fuel is depleting and demand for CO_2 reduction is becoming inevitable. Li-ion battery technology has been focused as high energy density storage application [1,2]. Meanwhile, the efficient supercapacitors (SCs) with high energy, power output and extended lifetime have been a vital and supporting to Li-ion battery technology for the sustainable energy storage [3–5]. In SCs, electrostatic interactions or faradaic redox reactions are responsible for the electrochemical energy storage [6,7]. Electrostatic interaction involves numerous rapid kinetic interactions as the charges electrostatically accumulate on the electrode-electrolyte interface, delivering high power density to SCs. However, Faradaic storage involves reversible kinetically faster redox reactions at the electrode-electrolyte interface, producing much higher energy to SCs. Therefore, major studies use state-of-the-art design and development of SC electrodes for simplicity and sustainability by using low-cost, environmentally benign electrochemically active materials that could provide high energy and power densities [3,8–10]. SCs with the most carbon-based 1D, 2D, and 3D material electrodes have been recognized as electric double-layer capacitors (EDLCs), where electrostatic interactions can store the charge. However, SCs with Ni-, Co-, Mn-, and Cu-based metal oxide electrodes have been popular as pseudocapacitors, where faradaic reactions can store the charge [7,11,12]. In both, the electrode electrochemical performance is confined to its thin active surface, so the material overloading at the electrode surface could degrade the SC performance.

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Uniform and fully decorated novel Li-doped α-Fe_2O_3 nanoparticles for high performance supercapacitors

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Specific capacity
Hybrid supercapacitors

ABSTRACT

Supercapacitors are considered emerging energy storage sources owing to their long-term cycling stability, high energy/power density, and rapid charge/discharge process. The performance characteristics of supercapacitors can be enhanced by devising electrodes with highly porous nanostructures through subtle hybridization of active materials and the development of current collectors with tailored nanoarchitectures. Herein, we reported the effect of Li doping on the electrochemical application of the pure α-Fe_2O_3 thin films. The preparation of nanoparticles-like nanostructures of the pure α-Fe_2O_3 and different percentages of Li-doped α-Fe_2O_3 thin films by cost effective and facile hydrothermal method for the supercapacitor application. As-synthesized pure α-Fe_2O_3 and Li doped α-Fe_2O_3 thin films were analyzed by the X-ray diffraction (XRD), and X-ray photoelectron (XPS) spectroscopy, scanning electron microscopy, transmission electron microscopy, and supercapacitor properties. The XRD results revealed the formation of the pure phase of the α-Fe_2O_3 with the rhombohedral crystal structure. XPS results confirmed the Li species existence in the 0.5% Li doped α-Fe_2O_3. The electrochemical properties indicate the 3D chain of the nanoparticle-like surface morphology of pure α-Fe_2O_3 and Li-doped α-Fe_2O_3 are more useful electrode materials for electrochemical application. The calculated values of the specific capacity (Cs) indicate the different percentages of doping of Li are affected by the electrochemical properties of the pure α-Fe_2O_3. The Cs of the optimized 0.5% Li-doped α-Fe_2O_3 (79 mAh g^{-1}) electrode was 1.3-fold higher than that of the pure α-Fe_2O_3 electrode (52 mAh g^{-1}) at a constant scan rate with excellent cycling stability upto 3000 cycles. The electrochemical and surface morphological analysis demonstrate that the 0.5% Li-doped α-Fe_2O_3 electrode is more useful than the pure α-Fe_2O_3 and other electrodes for developing high-rate hybrid supercapacitor-based energy storage devices applications.

1. Introduction

In this present era of digitalization, the rapid growth of portable devices, wireless electronics, hybrid electric vehicles, and the aerospace industry have triggered significant developments over the past few years [1,2]. The most important electrochemical energy conversion and storage devices include batteries and supercapacitors, which stand out because of their potential use in various electrical appliances [3–8]. However, batteries have certain limitations such as high production cost, low power density, and limited life span. By contrast, the supercapacitor has huge potential as a backup power source because of its rapid charge–discharge rate, high power density, fast energy delivery, prolonged cycle life, lightweight, excellent reliability, and flexibility, which can fulfill the growing power requirements of energy storage systems [9–11]. However, supercapacitors lag batteries in terms of energy density. Hence, the idea is to fabricate supercapacitors with increased energy density, while retaining all of their other beneficial features. Supercapacitors are categorized into two types based on the underlying energy storage mechanism, namely electric double-layer capacitors (EDLCs) and pseudocapacitors. EDLCs' function based on ion-adsorption

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REVIEW ARTICLE

On the identification and medicinal importance of Dashmula plant 'Shalparni' *Pleurolobus gangeticus* (L.) J.St.-Hil. Ex H.Ohashi and K.Ohashi (*fam.* Fabaceae)

V. N. Patil[1]*, P. S. Kabnoorkar[2]

Abstract

Nature has been a source of divergent bioactive compounds for thousands of years. A large number of bioactive compounds valued in modern drugs have been isolated from natural resources. Traditional medicines are an important source of potentially useful new compounds for the development of chemotherapeutic agents. Therefore, there is a necessity to explore these medicinal plants in respect with their pharmacognostic and pharmacological studies to discover their therapeutic properties. *Pleurolobus gangeticus* (L.) J.St.-Hil. ex H. Ohashi & K. Ohashi (Syn. *Desmodium gangeticum* (L.) DC.) is a spreading annual herb found throughout India. It is of great therapeutic value in treating various ailments such as typhoid, piles, inflammation, asthma, bronchitis and dysentery. This review attempts to highlight the available literature on *Pleurolobus gangeticus* with respect to ethnobotany, chemical constituents and summary of various pharmacologic activities.

Keywords: Chemical constituents, Medicinal plant, *Pleurolobus gangeticus*, Therapeutic uses.

Introduction

India is known for its rich repository of medicinal plants. Ayurveda is widely practiced in India. The emphasis on development of biologically active new molecules has been gradually replaced by the use of total herbs as medicine and food supplements. Medicinal plants must be given the status of "National Resources" because their continued availability is essential to sustain one of the world's oldest medicinal traditions, a priceless legacy of the Indian people.

Pleurolobus gangeticus (L.) J.St.-Hil. ex H. Ohashi & K. Ohashi (Syn. *Desmodium gangeticum* (L.) DC.) commonly known as Shalparni, is widely used medicinal herb. It is commonly used in systems of medicine viz. Ayurveda, Sidha, Unani, Tibetan, Folk, & Homeopathy. It is used in popular 'Ayurvedic' preparation like 'Dashmularishta'. It belongs to family Fabaceae. According to Bhavaprakasha (1974), the following descriptive synonyms are given.

Prisniparni, Prthkparni, Chitraparnyahi, Parnyapi Krestuvinna, Simhapucchi, Kalasi, Dhavaniguha.

P. gangeticus is a woody herb attaining a height of between 20-120 cm, with a short woody stem and numerous irregularly angled branches covered in a fine grey pubescence. It is found throughout the tropical India into the lower portions of the Himalayan range. The meaning of its Sanskrit name 'leaves like *Sala*' suggests its leaf structure is similar to those of the tree *Shorea robusta* C.F. Gaertn. (Kirtikar and Basu, 1935 and 1974; Warrier *et al.*, 1994).

Classification

The Plant classification details are as follows:

Classification System: APG IV 2016

Superregnum	:	Eukaryota
Regnum	:	Plantae
Cladus	:	Angiosperms
Cladus	:	Eudicots
Cladus	:	Core eudicots
Cladus	:	Rosids
Cladus	:	Eurosids I Ordo : Fabales

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12. Six Decades Progress of Maharashtra States Regional Imbalance

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Abstract

After independence, in the country of continental geographical expansion, diversity of language, religion and culture, an attempt was made to establish unity between national unity and regional identity by adopting the federal system of government. India has shouldered the difficult responsibility of maintaining national unity by giving place to language, religion and culture, but despite attempts to establish harmony between national and regional identities, regional problems arise as well. Even though the United Maharashtra of all Marathi speakers has been established as a state of Marathi speakers, there are sectional conflicts within the state. Similarly the public leaders of the disaffected sections within the state demand a separate state and the imbalance in development within the state due to the dominance of certain caste groups creates dissatisfaction among the people of underdeveloped or neglected sections. Dissatisfaction is caused or created among the masses, hence the dissatisfaction created among the masses of the underdeveloped or neglected sections is the cause of the inter-sectarianism. Conflict affects state politics and development processes.

This kind of divisional regional identity problem occurs in most of the states of India. Considering the case of Maharashtra, it is found that the divisions of Vidarbha, Marathwada and Konkan states are underdeveloped or if we compare the regional divisions of Maharashtra, West Maharashtra and Mumbai divisions are comparatively more developed divisions ie Marathwada and Konkan Development Council in their. The leadership of Nagpur sub-division of Vidarbha tries to balance the demands of development and the demand for an independent Vidarbha state has been continuously addressed to the State Reorganization Commission in 1956. It is said that the provision of Statutory Development Board relationship for the two divisions of Marathwada and Vidarbha was made in the State Reorganization Bill itself but due to the fact that the statesmen did not take proper measures in this regard, regional rift became more and more bitter in Maharashtra.

Results and Discussion

In the course of six decades after the establishment of the Marathi speaking state of Maharashtra, several committees were appointed to eliminate the regional imbalance of development in Maharashtra. The measures suggested by them did not remove the backwardness of Vidarbha Marathwada. Research is needed to find a permanent solution.

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Protein Alteration in Clarias batrachus exposed to Aqueous Fruit Extract of Kigelia pinnata

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Abstract
During the course of experiments, *Clarias batrachus* was exposed to sub lethal concentration (725.7PPM) of aqueous fruit extract of *Kigelia pinnata* to estimate the protein content. The mean (±SD) values for selected tissues were observed to be decreased during 7, 14, 21 and 28 days of exposure. The maximum content of protein shown by liver (103.1 mg/gm) and minimum content by gills (75.56 mg/gm) in control. Maximum decrease shown by gills (29.12%) and minimum by liver (19.62%) after 28 days in experimental set.

Keywords: *Clarias batrachus*, *Kigelia pinnata*, Aqueous fruit extract.

Introduction

The severe world population explosion is presenting complex challenges, being the most important one is malnutrition and shortage of food in terms of quantity and quality. Milk, meat and eggs are the important animal source of protein. Animal production is a long term project to produce adequate amount of quality protein to meet the national demand. Meat production in terms of demanding protein requirement is improving with the establishment of poultry industry and fish farming. The production of quality protein is associated with the development of fisheries on commercial basis. Fish production sector is very important not only as a main source of animal protein to ensure food security but also to improve employment and income for poverty elimination in developing countries like India (Bhosale *et al.*, 2010).

The *Kigelia pinnata* fresh fruit is poisonous and strongly purgative; fruits are prepared for consumption by drying, roasting or fermentation. In central Kenya, *Kigelia* is also used in a number of skin care products (Roodt, 1992). The tree is widely grown as an ornamental tree in tropical regions for its decorative flowers and unusual fruit.

Materials And Method

1. Collection of plant material

The fruit was collected in the month of February 2015, from university campus Sant Gadge Baba Amravati University, Amravati. Foreign matters and elements in the collected *Kigella pinnata* is were removed, rinsed twice with large quantity of de-ionized water, spread on a clean sack and cut into small pieces, placed under shade to air dry at ambient temperature. Sun dried for 1 hr and then fruit was ground into larger pieces using grinding machine. Fruit pieces were put in oven at 360 C temperature for 4-5 days till their weight remained constant and then ground into fine powder. The powder was stored in airtight container at room temperature.

2. Extraction

Aqueous extract of *Kigella pinnata* fruit 25gm powder in 200 ml distilled water was added separately to obtain extracts by Soxhlet apparatus which was then stored in glass bottles and refrigerated at 40C prior to use.

Observation And Result

During the course of experiments, *Clarias batrachus* was exposed to sub lethal concentration (725.7PPM) of aqueous fruit extract of *Kigelia pinnata* to estimate the protein content. The mean (±SD) values for selected tissues were observed to be

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Pesticide Residues in Commonly Consumed Vegetables: Impacts on Human Health and Safety Measures

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Abstract: Pesticides are typically used due to their ability to control or kill biological organisms such as insects, plant diseases, and weeds. Pesticide chemicals frequently reach consumers in the form of food residues. Presence of pesticide residues in foods raises the question as to what risks are consumers facing as they consume ubiquitous pesticide residues in their diet. Modern formulations of pesticides are said to be safe. Many scientific reports have demonstrated that pesticide residues from the food can produce long-term negative effects on the health of fauna, humans and the environment. This review mainly focuses on the vegetables (definition, nutritive and therapeutic benefits); pesticides (definition, types, benefits and adverse effects); and pesticide residues with detailed emphasis on pesticide residues recorded in common vegetable crops, health effects after exposure to pesticide residues, and safety measures for pesticide residues in vegetables along with strategies to be adopted to reduce pesticide residues in vegetables. This study recommends conduction of health risk assessment based on adequate daily intake and continuous monitoring together with a sample traceability system is recommended to protect consumers' health. New technologies should be developed for the safety of the agricultural products to protect consumers health and strict follow up of government regulations. To maintain the healthy ecosystems and better human health, correct and justified application of chemicals in the agriculture should be applied.

Keywords: Pesticide residues, Vegetables, Health risk assessment, Maximum Residue Limits (MRL)

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Introduction

Food safety is an important issue that attracts all of us. While the consumers are concerned about the safety of what they eat, the governments on their side are concerned with finding ways to reduce food related risks and illnesses (Keikotlhaile, 2011). Vegetables are segments of plants that serve as food to humans and other animals. It is often regarded collectively as edible plant matter, including flowers, fruits, stems, leaves, roots, and seeds (Ebabhi and Adebayo, 2021). Vegetables constitute a major part of the human diet by contributing to the dietary

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Role of Fruits in Human Health and Disease Prevention – An Overview

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Abstract: Fruits are rich in carbohydrates, dietary fiber, vitamin B6 and C, carotene, potassium, and with no cholesterol, low in calories and sodium. They have a unique role in a healthy diet. Fruits improve overall health and protect the vital organs of the body and reduce the risks of non-communicable and chronic diseases such as cardiovascular diseases, hypertension, diabetes, gastrointestinal diseases, and obesity. Further, more consumption of fruits can help to protect against eye diseases and improve overall health. Antioxidants from fruits can help to keep body cells and tissues healthy. Therefore, diets rich in fruits are highly recommended for promotion of health. Despite of many peer reviewed scientific studies, there are still gaps in knowledge and information that need to be addressed regarding the micronutrient deficiencies and nutritional disorders occurring due to low consumption of fruits. Aim of the present study was to overcome the knowledge gaps and further provide information on role of fruits in human nutrition and disease prevention. This review provides an insight into the importance of fruits as well as the benefits and progress of nutrition education in improving intake.

Keywords: Chronic diseases, Fruits, Health Benefits, Non-communicable diseases, Nutrition, Vitamins, Minerals

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Introduction

Nutrition is a basic human need and a prerequisite to a healthy life. A proper diet is essential from the very early stages of life for proper growth, development and to remain active (NIN, 2011). Fruits are an important component of a healthy diet and, adequate consumption of fruits on daily basis could help to prevent major chronic diseases such as cardiovascular disease (CVDs) and certain cancers. Non-communicable diseases (NCDs), such as CVDs, cancer, obesity and type 2 diabetes mellitus, currently kill more people every year than any other cause of death (FAO and WHO, 2004; Hiza and Bente, 2007).

Fruits are consumed at all times, and due to their convenient size; they are an excellent between-meal snack (Vicente *et al*., 2009). The World Health Organisation (WHO) (2009) have recorded that, worldwide, about 6.7 million deaths were attributable to inadequate fruit consumption. Daily consumption of fruits is

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Crystal Structure, Microstructure, Magnetic Properties, and Dielectric Properties of Dy^{3+} Substituted Co–Ni Mixed Ferrite

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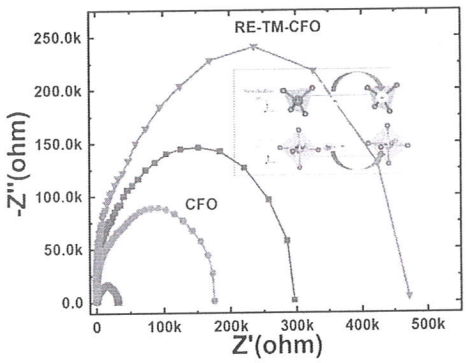
ABSTRACT: A comparative and exploration study of intrinsic, rare-earth (RE) and rare-earth and transition-metal (TM) cosubstituted cobalt ferrite ($CoFe_2O_4$; CFO) materials has been performed by studying their crystal growth, phase-stability, morphology, magnetic, and electrical properties comprehensively. Pristine cobalt ferrite ($CoFe_2O_4$), RE-ion (Dy^{3+}) substituted CFO ($CoFe_{1.95}Dy_{0.05}O_4$; RE-CFO), and TM-RE (nickel/dysprosium; Ni^{2+}/Dy^{3+}) cosubstituted CFO ($Co_{1-x}Ni_xFe_{1.95}Dy_{0.05}O_4$; x = 0.1, 0.5; RE-TM-CFO) samples were synthesized by a standard solid-state reaction method. X-ray diffraction (XRD) together with Rietveld refinement confirms the formation of the anticipated phase, which corresponds to the space group $Fd\bar{3}m$ (227), along with the presence of a small impurity phase ($DyFeO_3$) in the samples where Dy^{3+} was substituted. Surface morphology studies by means of scanning electron microscopy specifies the consequence of Ni^{2+}/Dy^{3+} on the microstructure as well as the presence of the orthoferrite phase of $DyFeO_3$ at the grain boundaries. Brunauer–Emmett–Teller (BET) analyses indicate that the specific surface area and pore contribution increases, whereas the pore width decreases for Dy-substitution in Co–Ni mixed composition, i.e., $Co_{1-x}Ni_xFe_{1.95}Dy_{0.05}O_4$; x = 0.5. Magnetization (M) versus magnetic field (H) measurements at variable temperature (5–400 K) confirm the ferrimagnetic nature of all the CFO, RE-CFO, and TM-RE-CFO samples. Saturation magnetization (M_s), coercive field (H_c), and remnant magnetization (M_r) are observed to be decreased with Ni^{2+}/Dy^{3+} substitution. However, the cubic anisotropy does not follow a systematic trend. A maximum magnetostriction coefficient $\lambda_{11} = -103$ ppm is attained for $Co_{0.9}Ni_{0.1}Fe_{1.95}Dy_{0.05}O_4$ along with the strain derivative $d\lambda/dH$ = 0.1108 ppm/Oe at a lesser magnetic field of 500 Oe, making it one of the best candidates for a stress or magnetic field sensing application. Moreover, this sample may be suitable as one of the constituent phases in magneto-electric materials. The dielectric constant dispersion measurements as a function of frequency revealed the typical dielectric behavior of the ferrites. Concurrently, the presence of a single semicircle arc in the complex impedance study confirms that only grains are contributing to the conduction mechanism. Furthermore, as expected, temperature-dependent complex impedance measurements show a decrease of grain resistance (R_g) and relaxation time (τ), whereas the grain capacitance (C_g) is observed to be enhanced. Overall, the results point to the outcome and highlight the TM-RE mixed CFO ($Co_{0.9}Ni_{0.1}Fe_{1.95}$ $Dy_{0.05}O_4$) is suitable for designing the magneto-mechanical devices.



INTRODUCTION

An industrial revolution requires smart materials, which are multifunctional and can demonstrate enhanced properties of the magnetic oxide materials. Among the oxide based materials, spinel ferrites, which can be represented by the chemical formula AB_2O_4, are promising to fulfill these requirements. Spinel ferrite materials have been on the radar of researchers since the late 1950s due to their excellent properties like high saturation magnetization, high coercive field, moderate remnant magnetization, low eddy current losses, and high thermal and chemical stability along with their twin properties of high electrical resistivity and good magnetic conductivity.[1−10] These varieties of properties make them good candidates for various industrial applications.[1−10]

Among the spinel ferrite family, cobalt ferrite ($CoFe_2O_4$; CFO) is one of the best candidates due to their astonishing properties.[12−14] CFO exhibits remarkable properties, such as moderate saturation magnetization ($M_s \sim 80$ emu/g), high coercive field, highest magneto crystalline anisotropy constant ($K_1 \sim 10^6$ erg/cm^3), and high magnetostriction coefficient ($\lambda \sim 225$ ppm) and possesses high Curie temperature ($T_c \sim 793$ K).[4,11,12] These superior properties of cobalt ferrite fuels its

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