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ABSTRACT BOOK

**INTERNATIONAL VIRTUAL  
CONFERENCE ON MATERIALS  
AND NANOTECHNOLOGY  
IVCMN-2021**

Jointly Organized by

Guru Nanak College of Science, Ballarpur

In Association with

P. R. Pote ( Patil ) College of Engineering and Management, Amravati

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# **International Virtual Conference on Materials and Nanotechnology**

## **IVCMN – 2021**

**29<sup>th</sup> and 30<sup>th</sup> April 2021**

Jointly Organized by  
Guru Nanak College of Science, Ballarpur  
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## **About the Conference**

It's our great pleasure to announce that our Guru Nanak College of Science, Ballarpur is going to celebrate the golden jubilee year of opening of college. We are pleased to inform you that on this occasion Department of Physics, GNC Ballarpur is going to organize two days international virtual conference on materials and nanotechnology on 29th & 30th of April 2021. We have invited seven guest speakers from the country and outside the country.

## **Aims and Objectives**

The main aim of this conference is to make everyone familiar with new researches that are being carried out in the field of material science and nanotechnology and their basic applications. The objectives of IVCOMN- 2021 are to bring about the sharing of views and researches carried out by eminent researchers, scientists, scholars and technologists by bringing them together on the dice and to develop curiosity among new researchers to bring about research in this field. The conference will cover healthy and useful discussion on theoretical and experimental aspects in the field of material science and nanotechnology. We take great pleasure in inviting you to submit original research papers on the topics given. You are requested to send an abstract of you.

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We take great pleasure in inviting you to submit original research papers on the topics given. You are requested to send an abstract of your research paper so as to reach us latest by 25 April 2021. All research papers will be published in UGC-approved, Google scholar, Research gate, Academia, DOAJ and Copernicus indexed journal.

We are looking forward for your positive response, active participation and valuable contribution for this conference.



**-: Guru Nanak College of Science, Ballarpur :-**

Guru Nanak Sewa Samitti is a multifocal diversified, being involved in various community & social activities to mankind. Guru Nanak College of Science, Ballarpur was established by veteran Late Sardar Ajit Singh Soni ji in 1971. Under the able guidance of Sardar Naginder Singh Soni ji, the institute is flourishing and blooming healthier, brighter & shiner. The Institution since its inception has help creating 1000+ success stories as doctors. engineers, diversified professional & country server through its NCC & NSS programmes shaping their careers & futures endurance ability.



**-: P. R. Pote ( Patil ) College of Engeening and Management, Amravati :-**

P. R. Pote (Patil) Group of Educational Institutes Amravati, is a foremost name in higher education in Maharashtra. Since its inception, the trust has been successfully conducting undergraduate and post graduate courses in emerging areas. It has 10 institutes under one roof. The Group offers undergraduate as well as post graduate courses in various disciplines of Engineering, Management and Technology. Various courses offered by the Group include ME, BE, MBA, MCA, Pharmacy, Architecture, Agriculture, B. Arch, B.Ed., CBSE Schooling, Polytechnic. By the blessings of Shri Sant Gajanan Maharaj, We aim at developing a pursuit of knowledge in Students, commitment to Economic, Social & Cultural uplifting of masses. The Institute highly believes in nurturing ethics and moral values in students. The P. R. Pote (Patil) Group has its branches at Amravati & Talegaon. We realize that education is the basis for the complete development of individual and for this purpose we have dedicated teaching staff, Digital Classrooms, Sophisticated Equipment, Wi-Fi campus, Finishing School, Placement Cell, State-of-Art Auditorium, Well Equipped Laboratories, Classrooms, International Quality Infrastructure and 24 hours Library. Our constant endeavor is to provide a gamut of opportunities for our students to make them practical engineers, top class managers and also good citizens.

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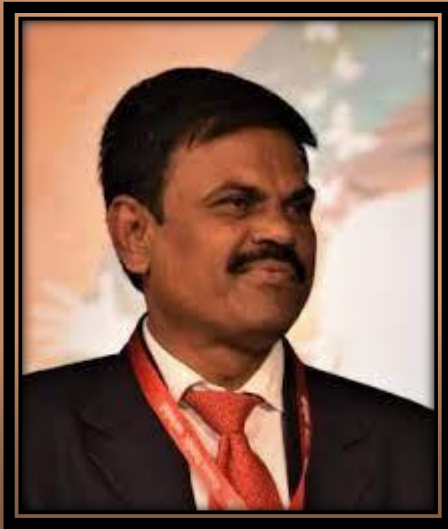


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## **Review: Metallic Nanoparticles, Synthesis and Applications**

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### **Abstract:**

Nanotechnology refers to the branch of science and engineering which deals with the materials having dimensions in the order of 100th of nm or less. The term being fascinating, has been widely used for the development of more reliable and efficient technology. In recent years, the concept of nanomaterials and in that even metallic nanoparticles have grabbed attention due to its potent application in the biomedical sciences and engineering. Metallic nanoparticles now have various synthetic routes and can be easily incorporated with many ligands, antibodies and other materials leading to hybrid composites thus opening all together new dimensions and applications. They have been used in the field like magnetic separation, preconcentration of target analytes, targeted drug delivery, gene and drug delivery and more importantly diagnostic imaging. Moreover, over the period of time many techniques such as MRI, CT, PET, ultrasound, SERS, and optical imaging have been developed as an aid to image various disease states. In all these metallic nanoparticles have act as source of contrasting agents. In this present review article we aim to put together introduction to metallic nanoparticles followed by compilation of some most suitable synthesis methods and some recently trending applications of metallic nanoparticles.

**Keywords:** Metallic nanoparticles, Synthesis, Applications.

## **A Mini Review: Green Synthesis of Nanomaterials by Using Different Plant Extracts and Their Applications**

**Himani C. Pandhurnekar<sup>1\*</sup>, Babita G. Yadao<sup>1</sup>, Chandrashekhar P. Pandhurnekar<sup>2</sup>, Arvind J. Mungole<sup>3</sup>**

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**ABSTRACT:** Currently Metal nanoparticles (MNPs) which have been synthesized by green methods which have received global attention because of their various physicochemical characteristics and their different applications in the field of biotechnology and they also have several uses for different medical, pharmaceutical, and agricultural applications. Nanotechnology when combined with green chemistry, it has gain great potential for the development of novel, potential and necessary products which would be beneficial for human health, environment, and industries. In the field of nanotechnology Green chemistry has an important role due to its contribution to unconventional synthesis methods of nanoparticles from plant extracts, which have exhibit different properties and also shown potential outstanding other biological properties. In recent years, the development of synthesizing NPs by using different plant extracts has now become a major focus of researchers because these NPs have shown low hazardous effect in the environment and also low toxicity for the human body. It has been observed that the synthesized NPs from plants are not only more stable in terms of size and shape, they also shown the yield obtaining by this method is higher than the other methods. Hence with the literature study, in this review paper we have try to discuss the green synthesis of nanoparticles which having different metals and get synthesized from different plant extracts and also discuss their study of other biological properties.

**Keywords:** Nanotechnology, Nanoparticles, Green Synthesis, Plant Extracts, Biological Properties

### **Latest technologies for waste water treatment using nanomaterials**

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My poster depicts various recently developed technologies for waste water treatment using nanomaterials like Iron oxide nanomaterials, zero-valent iron which are efficient for treating large volume of waste water up to appreciable extent and are convenient to separate out due to magnetic behavior, facilitating it widely used for heavy metal impurities. Activity of Iron oxide ( $\text{Fe}_3\text{O}_4$ ) can be evident with maximum adsorption capacity of Pb(II) ions as 36.0 mg per g of adsorbent surpassing other low cost adsorbent. Moreover, hollow  $\text{Fe}_3\text{O}_4$  Nano spheres are effective adsorbent for red dye. To improve target adsorption capability nanomaterials are undertaken with certain surface modification and chemical treatments like carbon coating on  $\text{Fe}_3\text{O}_4$  to extract traces of polynuclear aromatic hydrocarbons (PAHs). Besides adsorption Iron oxide ( $\text{Fe}_2\text{O}_3$ ) can act as good photo catalyst as having smaller band gap (2.2eV) in comparison to  $\text{TiO}_2$  (3.2eV), therefore, such magnetic materials are capable of easy photo degradation of organic compounds in waste water in visible light. Some other species of Fe(III) like  $\alpha\text{-Fe}_2\text{O}_3$ ,  $\gamma\text{-Fe}_2\text{O}_3$ ,  $\alpha\text{-FeOOH}$ ,  $\beta\text{-FeOOH}$  and  $\gamma\text{-FeOOH}$  also enhance photolysis effect to degrade organic waste. Further, to reduce electron-hole recombination deposition of noble metal on metal oxide is done to get desirable results, for instance, Gold deposited iron oxide aerogels are used for photodegradation of disperse blue 79 azo dye in UV radiation. Ferrous or Ferric ion coatings on pulverized orange peel also used in removing oils in waste water. These are several kind of methodologies illustrated in our poster.

## Structural, Morphological, Dielectric and Magnetic Behaviour of Rare Earth Substituted Cobalt Ferrite Nanoparticles – A Brief Review

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### Abstract

Cobalt ferrite proposes an excellent platform for solid state crystallography and structural chemistry point of view. The partial substitution of rare earth (RE) ion, such as Sm, Ce, Er, Dy, La and Nd for Fe<sup>3+</sup> leads to structural bend in spinel structure which in turn induces strain and considerably modifies electrical and dielectric properties. The chemical as well as physical nature of the dopant into Cobalt Ferrite Oxide (CFO) matrix allows tuning of structural, magnetic and electrical characteristics. In the field of engineering, doping of advanced and efficient ferrite materials with different RE/TM-ions is a well-adopted, straightforward and flexible way to tune the structural properties. Depending on the ionic size and concentration, assimilation of RE/TM-ions in spinel ferrite results in upgraded dielectric constant, rise in resistivity and reductions in dielectric and magnetic losses. Such a detailed understanding of RE incorporation might allow further opportunities to tailor the CFO-based materials' behavior for selective applications, where thermal and chemical constancy becomes important. The amalgamation of rare earths elements into CFO would be more attractive for future applications, such as advanced sensors and photocatalysis. Thus, a better understanding of the combined structural, magnetic, dielectric and transport properties of CFMO is highly beneficial to tune the properties for desired electronic and electromagnetic applications. The objective of present review article is to derive a precise understanding of the rare earth elements, substitution effects on the crystal structure, morphology, magnetic behavior, and dielectric properties of CFO.

**Keywords:** Rare earth elements (RE), Cobalt ferrite oxide (CFO), EDAX, VSM, SEM, TEM

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## Structural, Optical, Electrical and Photoluminescence Study of Eu doped Magnesium Aluminate Nanocrystals Synthesized Via Sol-Gel Method

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**Abstract:** Nanocrystalline spinel type Eu doped Magnesium aluminate was synthesized by sol-gel method. The structural, **optical**, **electrical** and photoluminescence properties of the prepared spinel type  $MgAl_2O_4$  ceramic material were studied by different techniques such as X-ray diffraction (XRD), Scanning electron microscopy (SEM) and photoluminescence spectroscopy (PL). The X-ray diffraction pattern of magnesium aluminate material confirms the formation of pure phase with spinel structure and space group  $fd\bar{3}m$ . The average surface topology and crystalline size was further confirmed by scanning and transmission electron microscopy. The band gap values of magnesium aluminate spinel nanoparticle is calculated using Tauc plot and it is found to 3.85 eV. Photoluminescence (PL) with an excitation around 314 nm, an intense broad emission peak appears around 468 nm due to  $4f_7 ({}^8S_{7/2})-4f_6^5d_1$  transitions. The temperature dependent variation of dc resistivity of material reflects semiconducting nature of materials.

**Key Words-**  $MgAl_2O_4$ , XRD, SEM, PL, Electrical, Optical.

### 3D Printed Tablets of Ketorolac an Innovative Medicine

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#### Background

Over the past few decades, there has been increased interest for innovative drug delivery system to improve the safety, efficacy and patient compliance, thereby increasing the product patent life cycle. This innovation is taken place in additive manufacturing or 3D printing technique. 3D printing involves layer by layer addition of filament to prepare intact tablet, Conventional method includes tablet manufacturing process which is tedious when design for variable release pattern as it require to some special excipients to govern the release pattern. The Conventional method also has limitation of weight, requires lots of excipients, solubility of API and incorporates multiple drugs in single unit. 3D printing has the solution for the above all limitation, which is said to be Personalise medicine. As per patient history, multidrug therapy can be included in single dosage without any drug-drug interaction and minimum excipient with maximum drug loading.

#### Methods

3D printing basically involves 'hot melt extrusion', by this technique drug-polymer filament is prepared. This prepared filament was then transferred to 3D printer to print desire shape tablet with the help of software. Drug-polymer interaction checked by FT-IR spectroscopy and drug release from printed tablet studied using USP-II dissolution apparatus. The release data were subjected to different models in order to evaluate their release kinetics and mechanisms.

#### Results

3D Printer Tablet is easy to manufacture and control drug release pattern. High precision in printing of tablets. From FT-IR no interaction was found in drug and polymer. The release data were subjected to different models in order to evaluate their release kinetics and mechanisms.

#### Conclusion

Polymers are used are suitable matrix-forming agent to sustain the release of a water-soluble/ insoluble drug. 3D printing was a better technique for formulating the product than compression.

#### Keywords

3D Printing, FT-IR, Hot melt, Kinetics, precision, Compression.



## **Study of structural, optical properties of thin film CdS using CBD with variable molar concentrations of complexing agent**

**A.Z. Shaikh, S. Kandekar, R. Hawaldar, K. C. Mohite**

Chemical Bath Deposition (CBD) is simple and low cost technique for thin film synthesis. This method can be used for large area deposition on variety of substrates. Synthesis of CdS thin films were carried out using CdCl<sub>2</sub>, CS(NH<sub>2</sub>)<sub>2</sub>, (NH<sub>4</sub>Cl) and ammonia. The deposition temperature was fixed to 70°C and ammonia concentration was varied from 0.15M to 0.75M. Thin film CdS is significantly used for different applications such as photo sensors, light emitting diodes, solar cells, light amplifiers etc. Structural, optical and photoelectric properties of CdS have been systematically and carefully investigated under the influence of different concentrations of ammonia. XRD analysis revealed hexagonal structure of all synthesized thin films, oriented along (002) plane with fixed intense peak at 26.6°. The calculated grain size of CdS films were in the range of 25-27nm. UV-visible spectrometer was used to study optical transmittance and energy band gap of CdS films. The transmittance values increased with increase in ammonia concentration and maximum transmittance (70%) was obtained at 0.75M ammonia. However optical energy band gap of CdS thin films were decreased from 2.25eV to 1.94eV as concentration of ammonia increased. Photo-sensing study of thin film CdS was carried out under the light intensity of 36mW/cm<sup>2</sup>. Electric resistance values were recorded for all films and showed high electric resistance for thin film CdS deposited with 0.45M concentration of ammonia.

**Key words:** CdS, CBD, XRD, UV-visible spectrometer

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## APPLICATIONS OF NANOTECHNOLOGY IN DIABETES – A REVIEW

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**ABSTRACT:** Nanotechnology is an advanced scientific technique that provides more accurate and timely medical information for diagnosing disease. Diabetes mellitus (DM) is a commonly seen chronic disease, which seriously threatens the health of human beings. About 150 million people suffer from diabetes in the world and it has been predicted that this number will be doubled within 15 years. Nanotechnology is a focal point in diabetes research, where nanoparticles in particular are showing great promise in improving the treatment and management of the disease. Nanotechnology can now offers new implantable or wearable sensing technologies that provide continuous and extremely accurate medical information. The purpose of this is to throw more light on the recent advances and impact of nanotechnology on biomedical sciences to cure diabetes. Nanomedicine, the application of nanotechnology to medicine, has already offered some new solutions, and many pharmaceutical companies are trying to develop targeted drug delivery using nanotechnology and already existing drugs. Nanotechnology offers some new solutions in treating diabetes mellitus. This review concluded that nanotechnology will be effective therapy in diabetes.

**Key words:** Nanotechnology, diabetes, nanoparticles, nanomedicine, nanospheres.

## LOW TEMPERATURE PHOTOLUMINESCENCE ANALYSIS OF CdS NANOCRYSTALS

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### **Abstract**

Spherical CdS nanocrystals of 4.8 nm diameter are synthesized by colloidal synthesis. Their structural, optical and electrical properties are studied. By photoluminescence measurements photoluminescence quantum yield of nanocrystals found about 10%. From low temperature photoluminescence measurements bandedge energy level was attributed to transitions of ground state energy levels  $1S_{3/2} \rightarrow 1S$ . Low temperature analysis of bandedge peak and defect peak shows increase in HOMO-LUMO gap with decreasing temperature. Also at low temperature there is reduction in thermal line broadening of energy levels with decreasing surface trap states.

**Keywords:** Nanocrystals, CdS Nanocrystals, Energy levels, Low temperature energy evolution.

### **Review On Nanoscale Ferrite**

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#### **Abstract:**

Present scenario shows that nanotechnology exhibits intense properties of materials. Nanotechnology introduces novel properties of materials. Nanotechnology made very huge revolution in science. Nanoscience are still emerging but the novel sciences is very much excited to do the work in this area because of its very wide uses. Nanoscience and nanotechnology consist with the technology of materials with dimensions ranging from 1 nanometres to 100 nanometres. There is very big changes in all the sciences like physics, chemistry, chemical industries, electrical and mechanical engineering.

The main aim of this review paper is to introduce about nanoscale ferrite and its application. Ferrites are very useful in so many applications. The excitement associated with nanomaterials at nanoscale is exhibition of many forms such as nanoparticles, or large ordered aggregates of molecules or atoms. Science has not been able to explore these structures completely. The interface determines the physical properties in nanomaterials. They are in a range of sizes in which quantum phenomena especially quantum entanglement and other reflections of the wave character of matter are important. The quantum phenomena are the ultimate basis of the properties of atoms and molecules, but they are hidden behind classical behavior in macroscopic matter and structures.

Keywords : Nanoscience, Nanotechnology, Nanomaterials, Nanoferrites

### STUDY ON OPTICAL PROPERTIES OF CDS ANNEALED THIN FILMS BY SPRAY PYROLYSIS

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**Abstract :** The CdS shows the direct band gap 2.4 eV and indirect band gap 2.35 eV CdS thin films were deposited by spray pyrolysis technique on glass substrate of different thicknesses. CdS thin films were annealed in air from 100°C about 3 hours.. RHE XRD revealed that the films were polycrystalline in nature and with hexagonal phase. The crystallinity of the films was improved by annealing in air at 100°C. The optical transmittances, reflectance's and absorption of annealed CdS thin films are studied and found to be different thickness and the refractive index varies from 2.15 to 2.85

**Keywords :** CdS, Spray pyrolysis, XRD, Optical and thin film

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## **Advances in electrochemical sciences: new approaches to environmental applications involving functionalized novel nanomaterials**

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### **Abstract:**

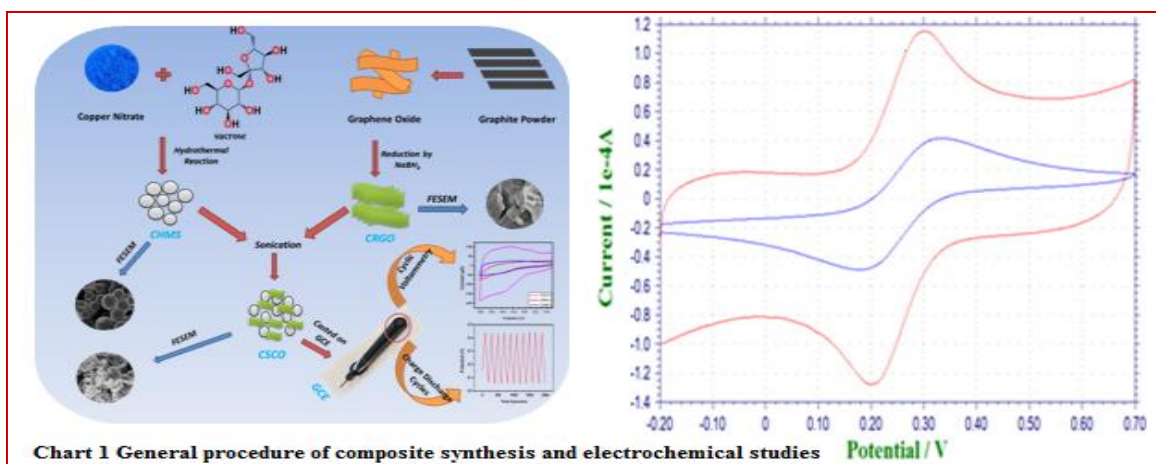
Recent advancement in the field of electrochemical sciences and nanotechnology has shown that advanced functional nanomaterials play an increasing role in environmental monitoring. The combination of nanotechnology and modern electrochemical techniques allows the introduction of reliable and powerful electrochemical devices for environmental applications.

Two major environmental issues that everybody is facing nowadays is the environmental pollution of some important substances ( $\text{CN}^{-1}$ ,  $\text{NO}_2^{-1}$ ,  $\text{NO}_3^{-1}$ ,  $\text{SO}_3^{-1}$ , some toxic metals, pesticides, insecticides, polycyclic hydrocarbons, etc) and the need of low-cost, environmental-friendly and high-performance energy storage devices known as supercapacitors. These two issues have been taken into consideration simultaneously in this lecture because both the problems can have a common solution. The same electrode material can be used as a selective and sensitive detector as well as an efficient electrode material for energy storage applications in supercapacitors.

Our group has designed some electrodes based on advanced functionalized materials which find potential applications for the sensitive detection of environmentally hazardous substances and some electrodes were fabricated and investigated for their performance in energy storage applications in supercapacitors.

I shall exemplify our new approaches for the synthesis of some advanced functional materials based on metal nanoparticles, metal porous oxides and polymers with carbon based materials (graphene and graphene oxide). Applications of these materials for the sensitive detection of metal toxicity, nitrophenols and pesticides in various environmental samples will be discussed in the lecture. In addition, some novel nanocomposite material functionalized electrodes and their applications in energy storage devices (supercapacitors) will also be exemplified.

**Keywords:** Electrochemical techniques, Sensors, Nanocomposites, Environment, energy density.





**A review on Intelligent Transportation System to reduce accidents**

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Intelligent Transport Systems or ITS are increasingly being used to improve road safety, reduce travel times. ITS services are designed to optimize transport times and fuel consumption thus providing safer transportation. ITS can be applied to road transport to improve efficiency and safety through the provision of on-line information to drivers in their vehicles and by equipping the vehicle with computerized systems which assist the driver. ITS techniques have innovation to suit the contrasting traffic characteristics of Indian roads.

ITS applications for road safety can be divided into three operational areas Data collection, Information exchange and emergency response & Enforcement. ITS along major urban corridors can resolve many traffic management safety issues, while creating a smart urban environment. The aim of this research paper is to conduct systematic analysis on ITS.

This paper, attempts to understand the application of Intelligent Transportation System (ITS) as a solution of present traffic congestion problem and how to decrease road accidents by the use of technology.

## Temperature Variation of Permeability for Sm – Dy substituted Magnesium ferrite

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### Abstract:

Sm – Dy substituted Mg ferrite materials with composition  $Mg[(Sm)_{0.4}(Dy)_{0.6}]_xFe_{2-x}O_4$  were prepared by chemical combustion method. The temperature variation of permeability and loss factor were obtained by using Ls and Q-factor values from Hioki LCR-Q meter instrument. It is seen that permeability of prepared ferrite samples vary with temperature from room temperature to Curie temperature. Near Curie temperature initial permeability ( $\mu_i$ ), real part of initial permeability ( $\mu'$ ) and imaginary part of initial permeability ( $\mu''$ ) drops to zero. Also it is seen that below Curie temperature low loss factor are observed, thereafter the value of loss factor suddenly increases. The value of Curie temperature of prepared Sm – Dy substituted Magnesium ferrite samples lies between 295°C to 325°C, but there is no remarkable changes occur in Curie temperature.

**Keywords:** Ferrites, Real permeability, Loss factor

## Eco-friendly synthesis of silver oxide nanoparticles using *Butea monosperma* leaves extract

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### Abstract

Bio-nanotechnology is an effective domain for the efficient synthesis of nanoparticles in a greener approach without affecting the environment. The present research provides the synthesis of *Butea monosperma* leaves extract substituted silver oxide nanoparticles ( $\text{Ag}_2\text{O}$  NPs) by a greener approach. The synthesized  $\text{Ag}_2\text{O}$  NPs were explored using scanning electron microscopy (SEM), high resolution transmission electron microscopy (HRTEM), energy-dispersive X-ray (EDX), X-ray powder diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), photoluminescence (PL) and UV-DRS techniques. The  $\text{Ag}_2\text{O}$  NPs were in highly uniform shape and size was in the size of 35-80 nm. In view of eco-benevolent and cost-effective nature, the present investigation revealed that *Butea monosperma* could be used as a natural fuel for the efficient synthesis of  $\text{Ag}_2\text{O}$  NPs.

**Keywords:** Eco-friendly synthesis,  $\text{Ag}_2\text{O}$  NPs, *Butea monosperma*

## **Sponge surfaced Bismuth Vanadate ( $\text{BiVO}_4$ ) as high capacitive retention Supercapacitor electrode**

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### **Abstract**

Design of nanostructured surface architecture is currently playing a vital role to enhance the energy storage capability of electrode materials and opening up a new era for future technology through electrochemical supercapacitors. Present effort portrays the growth of nanostructured bismuth vanadate ( $\text{BiVO}_4$ ) as an active electrode for supercapacitor application by using ease and industry scalable successive ionic layer adsorption and reaction (SILAR) method. Structural analysis reveals the development of orthorhombic structured  $\text{BiVO}_4$  with spongy nano-pebbles like surface architecture. As-prepared  $\text{BiVO}_4$  electrode yields remarkable capacitance of 707 F/g (@3 mV/s) scan rate. Electrochemical impedance spectroscopy (EIS) analysis of  $\text{BiVO}_4$  electrode exhibited 5.723 and 0.89  $\Omega \cdot \text{cm}^2$  values of series and charge transfer resistances, respectively. Interestingly,  $\text{BiVO}_4$  electrode delivers outstanding capacitive retention of 102% even after 3500 cycles, indicating its potential candidature for the advancement in high capability supercapacitors with excellent stability for the future technologies.

**Keywords:** Supercapacitor,  $\text{BiVO}_4$ , Spongy nano-pebbles, SILAR

## **Thickness varying CdS@Ag<sub>2</sub>S Core-Shell Nanowires Surface Architecture: Design towards Photoelectrochemical Solar Cells**

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### **Abstract**

Design and development of cadmium sulphide core with silver sulphide shell assembly in nanowire (NWs) surface architecture has been explored through room temperature, simple chemical route towards photoelectrochemical solar cell application. Incorporation of low band gap Ag<sub>2</sub>S nanoparticles over the outer surface of the chemical bath deposited CdS NWs has been achieved by simple cation exchange route based on negative free energy of formation. Shell optimization has been performed by investigating structure, surface morphologies and optical analyses and correlated with the photovoltaic parameters. Interestingly, core-shell CdS NWs/ Ag<sub>2</sub>S exhibits 1.5 times better performance in terms of linear voltammetry, photocurrent transient response and the photo stability. Furthermore, three-fold enhancement in photoelectrochemical performance have been observed for optimized FTO/ CdS NWs/Ag<sub>2</sub>S compared to bare FTO/CdS NWs due to the augmented light harvesting and condensed charge recombination. External quantum efficiency exhibits 24% for the optimized CdS NWs/ Ag<sub>2</sub>S core shell structure. Mott-Schottky and electrochemical impedance spectroscopy measurements have been used for better understanding the impact of gradual growth of Ag<sub>2</sub>S over CdS NWs which directly influences the overall photocurrent density of the device.

## **Predictions of Loan Defaulter - Improvement through Comprehensive Pre-processing**

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### **ABSTRACT**

For financial institutions and therefore the banking system, it's very crucial to possess predictive models for his or her financial activities, as they play a serious role in risk management. Predicting loan default is one among the critical issues that they specialize in, as huge revenue loss might be prevented by predicting customer's ability to pay back on time. During this paper, different classification methods (naïve Bayes, decision tree and random forest) are getting used for prediction, comprehensive different pre-processing techniques are being applied on the info set, and three different feature extractions algorithms are getting used to reinforce accuracy and performance. Results are compared using f1 accuracy measure, and improvement was over 3%.

**Keywords:** Classification, Pre-processing, Prediction, Feature selection, Generic algorithm, PSO algorithm, Naïve Bayes, decision tree, SVM, Random Forest.

### **Synthesis, Structural and Magnetic Study of Nickel substituted Magnesium Spinel Ferrites**

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**Abstract:** In our present investigation, Nickel doped Magnesium ferrite nanoparticles having the basic composition  $\text{Ni}_x\text{Mg}_{1-x}\text{Fe}_2\text{O}_4$  ( $x=0.1, 0.3, 0.5$ ) were synthesized by the Sol-gel auto combustion method. The structural and magnetic properties of samples were investigated by XRD, SEM, TEM, and VSM. The single-phase face-centered cubic structured nanoparticles were confirmed by the XRD pattern. The structural parameter like Particle size, X-ray density, Bulk density, Lattice constant from X-RD data was calculated by the various formula. The surface agglomerated morphology of the samples has been investigated using FESEM. The Coercivity ( $H_c$ ), a remnant ( $M_r$ ), and Saturation magnetization ( $M_s$ ) show variation with every sample is confirmed by VSM.

**Keyword:-** Ferrites, Sol-gel Method, X-RD, SEM, HR-TEM, VSM

## **Recent Development and Scope of Transition Metal Oxide Based Cathode Material. – A Review.**

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### **Abstract**

In the recent years number of research groups have concentrated on cathode material of LIBs. The batteries are promissible power source which can be used in portable electronic devices, electric vehicles and to store the energy from the natural sources. The capacity of LIBs varies with material to material. Nowadays most used LIBs cathodes are based on transition metal oxides. In these review, we describe the different types of cathode material for LIBs as well as their working efficiency.

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***Syzygium cumini* mediated green synthesis of silver nanoparticles for reduction of 4-nitrophenol and assessment of its antibacterial activity**

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**Abstract:** The biosynthesis of silver nanoparticles (Ag NPs) has become more significant in the recent years owing to its applications in catalysis, imaging, drug delivery, nano-device fabrication and in medicine. We propose the synthesis of silver nanoparticles from the plant extract of *Syzygium cumini* and evaluation of its antibacterial and chemocatalytic potential. Synthesis of Ag NPs carried out by using aqueous silver nitrate. The UV-Vis absorption spectrum of the synthesized Ag NPs showed a broad absorption peak at 436 nm, which is a characteristic band for the Ag. Ag NPs were characterized by transmission electron microscopy and confirmation of elemental silver was carried out by energy dispersive spectroscopy and X-ray diffraction studies. The bioreduced Ag NPs demonstrated that the significant catalytic properties in a reduction reaction of 4-nitrophenol by using NaBH<sub>4</sub> in aqueous condition. The biosynthesized Ag NPs have strong antibacterial activity against common clinical pathogens. The reductions of pure Ag<sup>+</sup> ions to form Ag NPs using leaf extract were characterized by UV-Visible spectroscopy. The same results were obtained up to three years, indicating the excellent stability of these nanoparticles. Considering the remarkable antibacterial activity against common pathogenic microorganism Ag NPs are extensively used in pharmaceutical industry.

**Keywords:** *Syzygium cumini*, Silver nanoparticles, Antibacterial activity, Catalytic reduction.

## **A prominent overlapping of red phosphor emission with the absorption spectra of green plants useful for artificial LED plant lighting**

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### **Abstract**

Horticultural lighting allows for year-round cultivation of vegetable crops independent of weather conditions or season of the year. Certain living organisms, such as plants and algae, cannot directly process the energy gathered from solar radiation. Instead, it has to be first converted into chemical energy. This process is called photosynthesis and it is one of the oldest, most abundant and perhaps most important biochemical processes on Earth. During photosynthesis, the incident solar energy is converted into chemical energy used for the growth and development of plants.

Artificial light sources were used to grow plants before the invention of incandescent lamp, with some of the earliest reports in the year 1861. The use and usefulness of incandescent lamps in horticultural lighting has been limited. The reasons are the low electrical efficiency, low light emission, unbalanced spectrum (reduced emission in the blue region) and short lifetime.

Conventional light sources cannot be spectrally controlled without the inefficient and limited utilization of additional filters. The LED does not suffer from these limitations. LEDs have emerged as a potentially energy-efficient, viable and promising technology for use in horticultural lighting. The use of LEDs in plant production applications offers completely novel opportunities for optimization of plant growth and development that can be achieved through more versatile and appropriate control of the quantity, periodicity and spectrum of the light provided. This optimization can be tailored to the specific needs of each crop species and their production conditions.

In this paper we reported the red emitting phosphor  $\text{CaS:Eu}^{3+}$  with good overlapping in the photosynthetic and photo morphogenetic receptors absorption spectra of green plants. It can be a promising candidate for coating on the 410 nm LEDs to get emission in the range 300-400 and 600-700 nm.

## TRIBOLOGICAL BEHAVIOR OF SPRAY-FORMED Al-ALLOY

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### Abstract

In the present work, the tribological behavior of spray deposited Al-alloys with 12Si and 20Si were studied using a pin on disc type machine. Wear resistance behavior with applied loads was observed to have three stages, in the first stage wear resistance decreased with the applied loads, in the second stage rate of increase in wear resistance was the highest and in the third stage it was the lowest. Wear resistance was found to increased for higher percentage of Si added spray deposited alloy.

Keywords: Spray forming, Al-Alloy, Wear rate

## **Literature survey on Aspect Based Sentiment Analysis for Products on E-Commerce Business Platform**

### **Abstract**

Now a days with the tremendous development in technology made many things possible for business as well as for customers and manufacturers to buy and sell online and know about those products from opinions, comments provided by previous user on various platforms like social media, forums, e-commerce sites. The opinions of customers which can also called as reviews can be present in any form like structured or unstructured. The collection of these reviews create large amount of data for producers to know more about their product .Sentiment analysis can help to know what customers want to tell from these positive or negative reviews to producers by doing analysis on that data .At the same time only to know about sentiment will not be sufficient so Aspect based sentiment analysis will help to do some feature based sentiment analysis .This survey paper will present how aspect based sentiment analysis will help customers to know about feature based analysis and for producers to know about improvisation in products from the reviews on E-commerce platform. With the use of some machine learning algorithms and using natural language processing we will be able to do these sentiment analysis.

## **A REVIEW ON NANOPARTICLES: PREPARATION METHODS AND APPLICATIONS IN THE TREATMENT OF VARIOUS DISEASES**

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### **ABSTRACT**

Nanomaterials are at the leading edge of the rapidly developing in the field of nanotechnology. A nanoparticle is a ultrafine particle that ranges between 1 to 100 nanometers. Their unique size properties make these materials superior in many areas of human activity. This brief review tries to summarise the various preparatory methods of nanoparticles and most advanced applications in the field of nanotechnology. The preparatory methods are mainly such as chemical methods and physical methods. Nanoparticles are applied mainly as in cancer treatment, neurodegenerative disorder treatment, ophthalmology, gene delivery, autoimmune diseases treatment, vaccine design and single virus detection.

**Keywords** : Nanoparticle, Preparation, Techniques, Applications, Treatment.

## **COMPREHENSIVE STUDIES ON THE PROPERTIES OF PURE TIN MONOSULPHIDE FILMS- A REVIEW**

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Profound studies on the properties of the Tin Sulphide films prepared by both physical and chemical methods were discussed in detail. Tin Monosulphide (SnS) films on annealing exhibited improved properties was the key find out. Structural studies revealed orthorhombic polycrystalline nature of the films. The average grain size and crystallite size were calculated. Uniform and Compact growth of the SnS films were found in SEM images. Perfect composition was detected by EDAX analysis. Optical studies revealed a direct band gap of 1.3eV for polycrystalline SnS films, but 2eV for amorphous nature of the films. Some of SnS thin films exhibited an indirect band gap of 1.05eV. As-formed SnS films exhibited p-type conductivity.

Keywords: Tin Sulphide films, Physical method, Chemical method, Polycrystalline, Orthorhombic, and Band gap

## **Study of Phase transition in Networks**

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Gurunanak College of Science, Ballarpur

### **Abstract**

Networks have long been studied as mathematical curiosity. However, advent of big data and large computing facilities made it possible to study them in detail. Small world model and scale free model are most popular models of networks. Some other variants of these models are also studied. We want to study of dynamical systems on various kinds of networks. These systems could be in class of cellular automata or coupled maps or coupled oscillators.

The study carries a phase diagram of theses systems, locate points of phase transition, define appropriate order parameter and find universality class. Even a detailed study of possible dynamical phases could be important in systems such as coupled neurons.

## Hydrogen Fuel cell Based Electric Vehicle

Swati Hirulakar

### Abstract:

The Adverse effects of pollutants from conventional fuel vehicles have caused the scientific world to move towards environmentally friendly energy sources. Though we have various renewable energy sources, the Best one to use as an energy source for vehicles is hydrogen. Like electricity, hydrogen is an energy carrier that has the ability to deliver Large amount of energy. Also, hydrogen storage in vehicles is an important factor that should be considered when designing fuel cell vehicles. In this study, a recent development in hydrogen fuel cell engines is reviewed to scrutinize the feasibility of using hydrogen as a major fuel in transportation systems. A fuel cell is an electrochemical device that can produce electricity by allowing chemical gases and oxidants as reactants. With anodes and electrolytes, the fuel cell splits the cation and the anion in the reactant to produce electricity. Fuel cells use reactants, which are not harmful to the environment and produce water as a product of the chemical reaction. As hydrogen is one of the most efficient energy carriers, the fuel cell can produce direct current (DC) power to run the electric car. By integrating a hydrogen fuel cell with batteries and the control system with strategies, one can produce a sustainable hybrid car.



## **Overview of Recent Developments in Flood Mitigation Techniques with Respect to Indian Subcontinent**

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### **Abstract**

The number of natural calamities like earthquakes, cyclones, landslides, pandemics, etc is known to have a devastating impact on human life but the flood hazards are frequent and severe in nature. Every year, floods strike many parts of the world and result in a huge loss of life and property. The trends in flood damages have been increasing exponentially mainly due to the growing population, investments in flood-affected areas, and changes in land-use land cover patterns in upstream regions. Climate change is playing a major role in the increased number and volume of flood events so it is also likely that flooding would be more frequent and widespread in the future due to the extreme weather events to be induced by changing climate. Besides, the social and environmental changes are further expected to increase the risk of life and property loss due to these natural disasters. **This paper presents an overview of different factors related directly or indirectly to flood risk assessment, different strategies adopted by the Government for mitigation of flood, flood damage statistics, impact on social, economical, and infrastructural perspective of flood.**

## Luminescence of $\text{Eu}^{3+}$ in some scandium phosphates

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Lanthanide ions are very efficient activators. Due to the presence of shielded 4f shell, the energy levels can be predicted with relative ease. Interaction with the surrounding lattice is minimum and luminescence efficiency is high. For this reason, many important phosphors having various applications have been discovered which use lanthanide activators.

For obtaining efficient phosphors, it is important to find a suitable host for lanthanide activators which can accommodate these ions without concentration quenching. The hosts must be transparent to the emitted light. Lanthanides, most commonly occur as trivalent. Thus, hosts constituted by trivalent metals can be suitable. Yttrium compounds have been extensively studied as hosts. Scandium is another trivalent metal. Compared to the yttrium compounds, Scandium compounds have been very scarcely studied as hosts. We are investigating Scandium compounds as luminescence hosts.

Synthesis and photoluminescence properties of  $\text{Sr}_9\text{Sc}(\text{PO}_4)_7:\text{Eu}^{3+}$  and  $\text{Sr}_8\text{MgSc}(\text{PO}_4)_7:\text{Eu}^{3+}$  phosphor are described in this work. The phosphors were prepared by solid state reaction. Usually, these phosphors are reduced and results on  $\text{Eu}^{2+}$  photoluminescence are reported. However, we have recorded photoluminescence before reduction and thus new results on  $\text{Eu}^{3+}$  emission could be obtained. For  $\text{Sr}_9\text{Sc}(\text{PO}_4)_7:\text{Eu}^{3+}$ , emission lines are observed at 580,591 and 613,615 nm corresponding to transitions  $^5\text{D}_0 \rightarrow ^7\text{F}_1$  (magnetic dipole transition) and  $^5\text{D}_0 \rightarrow ^7\text{F}_2$  (electric dipole transition), respectively. In the corresponding excitation spectrum, a weak broad band around 250 nm attributable to charge transfer excitation was observed. On the longer wavelength side, there are several sharp lines corresponding to f-f transitions of  $\text{Eu}^{3+}$ . These lines are observed at 284,289,298,300 ( $^7\text{F}_0 \rightarrow ^5\text{F}_4$ ), 318,323 ( $^7\text{F}_0 \rightarrow ^5\text{H}_6$ ), 362,366 ( $^7\text{F}_0 \rightarrow ^5\text{D}_4$ ), 376,381 ( $^7\text{F}_0 \rightarrow ^5\text{L}_7$ ), 394,398 ( $^7\text{F}_0 \rightarrow ^5\text{L}_6$ ), 415,422 ( $^7\text{F}_0 \rightarrow ^5\text{D}_3$ ), 465,470 ( $^7\text{F}_0 \rightarrow ^5\text{D}_2$ ), 526 and 534 nm ( $^7\text{F}_0 \rightarrow ^5\text{D}_1$ ). Strong orange-red emission was observed for  $\text{Sr}_8\text{MgSc}(\text{PO}_4)_7:\text{Eu}^{3+}$  also. In this case, emission lines were observed at 579,589, 599 nm ( $^5\text{D}_0 \rightarrow ^7\text{F}_1$ ) and 612,617 nm ( $^5\text{D}_0 \rightarrow ^7\text{F}_2$ ). In the excitation spectrum, a weak charge transfer band appears around 285 nm. f-f excitation lines appear at 298 ( $^7\text{F}_0 \rightarrow ^5\text{F}_4$ ), 318,327 ( $^7\text{F}_0 \rightarrow ^5\text{H}_6$ ), 362,365 ( $^7\text{F}_0 \rightarrow ^5\text{D}_4$ ), 376,380,383 ( $^7\text{F}_0 \rightarrow ^5\text{L}_7$ ), 394,398 ( $^7\text{F}_0 \rightarrow ^5\text{L}_6$ ), 415,422 ( $^7\text{F}_0 \rightarrow ^5\text{D}_3$ ), 464,470 ( $^7\text{F}_0 \rightarrow ^5\text{D}_2$ ), 526 and 533 nm ( $^7\text{F}_0 \rightarrow ^5\text{D}_1$ ).

## **Predictions of Loan Defaulter - A Data Science Perspective**

### **Sanjiwani Gawande**

#### **Abstract**

With the advancement of innovation and execution of Data Science in banking, changes the substance of banking industry. The vast majority of the banking, monetary areas and social loaning stages are effectively contributing on loaning. Be that as it may, monetary foundations may confront enormous capital misfortune on the off chance that they affirmed the credit without having any earlier appraisal of default hazard. Monetary organizations consistently need a more exact prescient framework for different purposes. Foreseeing credit defaulters is a urgent assignment for the financial business. Banks have massively enormous measure of information like client's information, exchange conduct, and so on Information Science is a promising zone to handle the information and concentrate the secret examples utilizing AI strategies.

## **Green Synthesis of Silver Nanoparticles by Using Plant Extract**

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Maharashtra, India.**

### **Abstract**

Nanoparticles are the simplest form of structures with sizes in the nm range. Metal nanoparticles have various medical, pharmaceutical and agricultural applications. Silver has been known to have effective bactericidal properties for centuries. Among the metallic nanoparticles, silver nanoparticles are very important due to their physicochemical and antimicrobial properties. The chemical synthesis has drawback because it involves use of hazardous chemicals and toxic by-products are obtained. So, Green synthesis plays an important role, there is need for economic and eco-friendly methods to synthesize them by using aqueous or alcoholic extract of plants from silver nitrate solution. Silver nanoparticles are playing major role in the field of nanotechnology and nanomedicine.

**Key words:** Green synthesis, Silver Nanoparticles, Bactericidal properties, Antimicrobial properties.

## **The Cloud-Based Health Tracking and Monitoring System with AWS**

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### **ABSTRACT**

Medical care has a basic situation in living souls particularly for the individuals who have some medical conditions and need a down to earth answer for a superior life. As of late, there is a quick ascent in e-wellbeing advances, for example, Electronic Health Records (EHRs) and some crisis location and reaction strategies for that used AWS cloud for storing and retrieving managing records. One of the advances that can deal with a portion of the difficulties of shrewd medical care as far as security, sharing, files for avoid data leakages and illegal access help of encryption and description algorithm addition security are digital signature . The motivation behind this article is to feature the estimation of inescapable processing, particularly cloud-based frameworks in medical services area. I survey the importance and chances of AWS Services in inescapable medical services.

**Keywords:** Cloud Computing, Smart Healthcare, E-health, multi-key search, AWS, DES3.

### **Touch Less Tough Screen Technology**

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#### **ABSTRACT**

The use of touchscreen in our day-to-day life is always there. People without Touchscreen are only a few. Touchscreens were built for ease of work and for saving Time. Further forward launched the touch-less touchscreen, to make even more ease Than now. Difficulties faced by the touchscreen users are that scratches on the screen, Failure of display, touch struck etc., can be rectified in this touch-less technology. This is done using a simple user interface which is developed for touch-less control Over electrically operated equipment. Elliptic tabs with innovative technology let the Users find a good control over the gadgets like computers, mp3 players etc. The Technology has a mounted sensor on the top for the interaction with the movements Done before. Thus, a source of ease, expects more usage and fun in the upcoming Generation.

#### **KEYWORDS:**

**technology, display, screen, and touch.**

## **“Experimental Investigation of Heat Transfer Using Twisted Tape With Uniform Alternate Length In Double Pipe U-Bend Heat Exchanger”**

**Vijaya Dabhade**

### **Abstract:**

In this experiment the effect of using twisted tape with uniform alternate length in both tubes of a double-pipe heat exchanger will be numerically investigated. The twisted tapes with uniform alternate length will be inserted in both sides of doublepipe heat exchanger to determine the heat transfer rate where the fluid will be used as a water in both sides of tubes. The influence of geometrical parameters including the number of twisted tape and creating perforated hollow hole on twisted tape with different aspect ratios will be investigated numerically. The obtained results will be analyzed by calculating the outlet temperature of both sides of water, pressure drop, Nusselt number, Reynold’s number and heat transfer coefficient. Numerical simulations of all parameters of heat exchangers will be calculated by commercial CFD code.

**Keywords:** Twisted Tape, Heat Exchanger, Numerical Simulation, CFD Code.

### **Objective:**

- To perform experimental analysis of the performance of the Double pipe U-bend heat exchanger.
- To perform experimental analysis of the performance using twisted tape with uniform alternate length in U-Bend heat exchanger.
- To perform experimental analysis of the performance using perforated twisted tape with uniform alternate length in U-Bend heat exchanger.
- To compare the performance in between double pipe U-Bend heat exchanger with or without twisted tape with uniform alternate length.
- To compare performance in between double pipe U-Bend heat exchanger with uniform or perforated uniform alternate length.

## NANOTECHNOLOGY FOR HERBAL MEDICINES AND ITS USES

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### ABSTRACT

“Nanotechnology” is based on the recognition of the particles less than the size of 100 nm. It is the engineering and manufacturing of materials at the atomic and molecular scale. The use of nanotechnology for “phytotherapy” or treatment of various diseases by herbal medicines/drugs, including herbal drug delivery where current and emerging nanotechnologies could enable entirely novel classes of therapeutics has been reported. The researchers have succeeded in using nanotechnology to insert and simultaneously activate the genes delivered into plant cell walls. The nanomaterial’s can significantly enhance the pharmacokinetics and therapeutic index of plant origin drugs. Interestingly, pharmaceutical sciences are using nanoparticles to reduce toxicity and side effects of drugs. The chemists are using nanotechnology for plant research to be applied as “phytotherapy”. The nanoparticles, so called “mesoporous” introduce the gene and activate it in a precise and controlled manner and without toxic after effects. The biologically synthesized nanoparticles with plant products have better chemotherapeutic effects against microbial diseases. With the implementation of Nano technological production techniques, it is possible to meet the high demand for artemisinin for malaria treatment and cancer chemotherapy as well. Using nanotechnology, the researchers found that a new herbal medicine compound was able to enter cancer cells without damaging the healthy cells of the human body. Recent advances in drug delivery systems of camptothecin (an anticancer agent) have improved this drug’s efficiency due to development in Nano-sized dosage forms of camptothecin-derived drugs. DNA topoisomerase is one of drug targets in cancer therapy. Recently, nanotechnology has drafted plant viruses for drug delivery in cancer..

**KEYWORDS:** Cancer, diseases, herbal drugs, nanoparticles/nanotechnology, plants, uses.

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## **Thermodynamics and transport properties of binary liquid mixtures of sulfolane with 1-Propanol, 1-Butanol and 1-Pentanol at 298.15K**

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### **Abstract**

An experimental determination of physical parameters of speed of sound propagation, density parameter and viscosity for the binary mixtures of various combination of organic solvents (sulfolane + 1-Propanol), (sulfolane + 1-Butanol), (sulfolane + 1-Pentanol) has been attempted at the temperature of 298.15 K. The thermodynamic properties of various liquids and their possible mixtures which are required for the purpose of design, storage of energy and other equipment processing have been measured. There has been a significant deviation exhibited by the various thermodynamic properties of binary mixtures which contains components that are of ability of being subjected to specific interactions. The deviations from established ideality have been in terms of fluctuations of molecular size and changes in structural shape. The data obtained in the experiment have been fitted to a polynomial equation of Redlich-Kister for estimating the coefficients along with standard deviations observed in measurements.

**Keywords:** Thermodynamics, Transport properties, Excess molar volume, Deviation in Isentropic Compressibility, Sulfolane, Intermolecular interactions.

**TO STUDY THE EFFECT OF SUBSTRATE TEMPERATURE ON OPTICAL PROPERTIES OF SPRAY  
PYROLITICALLY DEPOSITED CdZnSe<sub>2x</sub>Te<sub>2(1-x)</sub> Thin Films for x=0.25****Gaikwad S. A.**

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**ABSTRACT**

Spray pyrolysis is a simple, inexpensive and economical method to produce thin films on large substrate area. Semiconducting thin films of CdZnSe<sub>2x</sub>Te<sub>2(1-x)</sub> for x=0.25 have been deposited onto preheated glass substrate by varying substrate temperature from 250°C at an interval of 25°C to 325°C. The optimized deposition temperature is around 300°C. From optical transmission and reflection spectra, absorption coefficient ( $\alpha$ ) was calculated at various wavelengths ranging from 350 nm to 1100 nm and was of the order of  $10^4 \text{ cm}^{-1}$ . Band gap energy were determined from absorbance measurement in visible range using Tauc theory. It shows that the main transition at the fundamental absorption edge is a direct allowed transition. At the temperature of 300°C, the optical band gap is found to 2.27 eV. At the temperatures less than or greater than 300°C, the optical band gap goes on increasing. The refractive index (n) and extinction coefficient (k) both decreases as wavelength increases which shows that the optical constants are most suitable for many scientific studies and technological applications such as heat mirrors, transparent electrodes and solar cells. SEM study provide the information regarding the morphology of the material which confirms the formation of nano sized, nanotubes. The value of lattice parameter 'a' is 6.3702 Å for CdZnSe<sub>2x</sub>Te<sub>2(1-x)</sub> thin films deposited at substrate temperature 300°C with composition parameter 'x=0.25.'

**Key Words:** CdZnSe<sub>2</sub>, thin films, spray pyrolysis, absorption coefficient, optical band gap, refractive index, extinction coefficient.

### **Low temperature Sol-Gel synthesis of Bulk and Nanosized NbTi(PO<sub>4</sub>)<sub>3</sub>**

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#### **ABSTRACT**

Bulk and nano sized NbTi(PO<sub>4</sub>)<sub>3</sub> has been prepared by citrate gel pyrolysis using peroxo titanium complex as one of the reactant and ethylene glycol as gelating reagent. The compound was characterized by powder XRD and infrared techniques. It is found to crystallize in rhombohedral lattice with space group . The infrared spectra of samples prepared at different temperatures consist of mainly bands due to phosphate (PO<sub>4</sub>) group. The morphological characterization was carried out by transmission electron microscopy. The crystallite size was estimated from the line width of intense powder diffraction line using Scherrer's formula and TEM images

Keywords: Nanoparticles, sensors, sol-gel process, XRD



### **Raman Spectroscopic Technique for Cancer Diagnosis**

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**Abstract:** Raman Spectroscopic technique can be applied for the cancer diagnosis as it can probe the molecular changes associated with diseased tissue. The molecular and cellular changes occurring in the disease result in distinct Raman Spectra. We have recorded the Raman Spectra of 4 samples at different positions. The Raman features and intensity differs for normal and malignant cells which can be attributed to the variation in the chemical composition of the cells.

**Key words:** Raman Spectra, cancer, molecular change

**Effect of operational parameters on photocatalytic degradation of methylene blue using mixed metal nano ferrite**

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The present work demonstrates the photo degradation of methylene blue dye solution using cubic spinel mixed metal ferrite  $\text{Ni}_x\text{Zn}_{1-x}\text{Fe}_2\text{O}_4$  ( $x=0.4$ ) as photocatalyst. The ferrite was synthesized by sol-gel auto combustion method at pH 7. The ferrite sample was characterized using XRD, FTIR, SEM and TEM techniques. The photo catalytic study was carried out in the presence of short wave UV light. The effect of operating parameters such as initial pH, amount of catalyst, initial dye concentration on the rate of dye degradation was studied. The photocatalyst showed excellent photocatalytic activity against methylene blue dye (96%) for 120 min contact time. The pseudo first order kinetics for photo degradation was observed using Langmuir-Hinshelwood model.

**Keywords:** Methylene blue, Ni-Zn nano ferrite, Photo catalytic degradation.

## **Controlled Synthesis of Graphene-decorated CoMn<sub>2</sub>O<sub>4</sub> Nanorods for High Capacitive Supercapacitor Applications**

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**Snehal wadhi**

**Abstract:** The interface characteristics of electrode materials are of tremendous value for supercapacitors, however, poor conductivity, instability in harsh reaction conditions and limited ion mobility in oxide materials are identified as massive challenges for producing high energy density deprived of rejecting the power capability. Herein, a peculiar catalytic chemical vapour deposition approach is employed to decorate a very thin graphene on the surface of CoMn<sub>2</sub>O<sub>4</sub> nanorods to synthesize a very active and uniformly distributed CoMn<sub>2</sub>O<sub>4</sub>/graphene nano-hybrid material with modified interface characteristics. The graphene not only provide the physicochemical protection as well as improve the electrical conductivity. As an electrode material, CoMn<sub>2</sub>O<sub>4</sub>/graphene possess the specific discharge capacitance of 478 F/g which is far superior to CoMn<sub>2</sub>O<sub>4</sub> at the current density of 0.5 A/g in 0.5 M Co<sub>2</sub>SO<sub>4</sub> aqueous solution. In addition, the CoMn<sub>2</sub>O<sub>4</sub>/graphene exhibit an outstanding specific capacitance of 394 F/g even at a much higher current density of 9 A/g. Moreover, after 3000 charge and discharge cycles, CoMn<sub>2</sub>O<sub>4</sub>/graphene electrode retains nearly 93% of initial capacity, higher than that of spinel CoMn<sub>2</sub>O<sub>4</sub> electrode which retains only 88%. This advanced method can be implemented to synthesize a large variability of other nano-hybrid materials for consumer utilization and research in the field of supercapacitors.

**Keywords:** Supercapacitor, CoMn<sub>2</sub>O<sub>4</sub>, graphene nano-hybrid, specific capacitance, electrode materials

## **Comparative adsorption of Congo red dye onto activated carbon prepared from prickly pear seed cake and olive wood**

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### **Abstract**

The adsorption of Congo red dye (CR) on activated carbons from prickly pear seed cake (PPSC) and from olive waste wood (OWW) was investigated. Phosphoric acid was applied as an activating agent. The influence of several parameters (kinetics, contact time, sorbent amount, adsorbate concentration and pH) on the adsorption capacity was evaluated and discussed. The MO adsorption equilibrium of active carbon from OWW is lower than that of activated carbon from PPSC. The CR adsorption increases with its concentration in the aqueous solutions. Langmuir models provided the best fit to the experimental data with high correlation coefficient for both active carbons. The kinetic study demonstrated that CR adsorption was in good accordance with the pseudo-second-order kinetic model for both adsorbents. The results of this study focus on the valorization of agricultural waste to reduce environmental pollution and preserve natural resources. In this way, researchers are encouraged to undertake more in-depth studies in this sector.

**Keywords-** Olive waste wood, Prickly pear seed cake, Activated carbon, Adsorption, Congo red.

### Bandgap of $\text{Bi}_2\text{Al}_4\text{O}_9$

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#### ABSTRACT

In the system  $\text{Al}_2\text{O}_3$ - $\text{Bi}_2\text{O}_3$  two compounds, viz.  $\text{BiAlO}_3$  and  $\text{Bi}_2\text{Al}_4\text{O}_9$  are well known.  $\text{Bi}_2\text{Al}_4\text{O}_9$  is useful for several applications such as photocatalysis, dye degradation, scintillation, ratiometric thermometry, etc. However, literature data on the optical and electronic properties of this compound are confusing. In the early literature, optical absorption of this compound is shown to have an absorption edge around 290 nm. The powders samples are mentioned to be white and single crystals colourless. UV absorption around 285 nm had been assigned to  $^1\text{S}_0 \rightarrow ^3\text{P}_1$  transition of the  $\text{Bi}^{3+}$  ion by some researchers. Absorption spectrum of the single crystal showed bands at 270 and 233 nm. On the other hand, relatively recent literature mentions  $\text{Bi}_2\text{Al}_4\text{O}_9$  powders to be yellow coloured. The bandgap had been obtained from the diffused reflectance spectrum as 2.84 eV. Density function theory calculations predicted bandgap of 2.71 eV. Considering these inconsistencies, we decided to reinvestigate the bandgap of this compound and obtain an explanation for the difference in the literature data.

$\text{Bi}_2\text{Al}_4\text{O}_9$  was prepared by a two step method. In the first step combustion synthesis was adopted. However, powders so prepared were of amorphous nature as found by X-ray diffraction patterns. Combustion synthesis was thus followed by annealing at 800 C. Annealed powders showed sharp lines in the diffraction pattern which indicated good crystallinity. The pattern also matched standard ICDD data. These powders had yellow body colour. Reflectance spectra were obtained over entire range. It showed several absorption bands besides a prominent absorption around 280 nm. The bands at longer wavelengths are interpreted as arising due to lattice defects. Such bands have been observed previously for single crystals. 280 nm absorption can arise from transition between valence and conduction bands. Tauc method was used for calculating bandgap using reflectance data. Tauc plot revealed a direct band gap 4.5 eV. These results thus show that the previous value of 2.84 is wrong, it corresponds to the defect absorption.



## **BIOMASS BRIQUETTES AS AN ALTERNATIVE ENERGY SOURCE COMPARE TO WOOD CHARCOAL IN BOILERS**

**Neha Kuthe**

**Abstract:** Growing global demand and utilization of fossil fuels has elevated wealth creation, increased adverse impacts of climate change from greenhouse gases (GHGs) emissions, and endangered public health. In most developing countries, biomass wastes, which include but are not limited to agricultural residues, are produced in large quantities annually. They are either inefficiently used or disposed of indiscriminately, which threatens the environment. It is possible to convert these wastes, through densification, into high-density and energy-efficient briquettes. Densification of biomass into briquettes presents a renewable energy option as an alternative to fossil fuels. This paper reviews biomass briquetting with reference to biomass resources, feedstock pre-processing, briquetting process parameters, briquetting technology, and briquettes quality evaluation parameters. The review also includes the economic aspect of briquetting relating to costs and feasibility.

The combustion of biomass briquettes made of various mixtures of sawdust and harvested crop residues (wheat straw, corn stover, and reed) in a small boiler with downdraft combustion, designed to burn wood or sawdust briquettes. The analysis of five types of biomass mixtures showed that their combustion properties are similar to the manufacturer's recommended fuel, but also revealed some improvement potential, specifically the thermal shielding of the primary combustion chamber using a refractory lining and the adjustment of the excess air between the two combustion chambers. The experimental measurements indicated a global thermodynamic efficiency increase from 86.73% to 94.08%, a combustion maximum efficiency increase from 91% to 96.2%, a significant reduction of maximum CO emissions ( $O_2^{ref} = 12\%$ ) from 8292 ppm to 4756 ppm, and a similar reduction of maximum NO<sub>x</sub> from 272 ppm to 126 ppm. These results have been obtained by using briquettes made of a 50/50 mixture of sawdust and corn stover.

**Keywords:** biomass; briquette; densification; technology; production costs; economic feasibility



### **Detection of Hazardous gases using nanostructured ZnO thick films**

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**Abstract:** Nanostructured ZnO powders were prepared using ultrasonic atomization technique. The powders were characterized using X-ray diffraction, scanning electron microscopy, transmission electron microscopy and elemental analysis using EDAX. It was observed from XRD and TEM that the powder consisted of nanocrystallites with sizes less than 20 nm with spherical in shape. Thick films were prepared using nanostructured ZnO. This thick film is used as detector to test the hazardous gases. The thick film sensor gives maximum response to Ammonia and DMMP.

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## **Comparative study of zinc oxide nanoparticles and silver doped zinc oxide nanoparticles for their application in bandages**

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**ABSTRACT:** The zinc oxide nanoparticles and silver doped zinc oxide nanoparticles were synthesized by simple wet chemical method using zinc nitrate and silver nitrate as the precursor. The synthesized nanoparticles were characterized by X- ray diffraction, Energy Dispersive X- ray Spectroscopy and Scanning Electron Microscopy. The synthesized zinc oxide nanoparticles show micro flower like structure while silver doped zinc oxide nanoparticles show rod like morphology. The nanoparticles are then checked for their antibacterial property against skin infection producing microorganisms. Silver doped nanoparticles show enhanced antibacterial activity as compared to zinc oxide nanoparticles. These nanoparticles are then used for their application in bandages. Also the effect of pH and temperature on the antibacterial property of these nanoparticles was also checked.

**KEYWORDS:** Zinc oxide nanoparticles, Silver nanoparticles, nanocomposites, antibacterial activity

## CRITICAL REVIEW FOR ANALYSIS OF PRESSURE VESSEL STRUCTURES

**Abstract:** This paper provides an overview of the pressure vessel, starting with its background and a brief history. Then, the geometry, main components, classification, applications, materials and fabrication process of the pressure vessel are also discussed. When designing or performing optimization on the vessel, it is crucial for the designers to familiar with the types of failures and loadings, to select appropriate analytical methods to analyze the vessel. As well as the design parameters such as thickness, design pressure or allowable stresses, which can alter the performance, efficiency and safety of the vessel. Since the design of the pressure vessel is governed by the codes and standards, some of the commonly used codes are presented, with more details included for the ASME pressure vessel code.

**Name of Student**

**Aniket Aware**

**Name of Guide**

**Prof. V. G. Gore**

## **An Approach towards securing information using Cloud Services**

Abstract

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Abstract—In today's fastest growing world the Cloud Computing comes out as an important and the biggest revolution in the field of information storage. It also changed the way of storage and accessing the information of various industries like businesses, IT i.e. Information Technology and Healthcare. The cloud becomes more trustworthy, more distributed and revolving day by day & it is going to be never ending. There are various aspects where there is a need to store the data with the revolution in various sectors and the data which is there need to be secure as the hacking is also growing with the more storage of data. The intruders are awake all the time to get any sort of information as every data have it's own value. So to get aware about all the security measures for various data this paper have it's main focus.

*Keywords—Security , Cloud Computing*

## **Oxidation of Xanthine Derivatives in the presence of Micelle forming surfactants by Ceric Ammonium Nitrate in Acetonitrile – A Kinetic study**

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<sup>2,3</sup>Department of Chemistry, Chaitanya Bharathi Institute of Technology, Hyderabad, INDIA.

### **Abstract**

Oxidation of Xanthine alkaloids have been studied with various one and two electron oxidizing agents using micelle forming surfactants. Oxidation of Xanthine alkaloids such as Xanthine (XAN), hypoxanthine (HXAN), caffeine (CAF), theophylline (TPL), theobromine (TBR) with ceric ammonium nitrate (CAN) is too sluggish in acetonitrile media even at elevated temperatures, but significantly accelerated in presence of micelle forming surfactants such as Tx-100, SDS, and CTAB. Reaction followed first order kinetics in both [CAN] and [Xanthine alkaloid]. Rate of oxidation is accelerated with an increase in [Surfactant] linearly. Mechanism of oxidation in Tx-100 micellar media has been explained by Menger- Portnoy enzymatic model with the oxidation of micelle-bound substrate (MS) by Ceric nitrate (CAN) appropriately. However, in SDS and CTAB mediated reactions micelle bound-CAN is formulated as oxidizing species.

**Keywords:** Oxidation, Xanthine Alkaloids, One and Two Electron Oxidizing agents, Micelle Forming Surfactants, Catalysts.

## Study of surface modified TiO<sub>2</sub>- La<sup>3+</sup> Nanostructure on Structural and Electrical properties

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### Abstract

A titanium dioxide (TiO<sub>2</sub>) nanopowder is surface modified by lanthanum ions (La<sup>3+</sup>). These thick film sensors were prepared by using standard screen printing technique and fired at 650°C temperature in air atmosphere. The structural behaviour, surface morphology and phase composition of TiO<sub>2</sub> nanopowders on La<sup>3+</sup> content were analysed by XRD, SEM and EDX, FTIR technique respectively. In XRD all nanopowder samples are assigned to rutile phase of TiO<sub>2</sub> and variation of nanocrystallite size with dopant content, shifts and broadening of peak of different concentration. Special attention is dedicated to the changes in the La-doped TiO<sub>2</sub> nanopowders observed after high temperature treatment. The obtained results are compared with the results of XRD spectroscopy. Electrical measurements of thick films prepared with these materials showed that La increased the base resistance of TiO<sub>2</sub> and shows the semiconducting behaviour.

**Key Words:** Titanium Dioxide, Lanthanum oxide, Thick films, Resistivity.

## SYNTHESIS AND CHARACTERIZATION OF Ag DOPED ZINC OXIDE NANOPARTICLES

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### Abstract:

Fabrication of metal oxide nanoparticles is an ecologically friendly, low cost and easy handling process used worldwide. In this research work demonstrated an elaborate structural investigation of Silver (Ag) - doped Zinc Oxide (ZnO), synthesized using the co-precipitation method at room temperature. The structure, morphology and optical properties were evaluated using XRD, FESEM, EDAX, FTIR, and UV - Visible techniques respectively. The results from the XRD pattern reveals that the Ag-doped ZnO have hexagonal wurtzite structures. Prominent peaks (100) (002) and (101) for Ag-doped ZnO were recorded from the evaluation with the average crystalline size of 46 nm. The shape of the surface morphology was strongly influenced by the doped Ag material and it looked like spherical and tiny particles in FESEM. The crystalline size also confirmed from FESEM results. The crystalline size, morphology and particle size results from XRD, FESEM strongly supports the physical interactions of the ZnO nanoparticles. The FTIR confirmed the functional group of Ag-doped ZnO with FTIR spectra broadband value ranging from 4000  $\text{cm}^{-1}$  to 500  $\text{cm}^{-1}$  at Zn-O stretching mode. The UV absorbance was excellent for Ag-doped ZnO with the peak value. The bandgap was calculated using tauc plot. These chemically modified nanoparticles will be applicable for various industrial or medicinal applications such as the deposition of antimicrobial coatings, food packaging, antimicrobial activity, dye degradation of organic dyes. The reusability of the ZnO supported with silver was ascertained and catalytic performance of the regenerated catalyst was comparable to that of the fresh catalyst.

**Keypoints:** Ag doped ZnO, XRD, FTIR, FESEM.



## **Synthesis and Antifungal activity of chlorosubstituted 1-phenyl- $\Delta^2$ -pyraoles and 1-phenyl- $\Delta^2$ -pyraolines on plant pathogen *Alternaria solani* .**

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### **ABSTRACT**

Alternaria leaf blight is one of the most important disease of potato worldwide. During 2009 – 2010 in the Kashmir valley surveyed that the disease was prevalent in all the potato growing areas. The overall mean disease incidence and intensity ranged from 24.54 to 28.23%. In early stages of disease development , small irregular to circular dark brown spot on lower leaves appear meaning 0.5 mm in size. The aim of the present study was to investigate the antifungal and antibacterial activities on *Alternaria solani*. *Alternaria solani* was procured from genuine agricultural agencies. The compound synthesis in part I was screened invitro for their antifungal & antibacterial activities by disc diffusion method.

**Keywords:** *Alternaria solani* , antifungal and antibacterial activities , Pyrazoles, Pyrazolines,

## ANALYSIS OF VARIOUS FACTORS TO REDUCE HEAT INSIDE WAREHOUSES

### Abstract

With Growth of E-commerce & Global consumer good industry Warehouse demand in India has overtaken supply for the first time in four years. According to a new report by property developer Jones Lang LaSalle (JLL), FY 2018-19 India's total stock of Grade A and B warehousing space increased 22% year on year to 169 million sq ft. "Last year saw India's warehousing sector come of age, outshining some of the conventional real estate asset classes and attracting global investors," the report notes.

With more warehouse coming up the need for improvement in current Operations and maintenance is in high priority by the users. Temperature control is one of the biggest maintenance requirements of running a warehouse. Too much heat causes heat stress, which can make employees less productive. Extreme cold also has its shortcomings, including exposing employees to cold-related illnesses. Depending on the nature of the warehouse inventory, extreme heat can cause damages and hefty losses.

The vast space in a warehouse makes temperature control complicated – and expensive. This paper addresses the complications of air conditioning in a warehouse and suggests efficient remedies which can be implemented before and after construction of Warehouses.

## **Application of Nanotechnology methods in water treatment: A Review**

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**Abstract:** Water contaminants may be organic, inorganic, and biological. Some contaminants are toxic. Many ions and heavy metals show hazardous effects at high concentrations; therefore, it is necessary to remove these pollutants from contaminated water to provide good health to the public. New and improved technologies for water purification are, therefore, extremely important. Different methods are available for water purification but now a days nanotechnology provided innovative solutions for water treatment. Nanotechnology-enabled processes are highly efficient, modular, and multifunctional in nature, and they provide high performance, reasonable water and, wastewater treatment solutions. Numerous studies have shown that nano-materials can effectively remove various pollutants in water and thus have been successfully applied in water treatment. The present review emphasizes on the potential of the nano-particles hold in advancing the water treatment. The various nano-adsorbents mostly used in water treatment have been discussed in this study. The review also discusses the types of pollutants that can be removed by nano-adsorbents. This review article describes various applications of nano-material in removing different types of impurities from polluted water. The purpose of this review is to emphasize upon the importance of Nano-particles in the water treatment industry and to showcase how it has ability to transform the waste water treatment.

**Keywords:** Nano-material applications, Nano- Particles, Water treatment, Water contaminants

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## Synthesis and Physio-Chemical aspects of chlorosubstituted 1-Phenyl- $\Delta^2$ -Pyrroles and 1-Phenyl- $\Delta^2$ -Pyrrolines on plant pathogen *Cercospora personata*.

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### ABSTRACT

*Cercospora* genus are the plant pathogens that cause disease in the peanut plant which belongs to the family leguminose. They cause tikka or leaf spot. Plants suffering from this disease have dark brown or black spot are formed on the upper and lower surface of leaf. This infection leads to the early death of leaves or plants which results in the low yields. *Cercospora personata*. was procured from genuine agricultural agencies. The compound synthesis in part I was screened invitro for their antifungal & antifungal activities by disc diffusion method. The newly prepare 1-phenyl- $\Delta^2$ -pyrroles and 1-phenyl- $\Delta^2$ -pyrrolines were more effective against *Cercospora personata*. The result in the present study suggest that 1-phenyl- $\Delta^2$ -pyrroles and 1-phenyl- $\Delta^2$ -pyrrolines can be used for treating disease cause by *Cercospora personata*.

**Keywords:** *Cercospora personata*. Antifungal and antibacterial activities, Pyrroles, Pyrrolines,



**ANKITA KASDEKAR**

**Smart Grid Concepts and Comparison with Traditional Grid**

**Abstract**

Smart grid integrates the traditional electrical power grid with information and communication technology. This integration empowers electrical utilities provider and consumers to improve efficiency and availability of power system, while constantly monitoring , controlling demand of customers This paper deals with the concepts of smart grid, starting from introduction of smart grid , what is need of smart grid in today's world and componants used in smart grid .This paper attempted to give information about difference in traditional grid and smart grid. This paper give an overview about smart grid and concepts related to it and how it is different from traditional grid.

### **Sensor Based Applications of Photonic Crystal: A Review**

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#### **Abstract**

A sensor is a device to detect changes in environmental factors like temperature, pressure, humidity, electric/magnetic field, chemical and bio component etc. Such modification changes physical, chemical or electromagnetic properties of device, which are used to read for detection. Photonic crystal based optical sensor uses refractive index of material as detection parameters. Refractive index of material has dependence on various factors like temperature, pressure, humidity, chemical, bio-components etc. Therefore, photonic crystal based optical sensor application became great deal of interest from last decades. Photonic crystal based optical sensor has several advantage as ultra-fast response, ultra-compact size. Such, biosensor devices are having very good sensitivity and detection limit too. So, researchers are attracted to photonic crystal based biosensor applications. Here, our focus is to study various optical sensor devices based on photonic crystal.

**Keyword:** Photonic crystal, optical sensor, biosensor, photonic bandgap etc.

**A review on recent advances in electronic tongues and their principle of detection****Anil B. Patil<sup>1a</sup>, Arun V. Patil<sup>2, 3b</sup>**<sup>1, 2</sup>Department of Electronic Science and Research Centre, L.V.H College, Nashik, India.<sup>3</sup>Professor, Arts, Science and Commerce College, Surgana Dist. Nashik, India.Corresponding Author: <sup>a</sup>anilpatil1@gmail.com, <sup>b</sup>aruptl@gmail.com**Abstract:**

The present review is dedicated to recent developments and principle of detection of electronic tongues and taste sensors, employing electroanalytical technique used for transduction, viz.: potentiometry, voltammetry/amperometry or electrochemical impedance according to the different families of chemosensors and biosensors. This classification is done according to the nature of the primary signal, whether after an interaction with the analyte, a potential, electrochemical current or resistivity/capacitance change is generated.

Taste sensing does impart very significant information about taste disorder condition of a person which can lead to other disorders like obesity and high blood pressure in recent years. Even though a normal person starts losing his taste buds after the age of 50. Especially in the industrial field where a human expert is not a possible choice, like in automatic control, poisonous/extreme condition samples, etc, a different, more bio-inspired trend is the artificial taste analogues of human taste concept invented with the goal of performing automated taste perception.

An electronic tongue has been the popular innovation for taste sensing during the last decade, where a complex system had been developing with disposability, simplicity, and rapid responses which replicates the functions of a human tongue and have been a favourite choice for some time for a lot of health-related applications. They have been widely used for the analysis of food, beverages, fruit juices, coffee, milk, drinks wines and taste of pharmaceuticals.

Many researchers have been working to realize it scientifically. Prof. Toko in Japan first initiated this idea, which consists in developing a sensor array responding to the basic tastes viz: sweet, sour, salty and bitter, and umami. Even though some research groups have developed systems for taste assessment, there are certain limitations associated with their work which were solely based on the identification of one or two taste types. Traditional evolution in the field of sensors and biosensors has followed the path of continuous search of better selectivity and sensitivity which is a clear option for a fast, simple and cheap for gathering of information

Thus, there is a scope for further study of the electronic tongue which appears as an ideal device enabling fast, precise and direct analysis and can be applied for the automatic on-line monitoring using artificial intelligence and information visualization methods, such as sample recognition/origin tracing, process monitoring and quality control to enhance the performance of e-tongues.

**Keywords:** Electronic tongues, sensors, biosensors, potentiometry, basic taste, selectivity, process monitoring

## **Realization of optical XOR gate based on photonic crystal**

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### **Abstract**

In the present communication, we studied two-dimensional photonic crystal of ring resonator structure. Such design is used to realize optical XOR logic gate at three different frequencies as 1645.3 nm, 1455.5 nm and 1432.4 nm. The proposed optical logic gate is based on the interference principle. The contrast ratio, response time and bit rate has been achieved as 22.83 dB, 4.5 ps and 222.22 Gb/s respectively.

**Keyword:** Photonic crystal ring resonator, defects, photonic bandgap, optical logic gate etc.



## **Application of Switched Reluctance Motor drive in Electric Vehicles**

D.A.Shahakar (Ph.D Scholar)

### **ABSTRACT:**

Nowadays, switched reluctance machines (SRM) are gaining interest in the scientific community due to the advantages they offer. The SRM offers an overall efficiency similar to an induction motor of the same rating, since the friction and windage losses are comparable. Many researches have been done on SRMs, their related systems and challenges. This paper reviews the SRM structures, their advantages and disadvantages. Various SRM topologies are studied and their merits and limits are given. Additionally, the most common control strategies for SRM drives are categorized, which is followed by a summary of the researches on challenges in torque and vibration reduction.

**Keywords:** Switched reluctance machine, direct and indirect control, torque ripple, vibration reduction

## **Design and Analysis of Compressor Fins Thermal Distribution**

**GAUROVE TIJARE**

### **Abstract:**

Most of the air compressors are either reciprocating piston type or rotary vane screw. Centrifugal Compressors are common in very large applications such as supply a high-pressure clean air to fill gas cylinders, supply a large amount of moderate pressure air to power pneumatic tool. In air compressor heat can be generated by two ways, heat produced by friction as well as by due to compressing of air at high pressure. So, this heat will transfer to the atmosphere by fins.

To determine the heat transfer rate related to a fin, we tend to should initial get the temperature distribution on the fin. In this work, we altered geometrical shapes of fins for analysis and select the most effective cooling fin. Finite element method (FEM) is an important numerical technique used in engineering analyses. In this project Rectangular, triangular, concave, and convex profile fin of Aluminium nitride and Aluminium alloy A204 were preferred for analysis. Analysis the parameters such as heat transfer rate through the fin, fin efficiency and effectiveness through free and forced convection heat transfer mode. Insulin Heat flux & Aluminium, Aluminium nitride is compared with Aluminium Alloy A204. The varying parameters are considered in the study, by changing the shape of the fin to Rectangular fin, Triangular fin, Page 140 Convex fin, & Concave fin, the weight of the fin body reduces thereby increasing the heat transfer rate and efficiency of the fin. The results show, by using Concave fin with material Aluminium Alloy A204 is better since the heat transfer rate of the fin is more. By using Concave fins, the weight of the fin body reduces compared to existing rectangular engine cylinder fin.

### **Components:**

- Compressor fin

### **Advantages:**

- The effectiveness of a blade can improve by changing the geometry of balance.
- The amount of conduction, convection, or radiation decides the temperature and flow of the heat.
- Human power is not necessary.
- Maintenance is low

## Stability constants and thermodynamic parameters of lanthanides (III) complexes with 5-bromo, ortho hydroxy acetophenone – N – (4'-methyl phenyl) imine at 25°C

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### ABSTRACT:

Stability constants of some trivalent lanthanides (La, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Yb and Ho) complexes with Schiff base 5-bromo, Ortho hydroxy Acetophenone – N – (4'-methyl phenyl) imine ( $R_1$ ), have been determined in 50 % (v/v) ethanol-water medium at 25°C and  $\mu = 0.1$  M ( $\text{NaClO}_4$ ) ionic strength by Irving – Rossotti method. The  $\log K^H$  and  $\log K$  values are used to discuss the effect of substituents and atomic size of the trivalent lanthanides. The thermodynamic parameters for the formation of 1:1 and 1:2 complexes have been calculated.

**Key words:** Stability constants, thermodynamic parameters, lanthanides, Schiff base.

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**Comparative Study of Electrical Properties of Substituted Calcium Hexaferrites**MOHARKAR P.R.<sup>1\*</sup> and GAWALI S.R.<sup>2</sup><sup>1</sup>Department of Physics, Arts, Commerce and Science College, Tukum, Chandrapur, MS, India. Pin code 442401<sup>2</sup>Department of Physics, Dr. Ambedkar College, Chandrapur, MS, India. Pin code 442401

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**ABSTRACT**

The Two series of samples substituted calcium hexaferrite with composition  $\text{Ca}_2\text{Zn}_2\text{Fe}_{12-x}\text{Me}_x\text{O}_{22}$  (Me = Al and Co,  $x=0, 0.3$  and  $0.7$ ) were prepared by the auto combustion method. The microstructure of the both series of prepared samples have been characterized by XRD technique. The XRD data shows the prepared sample are found to be a single phase Y-type hexagonal ferrite. The lattice constants  $a$  and  $c$ , X- ray density, bulk density and porosity of both series of synthesized sample were measured. The lattice parameters of the synthesized sample were found to increase with increase substitution of  $\text{Al}^{3+}$  ion for  $\text{Fe}^{3+}$  ion and decrease with substitution of  $\text{Cr}^{3+}$  ion for  $\text{Fe}^{3+}$ , which is attributed to the ionic size differences of cations involved. The dc electrical conductivity measurements of both series have been carried out the temperature range 300 K-800 K by using impedance analyzer. The electrical conductivity of the sample was explained on the basis of hopping mechanism. The resistivity of the sample was found to be enhancing with the substitution of  $\text{Al}^{3+}$  ion for  $\text{Fe}^{3+}$  ion which has potential applications in microwave devices.

Key words: Y-type hexagonal ferrite, microstructural property, XRD, electrical conductivity and auto-combustion method etc.

## **Heartbeat and Temperature Monitoring system for remote patients using Arduino**

**Suvarna Bhople**

### **ABSTRACT**

This project describes the working of a wireless heartbeat and temperature monitoring system based on a microcontroller ATmega328 (arduino uno). Most monitoring systems that are in use in today's world works in offline mode but our system is designed such that a patient can be monitored remotely in real time. The proposed approach consists of sensors which measures heartbeat and body temperature of apatient which is controlled by the microcontroller. Both the readings are displayed in LCD monitor.

This Wireless system is used to transmit the measured data from the remote location. The heartbeat sensor counts the heartbeat for specific interval of time and estimates Beats per Minute while the temperature sensor measures the temperature and both the data are sent to the microcontroller for transmission to receiving end. Finally, the data are displayed at the receiving end. This system could be made available at a reasonable cost with great effect.

## Comparative Study of Electrical Properties of Substituted Calcium Hexaferrites

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### ABSTRACT

The two series of samples of substituted calcium hexaferrite with composition  $\text{Ca}_2\text{Zn}_2\text{Fe}_{12-x}\text{Me}_x\text{O}_{22}$  (Me = Al and Co,  $x=0, 0.3$  and  $0.7$ ) were prepared by the auto combustion method. The microstructure of the both series of prepared samples has been characterized by XRD technique. The XRD data shows the prepared sample are found to be a single phase Y-type hexagonal ferrite. The lattice constants  $a$  and  $c$ , X-ray density, bulk density and porosity of both series of synthesized sample were measured. The lattice constants of the synthesized sample were found to increase with increase substitution of  $\text{Al}^{3+}$  ion for  $\text{Fe}^{3+}$  ion where as decrease with substitution of  $\text{Co}^{3+}$  ion for  $\text{Fe}^{3+}$  in calcium hexaferrites, which is attributed to the ionic size differences of cations involved. The dc electrical conductivity measurements of both series have been carried out the temperature range 300 K-800 K by using impedance analyzer. The electrical conductivity of the sample was explained on the basis of hopping mechanism. The resistivity of the samples was found to be enhancing with the substitution of  $\text{Al}^{3+}$  ion for  $\text{Fe}^{3+}$  ion in calcium hexaferrites which has potential applications in microwave devices.

**Key words :** Y-type hexagonal ferrite, microstructural property, XRD, electrical conductivity and auto-combustion method etc.

## **Spectroscopic characterization of cadmium sulfide nanoparticles synthesized using different surface stabilizer.**

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### ABSTRACT

Cadmium sulfide nanoparticles were prepared by chemical precipitation method using Sodium hexametaphosphate Polyvinyl pyrrolidone and soluble starch stabilizers. The samples were examined by X-ray diffraction, scanning electron microscopy, UV-visible absorption spectroscopy and Fourier transform infra-red spectroscopy. The structural and morphological study revealed the crystalline nature and particle size change with different stabilizer. UV- visible absorption spectra exhibited quantum confinement effect on CdS nanoparticles. Further, the results indicate that the surface states and band gaps can be modified with the nature of surfactant. The chemical bonding and interaction between CdS and surfactant was confirmed by Fourier transform infra-red analysis.

**Structural and Magnetic studies of  $\text{CoFe}_{1.95}\text{Dy}_{0.05}\text{O}_4$ : Estimation of lattice strain and anisotropy in nano ferrite.**Ravindra N. Chikhale <sup>a, b\*</sup>, Pushpinder G. Bhatia <sup>b</sup><sup>a</sup> Department of Physics, J.S.M. College, Alibag, Raigad, Maharashtra 402201, India<sup>b</sup> Department of Physics, **Guru Nanak College**, G.T.B. Nagar, Mumbai, Maharashtra, India**\*Corresponding author - chikhaleravi@gmail.com**

**Abstract** – The cobalt ferrite is a prominent material for various applications therefore many researchers working on it. The cobalt ferrite doped with rare-earth ions modifies the structural, magnetic, and electrical properties. In present study  $\text{CoFe}_{1.95}\text{Dy}_{0.05}\text{O}_4$  nanoparticles were synthesized by the sol-gel autocombustion method at low temperature. X-ray diffraction pattern revealed the presence of reflection peaks corresponding to cubic spinel structure. Extra small peak is observed corresponding to orthoferrite ( $\text{DyFeO}_3$ ) because of the low solubility of larger ionic radii  $\text{Dy}^{3+}$  ions into spinel ferrite. The crystalline size was estimated by using Debye – Scherrer, and Williamson - Hall (W-H) and found to be 43.89 nm and 57.75 nm respectively. The lattice strain in crystal lattice was calculated by using the W-H method and found to be  $6.45 \times 10^{-4}$ . The positive value of the lattice strain indicates an expansion of crystal lattice. Fourier transform infrared spectrum of  $\text{CoFe}_{1.95}\text{Dy}_{0.05}\text{O}_4$  shows absorption bands at  $563.21 \text{ cm}^{-1}$  and  $449.41 \text{ cm}^{-1}$  due to stretching vibrations of metal-oxygen bonds at the tetrahedral site and octahedral site respectively. The magnetic properties were studied using a Vibrating sample magnetometer at room temperature. The estimated values of coercivity and remanent magnetization from the M-H loop are 977.60 Oe and 35.38 emu/gm respectively. The anisotropy of the sample was studied by using the Law of approach to saturation. The estimated values of corrected saturation magnetization and anisotropic constant are 77.84 emu/gm and  $3.47 \times 10^6 \text{ erg/cm}^3$  respectively. The squareness ratio was found to be 0.466 indicates a multi-domain magnetic structure was formed.



## INVESTIGATIONS ON THE PROPERTIES OF DOPED TIN SULPHIDE FILMS – A REVIEW

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Comprehensive studies on the doped SnS films for thin film photovoltaic applications is the essence of the present work. Various dopants such as Antimony, Bismuth, Copper, Aluminium, Iron, Germanium, Gallium, Molybdenum etc synthesized by different deposition techniques were studied in detail. Variation in the magnitude of the parameters and its influence on the structural, morphological, optical and electrical properties were discussed. Atomic percentage of the films w.r.t doping concentration were highlighted. Shifting of the type of conductivity of SnS films from n-type to p-type were highlighted and the reasons were discussed. In conclusion, better dopants out were suggested for good photovoltaic performance.

Keywords: SnS films, Deposition techniques, Structural, Morphological, Optical, Electrical and Conductivity

## Thermodynamic and Electrochemical analysis of Expired drug as an corrosion inhibitor for mild steel in 2M hydrochloric acid

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### Abstract:

In the present work, the inhibitory properties of Expired Flunarizine drug (EFD) for the corrosion of mild steel in an HCl solution were investigated. Electrochemical methods like electrochemical impedance spectroscopy and Tafel polarisation method were used. Effect of temperature, Concentration of inhibitor and time of immersion were studied by weight loss method The inhibition efficiency of the Expired Flunarizine drug was calculated and found to be more than 90% for all employed methods. Expired Flunarizine is mixed type inhibitor. The adsorption of this inhibitor was described by Temkin adsorption isotherm. The negative values of Gibbs energy indicate the nature of interactions between the inhibitor molecules and the metal surface is spontaneous adsorption process.

**Keywords:** Electrochemical methods; Mild steel; inhibitor; adsorption isotherm. , Expired drug SEM-EDX, FTIR

## Nano Based Drug Delivery System Recent Development and Future Approach

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### Abstract

Nanoparticles was first observed by scientist Richard Adolf Zsigmondy and was first to use the term Nanometre(nm) in the first decade of 20<sup>th</sup> century. Nanoparticles usually refers to a small sized nanosphere size measured in nm. For the delivery of drug using nanoparticles include liposomes, micelles, nanobots, quantum dots etc. are used. In recent studies nanoparticles are widely used in the treatment of cancerous cells, to facilitates personalized medicine and targeted delivery of drug. In future these Nano based drug delivery may be helpful to reduce amount of drug required for treatment of the disease.

**Key words:** Nanosphere, Cancerous cells, Nanobots, Quantum dots.

## Nanoparticle Delivery Systems in the Treatment of Diabetes Complications

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**Abstract:** Diabetes mellitus, is an incurable chronic metabolic disorder that affects millions of people worldwide and takes a heavy toll on human life, is characterized by changes in the homeostasis of blood sugar levels, being the subcutaneous injection of insulin the first line treatment. However, this administration route is associated with limited patient's compliance, due to the risk of pain, discomfort and local infection. The combination of nanotechnology and medicine has created a new field 'nanomedicine' to enhance human health care. Nanotechnology has enhanced drug delivery to those areas which were unfavorable for macromolecules. Nanoparticles have been proposed as insulin carriers to make possible the administration of the peptide via friendlier pathways without the need of injection, i.e., via oral or nasal routes. Nanoparticles stand for particles in the nanometer range that can be obtained from different materials e.g., polysaccharides, synthetic polymers and lipids are commonly used with the aim to improve the physiochemical stability of the loaded drug and thereby its bioavailability. This review discusses the use of different types of nanoparticles e.g. polymeric and lipid nanoparticles, liposomes, Dendrimers, Niosomes, micelles, nano emulsions and also drug nanosuspensions for improved delivery of different oral hypoglycemic agents in comparison to conventional therapies.

**Keywords:** Diabetes mellitus; insulin; nanoparticles; drug delivery systems; oral hypoglycemic agents.

## Synthesis, Characterization and Optical Studies of Cation Deficient fcc type NiO Nanoparticles for Electrochemical Capacitor Applications

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### Abstract

In this work, we report, synthesis of black coloured cation deficient NiO nanoparticles (NiO NPs) via citric acid assisted combustion method and calcined at 500° C for 3h. The phase structure and crystallite size of NiO NPs was analysed through powder X-ray diffractometer (PXRD) technique and observed to be fcc nature. The metal ion to oxygen vibrational analysis was carried out by Fourier transform infrared (FTIR) spectroscopy. The morphological analysis was carried out using scanning electron microscope (SEM). The optical bandgap analysis was performed by applying Kubelka-Munk relation to the reflectance data obtained from diffuse reflectance spectroscopy (DRS). The optical band gap of synthesised NiO NPs was found to be 3.51eV. The electrochemical analysis was employed in 1M H<sub>2</sub>SO<sub>4</sub> using a CH instrument and results have shown good capacitance values, suitable for electrochemical capacitor applications.

**Keywords:** Citric acid assisted combustion; XRD; FTIR; SEM; DRS.

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**STRUCTURAL STUDIES OF ZnSe THIN FILMS SYNTHESIZED  
BY SILAR METHOD**

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**ABSTRACT**

Zinc Selenide (ZnSe) is an important II-VI semiconductor material for the development of various modern technologies and photovoltaic applications. ZnSe thin film was prepared by SILAR method at room temperature. Zinc Chloride and Selenium Dioxide were used as cationic and anionic precursors for the thin film. ZnSe thin films were grown by optimizing the concentration of cationic and anionic precursors of immersion cycle and immersion time . The crystal structure of the films were studied by X-Ray Diffractometers. The thin film topography and morphology was studied by AFM and SEM. Effect of deposition techniques on structural properties were reported.

**Keywords**

ZnSe thin film, SILAR method, ZnCl<sub>2</sub>, Selenium Dioxide , AFM, SEM

## **PARAMETER ESTIMATION OF SINGLE PHASE INDUCTION MOTOR**

RACHANA JAMBHALUKAR

### **ABSTRACT:**

This paper presents a methodology to estimate the parameters of a single-phase induction motor (SPIM) equivalent circuit using a dc test, a locked-rotor test, and a no-load test. By neglecting the core-loss resistance, the SPIM parameters can be first directly calculated using a simplified equivalent circuit. However, an equivalent circuit using the resultant parameter values fail to match the power input measured at the motor terminals, especially for the active power under the no-load test. We include the core-loss resistance into the parameter estimation framework and use the Newton-Raphson (N-R) algorithm to improve the estimates obtained by the direct calculation method. Experimental results on a laboratory SPIM demonstrate the effectiveness of our proposed N-R based parameter estimation scheme, in terms of excellent match with the active and reactive power measurement data from the aforementioned tests, and mismatch reduction at other operating conditions.

### **KEYWORDS:**

Induction Motor Faults, Motor Current Signature Analysis, Identification, Diagnosing Techniques, Arduino Uno, Embedded system, Tests, Voltage, current, speed, power, torque, efficiency.

### **Structural and morphological properties of spray deposited lead telluride thin films**

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#### **Abstract:**

The present research work reports the deposition of lead telluride (PbTe) thin films on the glass substrates by economical spray pyrolysis technique at 473K. The deposited lead telluride films are nanocrystalline in nature with cubic lattice having preferred orientation along (2 0 0) and exhibit a direct bandgap of 1.27eV. The electrical resistivity of the as-deposited films was found to be  $1.80 \times 10^{-2} \Omega \text{cm}$ . Thermo-emf studies confirm that the films possess n-type conductivity.

**Keywords:** Nanostructured thin films; Scanning electron microscopy; X-ray diffractometry.



## A Study of Green Inhibitor for Acidic Corrosion of Mild Steel

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### Abstract

Euphorbia hirta was chosen as green corrosion inhibitor. The inhibition efficiency of Euphorbia hirta leaves on the corrosion of mild steel in hydrochloric acid (1M) was investigated by the weight loss method. Potentiodynamic polarization and electrochemical impedance were studied to evaluate the corrosion inhibition performance of the Euphorbia hirta leaf extract. The results revealed that Euphorbia hirta acts as a corrosion inhibitor in 1M HCl. The inhibition efficiency increases with increase of extract concentration. The inhibition action was attributed to the adsorption of the chemical compounds present in the leaf extract on mild steel. The formation of an adsorbed film on a steel surface was investigated using scanning electron microscopy (SEM) and FT – IR.

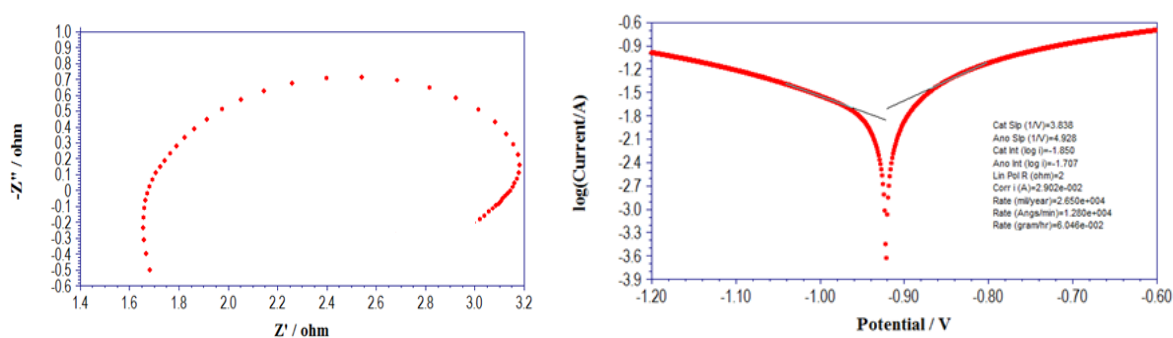


Figure Nyquist and Tafel plots for mild steel in 1M HCl with leaf extract

**Keywords:** Corrosion inhibitor, Mild steel, Euphorbia hirta, Polarization, 1M HCl, Electrochemical Impedance Spectroscopy.

### **Automatic Accident Detection, Ambulance Rescue And Traffic Signal Controller**

Nowadays the road accidents in modern urban areas are increased to uncertain level. The loss of human life due to accident is to be avoided. Currently there is no technology for accident detection. Also due to the delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of the death of victim. There is a need of introducing a system to reduce the loss of life due to accidents and the time taken by the ambulance to reach the hospital. To overcome this problem we will introduce a system called "**Automatic Accident Detection, Ambulance Rescue And Traffic Signal Controller**". The main theme behind this system is to provide smooth flow for emergency vehicles like ambulance to reach the hospital in time. In this system we introduce the various devices like GPS, GSM, Microcontroller Transmitter-receiver and LCD, temperature sensor, alcohol detector and measures the pulse rate of patient . When the such types of incident occur, the location of vehicles is send to nearest hospital and after this ambulance will come and send this patient to the hospital.

## **Automatic Hand Sanitizer Dispenser**

**ABHISHEKH GADEKAR**

**Abstract:-** An automatic hand sanitizer dispensing machine is automated, non contact, alcohol based hand sanitizer dispenser, which finds its use in hospitals, work places, offices, schools and much more. Alcohol is basically a solvent, and also a very good disinfectant when compared to liquid soap or solid soap, also it does not need water to wash off since it is volatile and vaporizes instantly after application to hands. It is also proven that a concentration of >70% alcohol can kill Corona virus in hands. Here, an ultrasonic sensor senses the hand placed near it, the Arduino uno is used as a microcontroller, which senses the distance and the result is the pump running to pump out the hand sanitizer.

**Keywords:-** Sanitizer, Pump, Alcohol, Soap, Corona virus, Ultrasonic Sensor, Relay.

## Smart Hand Glove

### AMRUTA RITHE

#### **Abstract :**

Everyday communication with the hearing population poses a major challenge to those with hearing loss. For this purpose, automatic sign language recognition system has been developed using Random Forest Classifier as a machine learning algorithm, and to translate the sign alphabets and common words into text and sound. A hand glove circuit has been designed with flex sensors or buttons, 4-axis accelerometer and gyroscope to capture the gestures or signs data. The finger bend data has been obtained from flex sensors on each finger while the accelerometer and gyroscope provided the trajectories of the hand motion and button touches with the other finger then give output from this smart hand glove. The data from the sensors or buttons has been passed through the trained model to recognize the gesture. The main purpose of Smart Glove is to provide an ease of sharing basic ideas, minimize communication gap and an easier collaboration for the hard of hearing people.

## Synthesis, Characterisation and Gas Sensing Performance of Pure and Modified BaTiO<sub>3</sub> Thick Film Resistors

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<sup>3</sup> Department of Physics, JES College, Jalana 431203, India

### Abstract

The thick films of pure BaTiO<sub>3</sub> (BT) were prepared by screen-printing technique. The gas sensing performances of these films were tested to various gases by using static gas sensing system at various operating temperatures. The pure film showed maximum response to H<sub>2</sub>S gas at 350°C but poor selectivity. Sn surface modified BT thick films were prepared by dipping pure SnCl<sub>3</sub> thick films in a 0.1M aqueous solution of strontium chloride for different intervals of dipping time of 5, 10, 20 and 30 min. Influence of Sn on the film phase composition, microstructure and sensing characteristics is discussed. The surface-modified BT sensor showed larger sensitivity to H<sub>2</sub>S gas (100 ppm) at 350°C. Sn on the surface of the film shifts the reactivity of film from higher operating temperature to lower operating temperature. Sn modified BT thick film with dipping time 20 minutes showed notable gas response for NO<sub>2</sub> gas sensor.

**KeyWords**—BaTiO<sub>3</sub> thick film, gas sensor, Sn surface modified.

## **Synthesis and biological activity 1, 3 disubstituted 2-Azetidinone containing bromo benzothiazole moiety.**

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### **ABSTRACT**

2-Azetidinone are reported to possess significant antitubercular, antibacterial & antifungal activities. 4-bromo aniline (1), which is aniline derivative have been found to be biologically interesting compound for many years. From this aniline derivative first we have synthesized 2-amino-4-bromo benzothiazole (2) which is then treated with hydrazine hydrate to form 2-hydrazino-4-bromo benzothiazole (3). Compound (3) condensed with o-nitro benzaldehyde, p-nitro benzaldehyde, o-vaniline, p-vaniline, p-methoxy benzaldehyde, p-chloro benzaldehyde p-dimethylamino benzaldehyde, to form corresponding hydrazone (4a-4h). These hydrazone heated with chloro acetyl chloride in presence of triethyl amine and dioxane to form corresponding 2-azetidinone (5a-5h) These newly synthesized 2-azetidinone compound screened for their antibacterial activity.

**Key Words** : benzothiazole, hydrazone, 2-azetidinone, antibacterial activity

## **The Covid Prevention Machine**

### **SAKSHI MOHAD**

#### **ABSTRACT**

An automatic hand sanitizer dispensing machine is automated, non-contact, alcohol-based hand sanitizer dispenser and also, we included thermal screening, oxygen level and pulse rate indication by using IOT technology. Here, an ultrasonic sensor senses the hand placed near it, the Node MCU is used as a microcontroller, which senses the distance and the result is the pump running to pump out the hand sanitizer and also we are using IR Temperature sensor for the thermal screening of body as well as we are implementing the oximeter sensor which is used to measure the pulse rate and oxygen level of the body. All these values are transferred on the one Android Application which is installed in doctors' mobile so that he is easily able to read those values without any contact with person. Hand sanitizer machines are common in the market to sanitize our hands, but they are not able to measure the body temperature, pulse rate and oxygen level.

## Effect of Annealing on the Photocatalytic Degradation of Rhodamine B by Nickel Oxide/Nickel Aluminate Nano Heterostructure

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### Abstract

Nanocomposite materials based on metal nanoparticles have gained increasing attention for their wide range of potential applications in various materials science fields. In the present work the Nickel Oxide/Nickel Aluminate nano heterostructure were synthesized by Solution Combustion Synthesis. The synthesized samples were then annealed at four different temperatures, viz 500°C, 700°C, 900°C and 1200°C. The structural and optical studies of the prepared samples were done using XRD, SEM and UV/Visible analysis. The photocatalytic activities of the synthesized samples for the degradation of Rhodamine B were studied. The variation of photocatalytic rate due to annealing of the samples is taken as the prime objective of the study. The study also focused on the effect of catalyst concentration, dye concentration, and contact time in determining the efficiency of photocatalytic degradation

**Keywords:** Heterostructure, Solution Combustion, Photocatalysis, Nanocomposite





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