Annexure C-6(6.7)

Faculty Members of this institution have published 21 papers in International Journals and 01 National Journal**.**

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POLYMER GELS

Evaluation of Environment Exposure Potential of Atrazine Herbicide and Synthesis of Polymeric Controlled Release Pesticide Formulations

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Abstract—A thorough understanding of pesticide fate in soil and replacement of traditional pesticide formulations with polymeric controlled release pesticide formulations may provide a preventive approach for safer and more effective application of pesticides in the field. In this direction, the present study discusses the soil adsorption study of atrazine herbicide on Indian soil and synthesis of polymeric controlled release formulation based on *Azadirachta indica* (Neem) (AI) leaf powder and sodium alginate. The value of Ground Ubiquity Score (GUS) for atrazine herbicide has been observed 2.58 which classifies it as a transition pesticide in terms of ground water contamination with higher Environment Exposure Potential (EEP) in Indian soil. Polymeric controlled release pesticide formulations (CRPFs) were synthesized by ionotropic gelation method with three different crosslinking ions i.e. Ca^{2+}, Ba^{2+}, and Al^{3+}. These CRPFs have been characterized by FTIR, SEM-EDAX and TGA. Polymeric CRPFs released the herbicide in controlled manner for a period of 300 h and followed non-Fickian diffusion mechanism. AI-Alginate-Ca beads showed maximum cumulative release 14.99 mg/g in 300 h, followed by $BaCl_2$ and $AlCl_3$ crosslinked beads. The release study showed that the Polymeric CRPFs can be effective in controlling the release and adverse effects of atrazine in the environment.

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INTRODUCTION

Farming without usage of agrochemicals like pesticides, is not possible in the modern agricultural practices. Extensive population growth leading to growing food demand, has led to intensify the application of pesticides in fields. Wide application of agrochemicals has led to severe health effects of humans and animals [1, 2]. Despite the dangerous health hazards, the usage of these pesticides cannot be stopped at once. Without using agrochemicals, either the crop is damaged by the herb, pests, fungus or it doesn't have proper growth due to lack essential nutrients in soil. In case of pesticide, less than 5% of the used pesticide actually reaches the target and rest of it goes into the environment. Most of the pesticide used in agriculture seeps into water bodies through leaching and the process of leaching for a pesticide is inevitable [3]. In soil, pesticide may travel in soil solution phase or gets adsorbed to the solid soil particles. This behavior determines the final fate of pesticide and the extent of surface water and ground water contaminations [4, 5].

The agro-environmental pollution derived by pesticide usage can also be reduced with the help of polymeric controlled release pesticide formulations (CRPFs). Conventional pesticide formulations release the active ingredient immediately causing quick loss of agrochemicals via degradation, volatilization, evaporation and leaching. An ideal pesticide formulation could be the one which can control the amount available at any time to be adequate for pest control and leave minimum residues on crops and in environment. This can be achieved by the use of polymeric CRPFs [6–9]. Natural origin polymers like alginates have gained attention for synthesis of CRPFs because they not only control the pesticide release in environment but also increase the water holding capacity of soil. In addition to these natural polymers are eco-friendly, cost effectiveness, easily available, biodegradability and may have inherent pest repelling tendency. Alginate is a linear polysaccharide, which easily forms a crosslinked polymer bead with divalent or trivalent metal ion. Alginate is mostly used in combination with another polymer to form bi-polymeric beads [10]. In present case *Azadirachta indica* (Neem) (AI) leaf powder has been used as the second component for bead formation. AI leaf powder is well known for its pest

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Synthesis and Characterization of Ni and Cu Doped ZnO Nanoparticles

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Self Attested

Abstract

In this article, exceptionally increase in production of nickel& copper doped zinc oxide nanostructures is reported. The ZnO nanostructures are synthesized with 10% of Ni & Cu doping adopting a Sol-gel method. Further the structural & Crystallite size studies were performed by utilizing X-ray diffraction. The identification of wurtzite phase and determination of lattice parameters of Ni & Cu doped ZnO nanocrystallites is ascertained. X-ray diffraction (XRD) results indicates that the crystallite size is in 23-39nm range, lattice parameters are a=0.32nm and c= 0.52nm respectively for wurtzite structure of ZnO.

Keywords: nanoparticles, Precursor, zinc oxide, Sol-gel, X R D

1. Introduction

Valued for ZnO ultra violet absorbance, wide chemistry, piezoelectricity and luminescence at high temperatures, ZnO has penetrated far into industry, and is one of the critical buildings in today modern society.[1] ZnO is indeed a key element in many industrial manufacturing processes including paints, cosmetics, pharmaceuticals, plastic, batteries, electrical equipment, rubber, soap, textile, floor covering etc. with improvement in growth technology of ZnO nanostructures, single crystal and nanoparticles, ZnO devices will become increasing functional in the near future.[2] Metal oxide nanoparticles were extensively investigated due to their applications in the field of spintronics,[3] photoelectronic,[4] sensor,[5] lasing devices[6] and light emitting diodes,[7] etc. The properties of these nano materials incredibly altered due to quantum confinement and enhanced surface to volume ratio.[8] ZnO is a multifunctional material.[9] The piezo- electric and pyroelectric properties of ZnO mean that it can be used as a sensor, converter, energy generator and photo catalyst in hydrogen production.[10-25] The physical and chemical properties of ZnO nano materials can be easily tailored as per the demand of device fabrication

1.1 Properties

ZnO is a relatively very soft material with approximate hardness just 4.5. Its elastic constants are relatively smaller than those of other III-V semiconductors, e.g. GaN. The high heat capacity and high heat conductivity, low values of thermal expansion and high melting points are 11 some of the characteristics of ZnO. Among the semiconductors bonded tetrahedrally, ZnO has the highest piezoelectric tensor. This makes it an important material for many piezoelectric applications, which require a high degree of electromechanical coupling among them. Piezoelectricity of ZnO has been extensively studied for various applications in force sensing, acoustic wave resonator, acousto-optic modulator, etc.[11]

ZnO has a quite large band gap of 3.3eV at room temperature and 60meV excitation energy,[12] The advantages of a large band gap include higher values of breakdown voltages, sustaining large electric fields, high-temperature and high-power operations. ZnO has n-type character, in the absence of doping. Non-stoichiometry is usually the

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TO STUDY THE PERFORMANCE OF FRACTIONAL ORDER LOW PASS FILTERS USING LT-SPICE

Self Attested

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Abstract: Fractional Order filters were First Proposed in RADWAN in 2008 where design Procedure for all filters with fractional order was introduced. General expressions for the maximum frequencies, quality factor, the right phase, and half power frequencies were derived. In addition, the effect of the transfer function parameters on the filter poles and hence the stability introduced. Here in this paper we studied the LT-SPICE Simulation results to validate the theoretical findings. Different filters responses are obtained from general delayed transfer function. We first have used the CFOAs technique to design the fractional Order low pass filters. Then we have used CHEBYSHEV low pass filters for designing fractional Order low pass filters. We have designed fractional Order low pass filters of order 1.2, 1.5, 1.8 by using both designing techniques and then compared their results.

Index Terms - Fractional Order, LT-SPICE, CFOAs, CHEBYSHEV, Quality Factor

I. INTRODUCTION

The importance of filters in signal processing and other engineering areas is unquestionable. Continuous time filters are widely used as functional blocks, from simple anti-aliasing filters preceding ADCs to high-SPEC channel-select filters in integrated RF transceivers. Four classical classes of filters which are currently used: Butterworth, Chebyshev, Elliptic and Bessel (Zverev, 1969). Even in the integer order case, filter design is challenging, mainly when the system has to meet a wide set of constrains. Most tools for filter design are based on the transfer functions of the above classes, which impose only requirements related to the magnitude or phase responses.

Active RC filters are the class of frequency selective circuits in which resistances, capacitances and OP- AMPs are the only components used. The modern IC fabrication precludes the use of inductors. Even in discrete component circuit, the use of inductors is avoided because they are bulky heavy and non- linear. In addition, they generate stray magnetic field may dissipate considerable amount of power.

The growing research interest for employing the concept of fractional calculus in electronic engineering is mainly originated from the interdisciplinary nature of this research area. For example, the modelling of viscoelasticity as well as of biological cells and tissues has been performed through the utilization of the fractional-order calculus. Biological signals such as electrocardiograms (ECG) and electroencephalographs (EEG) have spectra that do not increase or decrease by multiples of ±6 dB/octave but by multiples of ±6·a dB/octave ($0<a<1$). In addition, the capability for precisely controlling the attenuation gradient in fractional-order filters in comparison with the corresponding integer-order filters is an attractive feature. Fractional Order Elements (FOEs) are the main building blocks for performing signal processing according to the fractional calculus. Unfortunately, these elements are not commercially available and, thus, FOEs are approximated by appropriately configured RC networks.

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Dense nuclear matter in relativistic mean field model with isoscalar and isovector meson mixing interaction

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INTRODUCTION

The astrophysical phenomena concerning compact stars as well as the finite nuclei and nuclear matter properties are determined by the nuclear equation of state (EoS) that is established by the relationship between the energy density and pressure of the system. As a result of precise observations of neutron stars, such as the Shapiro delay measurement of a binary millisecond pulsar J1614+2230 [1] and the radius measurement of PSR J0740+6620 from Neutron Star Interior Composition Explorer (NICER) and from X-ray Multi-Mirror (XMM- Newton) Data [2, 3], theoretical studies have been currently performed more than ever to explain the neutron star physics through the EoS for dense nuclear matter. The tidal deformability of a neutron star has very significant role to construct EoS of neutron star. The aim of the present study is to construct new effective interaction to investigate the effects of quartic interaction of σ-δ meson on the properties of finite nuclei, bulk nuclear matter, and asymmetric dense nuclear matter within the framework of relativistic mean field model(RMF) model.

THEORETICAL MODEL

The effective Lagrangian density for the RMF model [4, 5] generally describes the interaction of the baryons via the exchange of σ, ω, ρ and δ mesons up to the quartic order

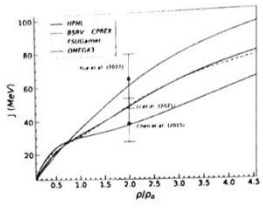

FIG. 1. (color online) Density dependence of symmetry energy.

of nucleon system is given by

$$\begin{aligned}\mathcal{L} = & \sum_{N=n,p} \bar{\Psi}_N[i\gamma^\mu\partial_\mu - (M_N - g_{\sigma N}\sigma - g_{\delta N}\delta.\tau_N) \\ & - (g_\omega\gamma^\mu\omega_\mu + \frac{1}{2}g_\rho\gamma^\mu\tau_N.\rho_\mu + e\gamma_\mu\frac{1+\tau_{3N}}{2}A_\mu)]\Psi_N \\ & + \frac{1}{2}(\partial_\mu\sigma\partial^\mu\sigma - m_\sigma^2\sigma^2) - \frac{\bar{\kappa}}{3!}g_{\sigma N}^3\sigma^3 - \frac{\bar{\lambda}}{4!}g_{\sigma N}^4\sigma^4 \\ & - \frac{1}{4}\omega_{\mu\nu}\omega^{\mu\nu} + \frac{1}{2}m_\omega^2\omega_\mu\omega^\mu + \frac{1}{4!}\zeta g_{\omega N}^4(\omega_\mu\omega^\mu)^2 - \frac{1}{4}\rho_{\mu\nu}\rho^{\mu\nu} \\ & + \frac{1}{2}m_\rho^2\rho_\mu\rho^\mu + \frac{1}{2}(\partial_\mu\delta\partial^\mu\delta - m_\delta^2\delta^2) - \frac{1}{4}F_{\mu\nu}F^{\mu\nu} \\ & + \frac{1}{2}\Lambda_{\omega\rho}g_{\omega N}^2g_{\rho N}^2\omega_\mu\omega^\mu\rho_\mu\rho^\mu + \Lambda_{\sigma\delta}g_{\sigma N}^2g_{\delta N}^2\sigma^2\delta^2 \qquad (1)\end{aligned}$$

RESULTS AND DISCUSSION

In the present work, new parameter set HPNL (Table(I)) is obtained for Relativistic Mean Field (RMF) model by adjusting parameters of the model to fit exactly the available experimental data of total binding energies, charge rms radii for some closed shell nuclei $^{16,24}O$, $^{40,48}Ca$, $^{56,68,78}Ni$, ^{88}Sr, ^{90}Zr, $^{100,116,132}Sn$, ^{144}Sm and ^{208}Pb. We also include in our fiting protocol, the value of neutron skin thickness of ^{208}Pb from PREX-II Experimental data [6]. In Table(II), we present results for properties of symmetric nuclear matter and neutron star and its tidal deformability at canonical mass ($\Lambda_{1.4}$) for various parameterization. The nuclear matter properties obtained by HPNL parameterization are consistent with the empirical and the observed values.

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Evaluation of Toxicity Indices for Frequently Used Pesticides

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Abstract

Pesticides are used all over the world to boost agricultural production to meet out expanding food demand with increasing populations. Even though we firmly believe that using pesticides is inevitable, there are still significant concerns about the possible risks and health hazards associated with their uses. Pesticide toxicity indicators can be used to reduce pesticide use risks and address agro-environmental pollution. In view of this, the current study evaluates the various pesticide toxicity indices viz. toxicity potential (TP), environmental exposure potential (EEP), hazard potential (HP) for five frequently used pesticides of different classes namely atrazine herbicide, malathion insecticide, thiram fungicide, carbaryl insecticide and zineb fungicide. The values of pesticide toxicity indices illustrate atrazine and carbaryl as very toxic pesticides.

Keywords: environmental pollution, ground water, hazards, pesticides, toxicity

1. Introduction

The agriculture sector dominates the economic scenario in India, as agriculture in India is the chief earner of the overseas exchange and the occupation of nearly 60% of our population is agriculture. We, all, depend on this sector for our basic and essential necessities i.e. food, shelter and cloth. However, with the increasing population of India, there is a rapidly growing demand for food. This pressure of increasing food production, due to population explosion as well as limited cultivation area, requires the need of more efficient operations in agriculture to increase the yields and to improve the quality of crops. In view of the fact that in India, every year about 30% of the food production is lost due to insects/pests [1] therefore, one of the ways to improve quality as well of quantity of food produced is the use of pesticides. These chemicals have increased agricultural production by preventing crop losses before and after harvesting.

The pesticides have an important contribution in the modern agricultural practices and have become essential for the crop protection and pest management. These chemicals would continue to be indispensable in

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ACADEMIC STRESS AND ITS IMPACT ON ACADEMIC PERFORMANCE: A STUDY OF COLLEGE STUDENTS

Basu Dev Garg *

Abstract

Normal stress is helpful for individuals to keep them active and productive. But experience of high levels of stress over a prolonged period may cause many mental and physical problems. Stress among college students being an important concept needs to be addressed properly, failing which consequences may be serious. This study is primary data based and it has been collected from college students using Google form. Chi square test has been used to test the significance of hypotheses. This study concludes that problem of money to meet academic expenses was moderate academic stressor and grade /marks in the final exam, study for competitive exams, problem of understanding lectures through online mode, expectations of parents about career goal and poor time management were nearly moderate academic stressors among college students. Academic stress irritates college students, distract them from study and affect their overall academic performance adversely.

Keywords: Academic stress, Career, Stress, Stressor

Introduction

It is estimated that 10–30% of students experience some degree of academic stress during their academic career (Johnson S. 1979). College students experience high stress due to various stressors. Negative or excessive stress can affects health and academic performance adversely. Despite other reasons COVID 19 lockdown is one of the new reasons for academic stress among college students who are at the threshold of career. COVID 19 has forced students to study from their homes through online mode. During this lockdown most of the students were found panicking about their career. Stress is usual part of life. College students experience

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Awareness, Perception and Practices of College Students towards Swatch Bharat Abhiyan in Himachal Pradesh

Basu Garg and Rajender Singh***

ABSTRACT

Swatch Bharat Abhiyan (SBA) is only the beginning and it is very necessary to run it continuously until it achieves its goals squarely. In India, it requires dedication and loyalty of people from all walks of life. The educated segment of society plays an important role in the success of any program or mission. Thus, this study examines the awareness, perception and practices educated segment of the society i.e. college youth towards SBA. A cross sectional research design was used to collect desired information from sample (n = 386). The data were analysed using mean, ANOVA and Chi-square. This study concluded that target population is aware about SBA and its usefulness. They are obedient about SBA practices; but half of the students do not practice SBA activities regularly. Mean score of SBA practices and creating awareness in public was found more in those students who were aware and perceive SBA useful.

Keywords: *Swatch Bharat Abhiyan (SBA); Cleanliness; Hygiene; Sanitation; Waste Management.*

1.0 Introduction

According to the data from Swachh Bharat Mission: Gramin (SBM) portal on October 2, 2019, all the villages in the 36 states and U.T.s of India were declared open defecation-free (ODF). In this series on October 1, 2021, Prime Minister Narendra Modi launched the second phase of the Swachh Bharat Mission (Urban), which envisions making all cities in the country "garbage-free".

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GBS IMPACT

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A STUDY OF SCHOOL TEACHERS' AWARENESS AND EXPERIENCE TOWARDS ONLINE TEACHING LEARNING PROCESS DURING COVID 19 LOCKDOWN

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ABSTRACT

Online mode of learning requires new type high-tech infrastructure, compatible digital gadgets, high speed and affordable internet connectivity and most importantly technical know-how to use the technology. It was very challenging to cope with the sudden change in teaching- learning pattern caused by COVID-19 lockdown. This study tries to investigate the awareness, experiences and identify the challenges faced by school teachers in Himachal Pradesh during the online teaching learning process. This is primary data based study information provided by school teachers through Google Forms. The study reveals that despite advantages of online teaching learning like flexibility, students' friendly, creative etc. There is lack of face to face interaction, problem of internet connectivity, absenteeism and difficulty in students' evaluation process.

Key Words: *Covid-19, Pandemic, Lockdown, Curricula, Online-Learning.*

1. INTRODUCTION:

Reaching students through live classes both educational institutions and students require high speed internet, infrastructure etc. Online education is not just oral presentation of content by teachers through mobile/laptop/computer or it's not listing at other end by a student but it posed many challenges right from no experience to conduct/attend live class by teacher and student, to lack of early preparation or support from educational technology teams.(Wang et al.2020) Studies reveals that teachers and students have faced many difficulties during online learning due to lack of technical knowledge, unavailability of compatible digital devices, unaffordable internet data

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Awareness and Perception of Rural Youth Towards Multi Level Marketing (Mlm)

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Abstract :

Multi level marketing which is also known as referral marketing or network marketing sells product or services to independent distributors rather than final customers. It is believed that traditional marketing sells product or services through chain of middle men which hike product cost and price. Hence network marketing emerged to curtail marketing cost. Despite numerous benefits network marketing is criticized for its scam and negative image. This paper is an attempt to know the awareness and perception of rural youth towards Multi Level Marketing (MLM in Himachal Pradesh. Structured questionnaire in Google form has been developed to obtain desired information from the rural youth. SPSS software has been used to analyse the collected data. This study concludes that rural youth are not fully aware about the concept of MLM. Awaked youth assume it good source of alternate income but fear to join due to its negative image. There is significant relationship between educational stream, age of rural youth and their awareness towards MLM and there is no relationship between their gender, educational stream and preference to join MLM.

Key words: Perception, Multi level marketing (MLM), rural youth, traditional marketing

Introduction :

MLM industry is operable in more than 100+ countries, and it is one of the best industries to stay profitable. Currently, the MLM industry is valued at around 167 billion USD, which is estimated to reach around INR 645 billion by 2025. Multi-level marketing is "the practice of distributing, selling or supplying products or services through various levels of independent agents" (Koehn, 2001, p. 153). As working from home became the norm in the past few years, MLM businesses promised financial freedom, a steady income, and opportunities for growth, all by working on the Internet. Multilevel marketing (MLM) is a strategy that sells products and services through a non-salaried workforce in a pyramid-shaped commission system. The MLM strategy is also known as network marketing or referral marketing. In this business model distributor or agents get commission on own as well as other's sale of product or service. Success of network marketing depends upon the ability and skill of distributors or agents. A distributor earns through MLM in two ways; by selling the product directly to the customer and recruiting new distributors. The income generated by the down line distributors gets the upper-level distributor a percentage of sales they make.

Favorable Aspect of MLM :

1. **Flexibility**: Multi level marketing is a flexible business model it offers people opportunity to work from home, they can choose their own hours, and be their own boss.
2. **Low initial cost**: Multi level marketing business demand a low investment, which makes it accessible to more people. People don't need to invest much on business infrastructure
3. **Experience sharing**: Most of the multi level marketing companies offer training and support to their distributors, which can help them improve their skills and succeed in the business.

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New Approach to Solve the Transportation Problem by Using NECM

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Abstract: The transportation problem is a special type of LPP where the objective is to minimize the cost of distributing a product from several sources or origins to several destinations. Transportation problem deals with transport things at least cost as much as possible. The North –West Corner Method (NWCM) is the first method or way to transport things from the one corner to another corner. In this paper The North–West Corner Method and the North East Corner Method (NECM) are adopted to compute the Initial Basic Feasible Solution (IBFS) of the transportation problem.

Keywords: NWCM; Least Cost; NECM; IBFS; Transportation Problem.

I. INTRODUCTION

The linear program to minimize the transportation costs from different origins to the different destinations in respecting the constraints of availability and demand, is called the transportation problem [1]. In this problem, the availability can be equal to the demand (balanced problem), the availability may be superior to the demand and the availability may be less than the demand. Important application of the linear programming is to formulate the transportation problem and find the least solution of the problem. The basic transportation problem was originally stated by Hitchcock [2] and later discussed in detail by Koopman [3]. An earlier approach was provided by Kantorovich [4]. The linear programming formulation and the associated systematic method for solution were first given in Dantzig [5]. The recent approaches were respectively given by Polaniyappa and Venoba [6].

TABLE I. TABLE OF THE GENERAL TRANSPORTATION PROBLEM

Origins \ Destinations	D_1	D_2	...	D_j	...	D_n	Supply: a_i
O_1	c_{11}	c_{12}	...	c_{1j}	...	c_{1n}	a_1
O_2	c_{21}	c_{22}		c_{2j}		c_{2n}	a_2
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
O_i	c_{i1}	c_{i2}	...	c_{ij}	...	c_{in}	a_i
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
O_m	c_{m1}	c_{m2}	...	c_{mj}	...	c_{mn}	a_m
Demand: b_j	b_1	b_2	...	b_j	...	b_n	$\sum_{i=1}^{m} a_i = \sum_{j=1}^{n} b_j$

In table I, a_i denotes the quantity of commodities available at the origin i, b_j is the quantity of commodities requested at the destination j and c_{ij} is the transportation cost from the origin i to the destination j. A set of non-negative values, i=1, j=1; that satisfies the constraints is called a feasible solution to the transportation

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POTENTIAL APPLICATION OF TITANIUM DIOXIDE IN SOLAR CELLS: A REVIEW

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Abstract: Titanium dioxide is widely studied due to its interesting properties such as wide band gap, crystalline nature, low cost, high refractive index and environment friendly. Titanium dioxide nanoparticles are suitable for many applications such as solar cells (anode material in solar cell), in batteries and also in antireflection coating. It affects the efficiency of solar cell & capacity in Li ion battery.

In the present work we discussed third-generation solar cells which are designed to achieve high power-conversion efficiency while being low-cost to produce. This review focuses on different types of third-generation solar cells such as dye-sensitized solar cells, Perovskite-based cells, and quantum dot solar cells. In these solar cells the $TiO_2$is used as a photo anode due to its wide band gap, high refractive index and environment friendly nature. When TiO_2 is used as photo anode in DSSC then, its efficiency is increased up to 8.02%. Similarly, if TiO_2 is used as photo anode in QDSSC, its efficiency is increased up to 13.84%.TiO_2 used as an electron transport layer (ETL) in PSC, its efficiency reaches 13%.This also includes working principles and components of third generation solar cells. For Li-ion battery, TiO_2 has been used as an anode material due to its high structural stability, stable capacity and fast charge ability for lithium-ion insertion and desertion. This anode material avoids short circuit and battery explosion problem and also reduced the cost. TiO_2 enhances the performance of the third generation solar cells and Li-ion battery. Another application of TiO_2 is that it is used as an antireflective coating. TiO_2 as an antireflective coating reduces reflection and enhance light absorption.

Key Words: **PSC - Perovskite Solar Cell, QDSSC- Quantum Dot Sensitized Solar Cell.**

1. INTRODUCTION

Titanium dioxide is the oxide of titanium with a chemical formula of TiO_2 and was first discovered in 1791 from limonite (ore of titanium).Titanium dioxide (TiO_2) attracted attention due to its wide band gap semiconductor (3-3.2 eV), large surface area, high catalytic activity, non toxicity and low cost [1]. TiO_2 belongs to the family of transition metal oxides. It is known to occur naturally in three crystalline phases: anatase, rutile and brookite (Figure.1.1). Comparing to these three structures, the rutile is more stable than the others. At temperatures above 550 °C, the anatase phase is transformed into the rutile phase. Anatase TiO_2 crystal structure comes within the tetragonal structure and it belongs to the space group $I4_1/amd$. The anatase-phase unit cell contains four units of TiO_2 with 12 atoms. The three Ti atoms are each integrated with an O atom, they have an unattached structure in the same plane. It has one long bond and two short bonds. Rutile TiO_2 crystal structure also comes within the tetragonal structure and it belongs to the space group $P4_2/mnm$. The rutile phase unit cell contains two units of TiO_2 with 6 atoms. The three Ti atoms are each integrated with an O atom; they have an unattached structure in the same plane. It has one long bond and two short bonds. Brookite TiO_2 crystal structure comes within the orthorhombic structure and it belongs to the space group Pbca. Its six Ti-O bonds also vary in length.

Figure 1.1 displays ball and stick models of the different tetragonal lattice systems for anatase, rutile and brookite. Moreover, rutile phase can be excited by both visible and ultraviolet (UV) light, whereas anatase is only excited by UV light and can be transformed into rutile at high temperatures. Brookite phase is not excited by UV light nevertheless its orthorhombic crystal system can be transformed into rutile by the use of heat. As shown in table1, in case of the anatase tetragonal crystal structure, the lattice constants are, a = b = 3.78Å and c = 9.50Å. On the other hand the tetragonal structure of rutile has lattice constants are, a = b = 4.58Å, c = 2.95Å. The orthorhombic structure of brookite phase has lattice constants are, a = 5.43Å, b = 9.16Å, c = 5.13Å [1].Because of its unique properties, titanium dioxide is widely used and is well known in nanoscience and nanotechnology. Nanoparticles (NPs) are generally defined as particles having at least one dimension smaller than 100 nm. Micro sized and Nano-size titanium dioxide is chemically identical because of its higher specific surface area; nano-powders may exhibit physical and chemical properties. Nano-sized TiO_2 in various forms is used widely in everyday life in a variety of products, such as in paints, household products, medications, cosmetics, sunscreens, pharmaceutical additives and food colorants, and many new applications are under development.

Enclosure 6

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Tailored TiO_2 nanostructures for designing of highly efficient dye sensitized solar cells: A review

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ABSTRACT

Energy and the environment are two major challenges for our modern civilization and solar energy plays an important role among the renewable energy alternatives due to its availability and eco-friendly nature. One of the prominent routes for the conversion of solar energy into electrical energy is photo-voltaic technology. The dye sensitized solar cell (DSSC) has emerged as one of the promising technologies among photo-voltaic solar cells due to its eco-friendly nature and cost effectiveness, being fabricated from specific components such as a photoanode, photo-sensitizer dye, electrolyte and counter electrode. Recent developments in various components of dye sensitized solar cells (DSSCs) have improved their performance under both solar sunlight (power conversion efficiency (PCE) ~ 15%) and ambient light conditions (PCE ~ 34%), with long term operational stability. The photoanode plays a vital role in developing a proficient DSSC and the tailoring of photoanodes is observed as one of the opportunities for world scientific communities to make further improvements in the PCE. For a long time, TiO_2 has played a lead role as a photoanode, owing to its low photo-corrosion and excellent optical as well as electrical properties, among various semiconductor metal oxides such as Nb_2O_5, SnO and ZnO. Hence, the present review is focused on TiO_2 based photoanodes, including zero dimensional (0-D), one dimensional (1-D), two dimensional (2-D) and three dimensional (3-D) nanostructures for DSSCs. The assessment of TiO_2 nanostructure based photoanodes has been comprehended in correlation to different photovoltaic parameters of the developed respective DSSCs with PCE values ranging from 1.01% to 34.5%. The conclusive properties of an efficient photoanode along with the related motivation have been stated and screen printed nanocrystalline mesoporous TiO_2 film based photoanodes are found to be most suitable to design a proficient DSSC.

1. Introduction

Environmental concern and energy demands are increasing at a very rapid rate with the increase in world population. Utilization of energies from renewable sources that have carbon neutral characteristics is considered as the plausible solution for the present energy and environmental crisis. Solar energy is abundantly available and a clean source of energy among the renewables, thus it may be one of the viable options for both stationary and mobile applications [1–4]. Solar energy can be harnessed by means of solar photovoltaic and thermal technology to produce electricity and heat, respectively. Harnessing power from the sun by means of photovoltaic technologies seems to be a large-scale

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(47/52)

Employees' psychological well-being in a pandemic: a case study during the peak of the COVID-19 wave in India

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Abstract: Subjective wellbeing (SWB) is associated with happiness and life satisfaction. Depression, anxiety and stress represent three different but relating concepts to poor mental health. COVID-19 pandemic has negatively impacted the subjective well-being of employees during the lockdown, especially the employees relating to the tourism industry. Inter-industry and intra-industry comparison of tourism employees' psychological wellbeing during the peak of the second wave of COVID across India was done. Socio-demographic variables were checked separately for psychological wellbeing. Stratified random sampling was used for data collection. Data was collected through an online questionnaire using the WHO-5 wellbeing index and DASS21 scale for depression anxiety and stress during the peak COVID-19 wave. A sample from 93 employees was collected, of which, 55 employees were from the tourism industry. The results indicated that tourism industry employees as a whole and the employees engaged in activities within tourism had poor subjective

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On Some Results of Strong Γ-Subgroups of a Strong Γ −Group

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Abstract

In this paper, we study the concept of strong Γ −group, strong Γ −subgroup and their properties viz: Γ −cosets, Normal Γ −subgroups, one-to-one correspondence between any two strong Γ −left(right) cosets of a strong Γ −subgroup in a strong Γ −group etc. Further if H and K be two strong Γ − subgroups of a strong Γ − group G. Then $H\Gamma K$ is a strong Γ −subgroup of a strong Γ −group G if and only if $H\Gamma K = K\Gamma H$.

Keywords: Strong Γ −group, Strong Γ −subgroup, Γ −cosets, Normal Γ −subgroups.

I. INTRODUCTION

The notion of a ternary algebraic system was introduced by Lehmer [1] in 1932.As a speculation of ring, the notion of a Γ−ring was introduced by Nobusawa [7] in 1964. In 1981, Sen [8] introduced the notion of a Γ−semigroup as a generalization of semigroup. In 1995, Rao [2-5] introduced the notion of a Γ−semiring as a generalization of Γ−ring, ring, ternary semiring and semiring. Rao [6] introduced the notion of field Γ−semiring and Γ−field. Semi group, as the basic algebraic structure was used in the areas of theoretical computer science as well as in the solutions of graph theory, optimization theory and in particular for studying automata, coding theory and formal languages. The formal study of semi groups begins in the early 20th century. Rao [5] studied ideals of Γ−semirings, semirings, semigroups and Γ−semigroups. Kumar [13] introduced the

Annexure 2
P: 3-6

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India's Ascent to Global Leadership: Opportunities and Obstacles

4

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Introduction

In 1947, India attained Independence and became Sovereign Socialist Secular, Democratic Republic. At the time of independence, the country had to deal with several problems, such as illiteracy, corruption, poverty, gender discrimination, untouchability, regionalism, and communalism. According to the National Sample Survey Office (NSSO), which conducted the first survey on unemployment in 1972-73, the unemployment rate in the country at that time was 8.35%. More than 250 million people were below the poverty line, which was 80% (Figure-1) of the population at that time. The per capita income was very small. During the independence the per capita income of Indian was Rs. 274 only. The health infrastructure was very poor. There were only 30 medical colleges and 2,014 government hospitals across the country. The average age of an Indian was 34 years. These and many other prevailing problems in the country hampered the economic development of the country. In fact, India's GDP at the time of gaining independence in 1947 was only 2.93 lakh crore, or 3% of the global GDP (Figure 3). All these problems faced by the Nehru Administration resorted for a planned economy based on Socialistic pattern of society with an aim of Modernization of economy, using indigenous technology, own resources and building a strong industrial sector in the country. Various structural functional reforms in the form of establishing Planning Commission, formulations of economic, Industrial Polices and administrative reforms were the top priority of the administration.

The decade of 60s was full of turbulence for Independent India. The country faced an acute shortage of food and eatables. This was the decade when the country had to go through the worst drought in history. Due to which the supply of food grains and food grains was

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A Study On Opportunities And Challenges Of Financial Services In Indian Banking

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ABSTRACT

The Indian economy is supported by its financial sector. Since the economic liberalization after 1990, the Indian banking industry has seen a development associated with a significant increase in its asset quality and efficiency. Today's environment is so ingrained with information technology that it is difficult to imagine an existence without it. technology that enables more efficient handling of larger volumes. Therefore, it is essential to not only upgrade the technology, but also integrate it into the way banks generally operate. The banking sector is no exception to this global changing environment. A new era in banking has emerged as a result of technology. Through the use of call centers, ATMs, internet banking, mobile and telebanking, bank automation and the increased use of plastic money, Indian banks have consistently encouraged investment in information technology. Banks are currently moving from decentralized operations to a centralized environment that is driven by information technology. By providing specialized goods and services, banks are better able to connect with their consumers. Banks were able to compete in the new environment due to changes in the banking sector. The banks of the future will be user-friendly, technology-driven businesses that strive to create a serious and sustainable corporate position. In order to provide tailored 'Anytime Anywhere Banking' services, information technology has been integrated into banking operations. In discussing the changing landscape of financial services in the Indian banking system, we addressed and analyzed the opportunities and challenges of technological development, legal regulatory framework and risk management.

Keywords: Economy, Information Technology, opportunities, Challenges, Business, Customers, Banks.

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A Comprehensive Review Paper addressing the Intersection of Ethics and Environmental Considerations

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Abstract - The intersection of ethics and the environment has become increasingly critical in today's globalized world. This abstract explores the intricate connection between ethics and the environment, delving into the ethical principles that guide human interactions with the natural world. It underscores the growing awareness of environmental issues and the pressing need to incorporate ethical considerations when addressing them. The abstract covers various key topics, including human moral obligations towards the environment, the consequences of climate change and resource depletion, the ethics surrounding conservation and biodiversity, and the role of environmental justice in addressing disparities in environmental impacts. It emphasizes the importance of scrutinizing the ethical aspects of contemporary problems like deforestation, pollution, and habitat destruction, as these actions have far-reaching consequences for present and future generations. Furthermore, the abstract highlights the significance of education and advocacy in promoting ethical conduct towards the environment. It stresses the need to nurture environmental literacy and instill a sense of responsibility for our planet. Additionally, it draws attention to the role of government regulations, corporate sustainability initiatives, and international agreements in aligning human activities with ethical environmental principles. In conclusion, the abstract underscores the intricate relationship between ethics and the environment, demanding ethical contemplation and action from individuals, organizations, and governments alike. Recognizing the ethical dimensions of environmental issues is a crucial step toward achieving a harmonious coexistence between humanity and the natural world. This abstract serves as a foundation for further exploration and discussion of this pressing global concern.

Keywords: Ethics, environment, resource depletion, deforestation, pollution, habitat destruction.

I INTRODUCTION

Before delving into the ethical concerns related to the environment, it is essential to establish a clear understanding of the concept of ethics. This clarification is necessary because a distinction exists between environmental science and environmental ethics. Environmental science, as a discipline, examines "what is" through its distinct methodology and principles, while environmental ethics is concerned with "what ought to be" and employs a reasoned methodology rooted in normative science. The term "ethics" finds its origins in the Greek word "Ethos," which encompasses customs, character, usages, and habits. It is also referred to as moral philosophy, derived from the Latin word "Mores," which similarly denotes customs, behavior, and character. Ethics can be viewed as the study of the highest Good. Environmental ethics places its focus on rights, values, duties, and principles, and engages in discussions that involve intuitionist and hedonist arguments. This field of inquiry delves into ethical relationships that exist among humans, between humans and the natural world, and among non-human life forms within nature. In an era characterized by pressing environmental challenges and heightened ethical consciousness, the convergence of ethics and environmental considerations has emerged as a pivotal domain of intellectual inquiry and societal relevance. The delicate equilibrium between human activity and the natural world is increasingly recognized as not only an ecological imperative but also a profound ethical concern. This comprehensive review paper embarks on a journey to explore the intricate and dynamic interplay between ethical principles and the environment. As our planet grapples with issues ranging from climate change and biodiversity loss to resource depletion and pollution, questions of moral responsibility, justice, and stewardship have come to the forefront of global discourse. How we perceive, evaluate, and respond to these environmental dilemmas is profoundly influenced by our ethical frameworks and moral values. It is within this context that we embark on a comprehensive examination of the manifold facets of ethics and their profound impact on the environment.

This review will traverse a multifaceted landscape, encompassing the rich tapestry of ethical theories that have sought to elucidate our relationship with the environment. From the utilitarian calculus of consequences to the deontological imperatives of duty, from the virtue ethics of character to the eco-centric moralities grounded in the intrinsic value of nature, we shall navigate the philosophical terrain that underpins environmental ethics.

Moreover, the ethical dimensions of environmental policy and regulation will be scrutinized, shedding light on how moral principles guide the development of legislation aimed at safeguarding our natural heritage. We shall delve into the intricate web of considerations surrounding environmental justice, seeking to understand how ethics inform our efforts to address disparities in environmental impacts and benefits among diverse communities.

Sustainability, as both a concept and an aspiration, occupies a central position in our exploration. Ethical obligations pertaining to sustainable practices and responsible stewardship of the Earth's resources shall be closely examined, illustrating the ethical imperatives that drive environmental conservation and the pursuit of a balanced and enduring coexistence with the natural world.

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The Effect of Human Resource Management Practices on Organizational Performance in the Himachal Pradesh Education Sector

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Abstract - "In recent decades, Human Resource Management (HRM) has garnered significant prominence, becoming a ubiquitous component in both larger corporations and many smaller enterprises. It is widely recognized that in India, as well as specifically in the Himachal Pradesh region, effective HRM plays a pivotal role as a source of competitive advantage for organizations. Without proficient HRM, no organization can operate efficiently. Managing human resources is notably more intricate than overseeing technology or capital, emphasizing the critical need for a well-structured HRM system to manage human resources effectively. This study aims to scrutinize primary and secondary data collected from the Bilaspur, Mandi, and Hamirpur districts of Himachal Pradesh. The research paper delves into HRM practices and their impact on the organizational performance of the education sector in Himachal Pradesh, encompassing colleges and universities, with a sample of 300 respondents. The primary objectives of this research are to assess the existing facilities provided to beneficiaries and to gauge the perspectives of respondents on HRM practices and their influence on organizational performance within the education sector. To support the analysis of primary and secondary data, statistical tools such as the chi-square test, standard deviation, and means are employed. The report concludes by offering a set of recommendations for executives and policymakers, suggesting ways to enhance the impact of HRM on organizational performance and the overall efficiency of the education sector in Himachal Pradesh. This study explores the impact of Human Resource Management (HRM) practices on organizational performance within the education sector in Himachal Pradesh, India. HRM has emerged as a crucial element in both large and small organizations and is recognized as a key source of competitive advantage. Effective HRM is considered indispensable for the efficient operation of any organization, surpassing even the complexities of managing technology or capital. The research conducted in this study involves the analysis of primary and secondary data collected from the Bilaspur, Mandi, and Hamirpur districts of Himachal Pradesh. The focus is on HRM practices and their influence on the performance of educational institutions, including colleges and universities. A total of 300 respondents participated in the study. The primary objectives of this research are to assess the existing facilities provided to beneficiaries in the education sector and to solicit the perspectives of respondents regarding HRM practices and their impact on organizational performance. To support the analysis of primary and secondary data, statistical tools such as the chi-square test, standard deviation, and means are utilized. The report concludes by offering a set of recommendations for executives and policymakers aimed at enhancing the influence of HRM practices on organizational performance and improving the overall effectiveness of the education sector in Himachal Pradesh. The findings of this study contribute to a better understanding of the critical role played by HRM in the education sector and offer insights for strategic improvements in this domain.

Keywords: Human Resource Management (HRM), Organizational Performance, Education Sector, Himachal Pradesh, HRM Practices, Competitive Advantage, Primary Data Analysis, Secondary Data Analysis, Facilities Assessment, Respondent Perspectives, Statistical Analysis, Chi-Square Test, Standard Deviation, Means, Recommendations, Policymakers, Strategic

I. INTRODUCTION

In the contemporary landscape of organizational management, the role of Human Resource Management (HRM) has evolved into a pivotal factor in the success of both large and small enterprises. Its significance transcends industrial boundaries, extending even to sectors as diverse as education. The education sector in Himachal Pradesh, India, is no exception, as it recognizes the indispensable value of effective HRM practices in achieving organizational excellence and maintaining a competitive edge. This study embarks on a journey to delve into the intricate dynamics of HRM practices and their direct impact on the performance of educational institutions within the scenic terrain of Himachal Pradesh. In this era of information and innovation, managing human resources has emerged as a far more intricate endeavor than handling technology or capital. Therefore, the establishment and maintenance of a well-structured HRM system become imperative to efficiently manage the human element within educational organizations.

The scope of this research encompasses a comprehensive analysis of primary and secondary data gathered from three

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Imminent Technologies And New Business Models In India

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Abstract

The aim of this essay is to review business models. As a result, business models are emerging that replac established business models, adapt organizational structures to the products and services offered, and emphasiz unique value propositions. This is because competition between companies will not only take place through ne products, services or technologies, but also through innovative business models. A review of the literature on th topic enabled the acquisition of the latest state of the art and the development of a research program. The studie material was found by a methodical search in several databases using the term disruptive business model. In tl material exploration phase, a content analysis technique was used to categorize the data for analysis. Later, tl authors used inference and interpretation based on the researched content to process the results. The collecte material allowed for a collection of data on disruptive business models, which were then evaluated and organiz to provide new deductions and interpretations. This article contributes by offering a comprehensive examinati of the topic, thereby deepening theoretical analyzes on the topic and reducing this gap in the literature. T disruptive process of business models is a significant phenomenon in the market, which lacks a theoretical ba for its maintenance. The research agenda presented in this study defines a disruptive business model and identif some potential areas for further empirical studies.

Keywords - Innovation, Business models, Emerging technologies

Self Attested

Annex – V

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AN INTERNATIONAL PEER REVIEWED, REFEREED MULTIDISCIPLINARY
& MULTIPLE LANGUAGES RESEARCH JOURNAL

मीडिया की भाषा दशा और दिशा

प्रीतम लाल

सह आचार्य, वाणिज्य विभाग, स्वामी विवेकानंद राजकीय महाविद्यालय, घुमारवीं, हि0 प्र0

शोध संक्षेप :–

मीडिया या जनसंचार माध्यम आज केवल एक क्षेत्र या देश तक सीमित न रहकर एक भूमंडलीय रूप ले चुका है। जनसंचार माध्यम विज्ञान की प्रगति और तकनीकी विकास के साथ–साथ मानव जीवन में परिवर्तन के प्रमुख शक्तिशाली साधन बन गए हैं। वर्तमान में मीडिया का अभिप्राय मुद्रित माध्यम व विद्युतीय माध्यम से है। प्रत्येक माध्यम के लिए अलग प्रकार की भाषा की आवश्यकता होती है। ये माध्यम सामान्य लोगों से लेकर विषय विशेषज्ञों तक सूचना पहुंचाते हैं। अतः यहाँ प्रयुक्त होने वाली भाषा आम बोलचाल की होनी चाहिए और साहित्यिक या संस्कृतनिष्ठ भाषा के प्रयोग से बचना चाहिए। प्रस्तुत शोध पत्र में व्यावसायिक दृष्टि से मीडिया की भाषा पर विचार किया गया है।

प्रस्तावना :–

भाषा अभिव्यक्ति का आधारभूत माध्यम है और मीडिया सूचना के प्रचार–प्रसार का आधारभूत माध्यम है इस प्रकार मीडिया की भाषा से अभिप्राय उस भाषा से है जो प्रत्येक व्यक्ति तक सूचना पहुंचाने में उपयोग में लायी जा रही है। सूचना में समाचारों से लेकर मनोरंजन तक, शेयर बाजार से लेकर क्रिकेट स्कोर तक वे सारी जानकारी समाविष्ट है जो हमारे जीवन स्तर को और अधिक बढ़ा सकती है। मीडिया शब्द में वे सभी माध्यम समाविष्ट हैं जिनका प्रयोग सूचना के आदान–प्रदान में किया जा रहा है। इन माध्यमों में प्रसार भारती (रेडियो व टेलीविज़न) और सोशल मीडिया जिसमें फेसबुक, यूट्यूब, ट्विटर, इंस्टाग्राम, व्हाट्स एप्प, ईमेल और ओटीटी आदि शामिल हैं। सोशल मीडिया की ताकत का अंदाजा इसी बात से लगाया जा सकता है कि आजकल हर चीज़ का वज़न सोशल मीडिया पर उसकी उपस्थिति और फोल्लोवर्स से लगाया जा रहा है। व्यावसायिक दृष्टिसे आज सोशल मीडिया पर आपके ब्रैंड की जागरूकता मात्र से ही आपके लाभ में बढ़ौतरी हो सकती है और सोशल मीडिया मैनेजमेंट विपणन रणनीति का अनिवार्य हिस्सा बन चुका है। मीडिया की भाषा सरल होनी चाहिए ताकी उसमें दी जा रही जानकारी आम लोगों को समझ आये और जानकारी में इतनी गहराई भी होनी चाहिए की विशिष्ट विषय से सम्बंधित विशेषज्ञ भी सूचना से संतुष्ट हों सके।

मीडिया में प्रयुक्त भाषा की दशा :–

वर्तमान में विभिन्न प्लेट फॉर्म्स पर ऐसी भाषा का उपयोग किया जा रहा है जिससे अधिक से अधिक लोग उत्तेजित हो उसी प्लेटफार्म का इस्तेमाल करें। टीवी न्यूज़ चैनलों में व्यूवरशिप पाने के लिए हर मर्यादा का

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Exploring Reducing Agent Effects in the Synthesis of ZnO Nanoparticles

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Abstract

In this study ZnO nanoparticles are prepared by using sol gel method. This method is used by many researchers because of its case of use, easily availability of apparatus, low cost and it is easy to perform. The aim of this research is to study the size of ZnO nanoparticles using different reducing agents (NaOH or NH_3OH or Triton X-100). The used chemicals are highly pure with AR grade. The precipitates were formed and annealed at temperature approx.1000°C.The precipitate was collected and characterized by X-ray diffraction (XRD) to calculate the crystalline size of the nanoparticles. Nanosized ZnO powder was successfully synthesized and XRD analysis revealed that crystalline size is nearly independent of different reducing agents at 1000°C. Also the results obtained show that sol-gel method can produce good quality ZnO nanoparticles by using any reducing agents.

Keywords: Nanoparticles, Precursor, Reducing agents, XRD, sol-gel

1. Introduction

Nanotechnology is the science that deals with matter at the scale of 1 billionth of a meter and is also the study of manipulating matter at the atomic and molecular scale. A nanoparticle is the most fundamental component in the fabrication of a nanostructure and is far smaller than the world of everyday objects that are described by Newton's laws of motion. Nanoparticles are the particles in the range from 1nm-100 nm [1-2]. These nanoparticles are useful in other fields like electronics, biological, medical etc as they show different properties with different materials [3]. Till date quantum dots, Integrated circuits are the best examples of nanoparticles use. Different methods like physical, chemical, biological are used for construction of nanomaterial [4-7]. Among these, ***sol-gel*** method is used because of low cost, easily