S. K. E Society's
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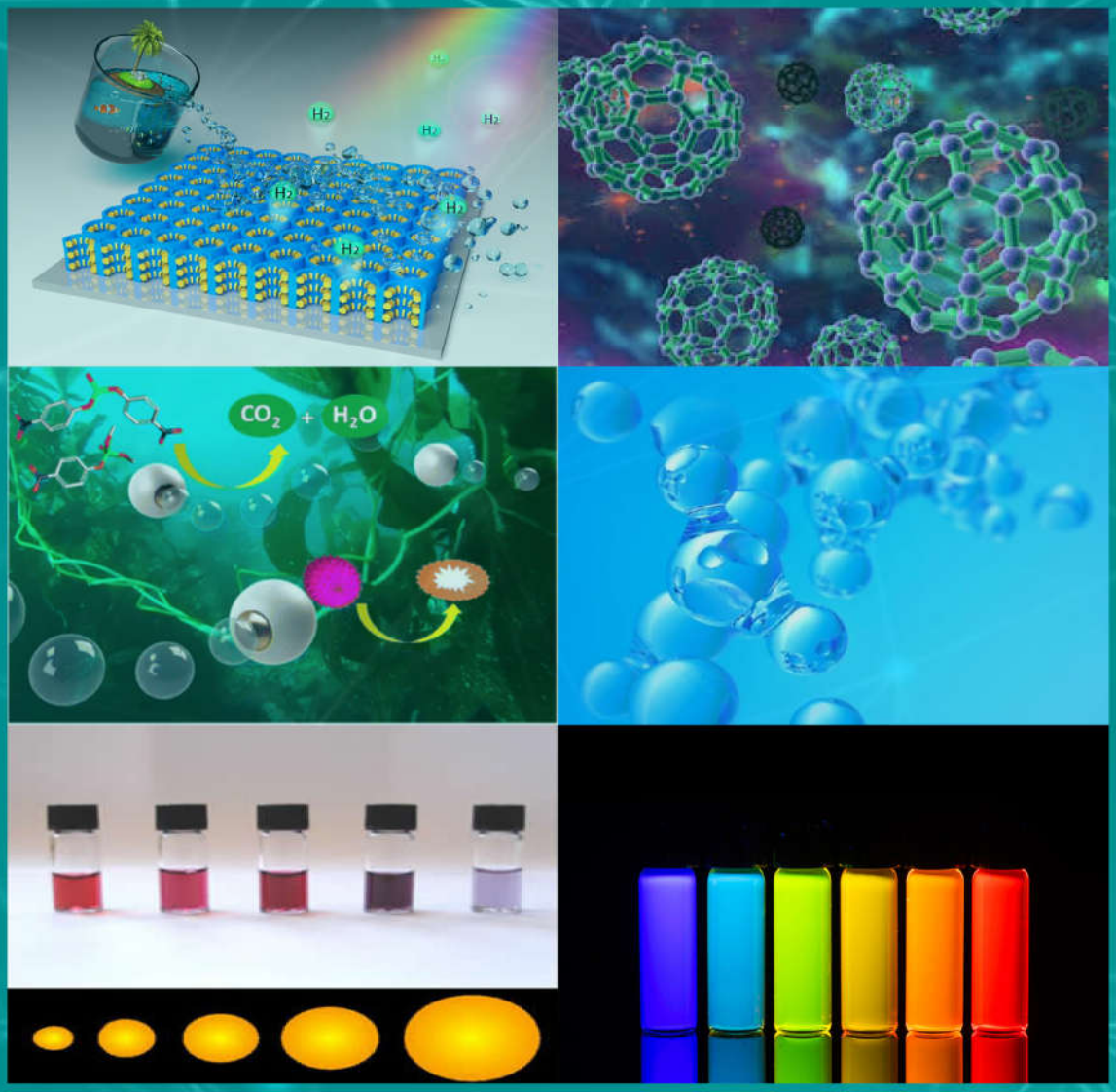
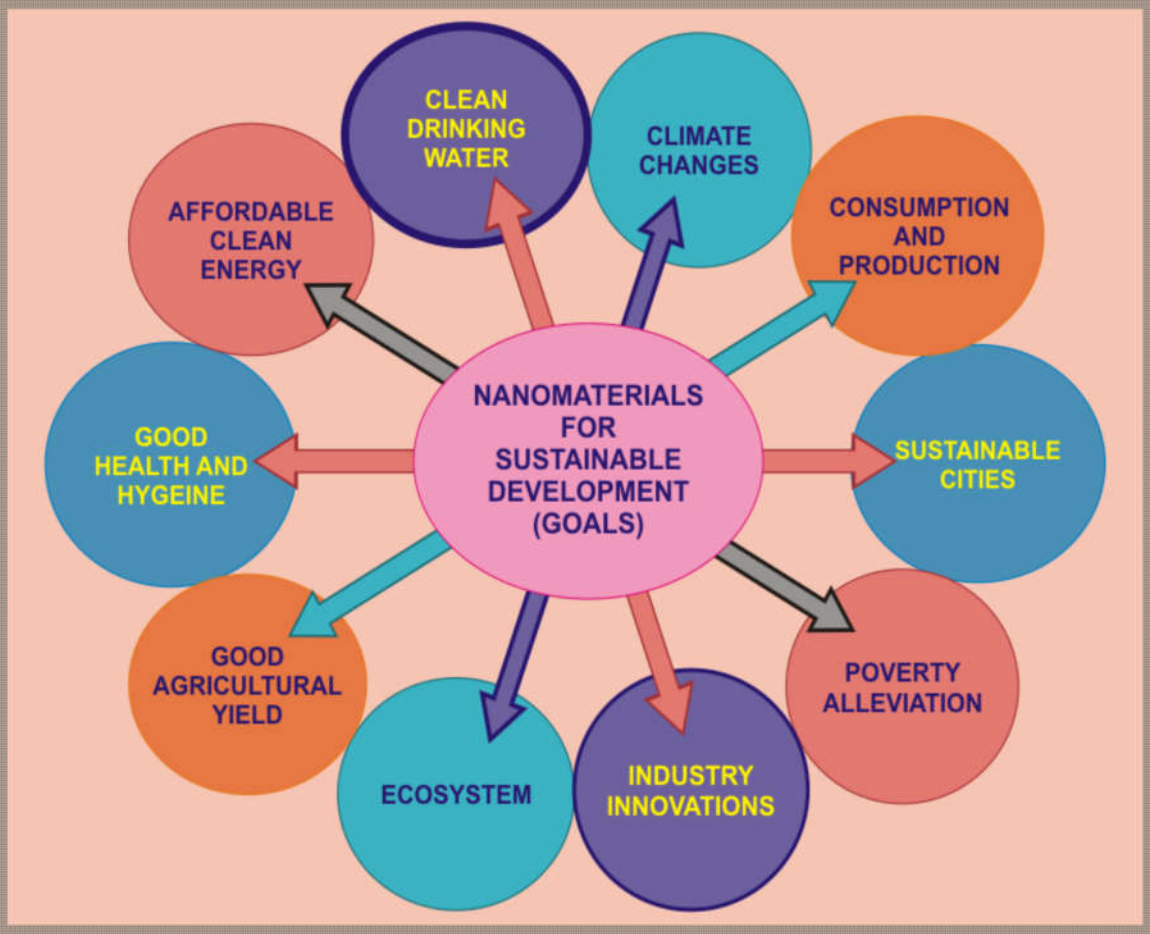


SOUVENIR

National Conference on
Nano Materials for Sustainable Development
NMSD - 2019

Organized by:

Department of Physics,
Govindram Seksaria Science College,
Belagavi - 590006



There's plenty of room at bottom

Richard Feynman

SKE SOCIETY'S

GOVINDRAM SEKSARIA SCIENCE COLLEGE, BELAGAVI

(Reaccredited by NAAC at A grade)

National Conference on

NANO MATERIALS FOR SUSTAINABLE DEVELOPMENT

1, 2 February 2019

SOUVENIR

Organized by

DEPARTMENT OF PHYSICS

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Chairman, SKE Society, Belagavi

Shri. S. V. Shanbhag,
Vice - Chairman, SKE Society, Belagavi

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South Konkan Education Society
1st Floor, G.S.S. COLLEGE, OFFICE BUILDING, R.P.D. COLLEGE ROAD,
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E-mail : principal.gss@gmail.com Website : www.gssbgm.edu.in
skesocietys@gmail.com
Chairman : 2468790
PAN No. AAATS6876L

Date : 28 JAN 2019

Chairman's Message

Nanotechnology is a common word these days, but many of us don't realize the amazing impact it has on our daily lives. Nanotechnology is "science, engineering, and technology conducted at the nanoscale, which is about 1 to 100 nanometers". Scientists are discovering that atoms and molecules behave differently at the nanoscale. It is also a rapidly expanding field. Scientists and engineers are having great success making materials at the nanoscale to take advantage of enhanced properties such as higher strength, lighter weight, increased electrical conductivity, and chemical reactivity compared to their larger-scale equivalents. It is said that many of the problems that we face today may be in the field of energy, health sector, drinking water and air pollution etc., can be minimised if not solved by the proper use of nanotechnology.

This year 2019, South Konkan Education Society that was founded way back in 1944 is completing 75 years of its existence. As a part of the Platinum Jubilee celebrations of the society, I am very happy that the Department of Physics of G. S. Science College is organizing a national conference on a very prominent and relevant topic 'Nano Materials for Sustainable Development'. I believe that the conference brings out some of the most recent developments in the field of nanoscience and nanotechnology that would motivate the young researchers and students to look for better solutions for the sustainable development. At the same time, I hope the conference would also deliberate upon the possible harmful effects of nanoparticles on the environment.

I wish the National Conference a Great Success.

(R. D. Shanbhag)
Chairman, S. K. E. Society

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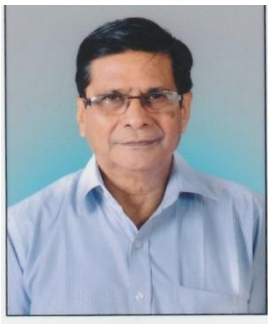

Message

The ugly duckling was not knowing he was swan and having magnificent talent. Similarly several materials which were much ahead of time i.e. super materials considering present time were existing. A Damascus sword is one among them. Normally hardness to maintain sharpness of sword is associated with brittleness causing failure in the service. The Damascus swords were exception. This property was achieved with help of carbon nano tubes of which manufacturers were in dark. But the manufacturer by practice were making this super alloy without knowing Damascus great steel is far ahead of time. Now this branch of new technology is growing at a great pace.

It is nice to know that as a part of the Platinum Jubilee of S. K. E. Society, the Department of Physics, G. S. Science College is organizing a National Conference on Nanomaterials for Sustainable Development. I am sure that the delegates attending the conference will be hugely benefitted by the latest developments in Nanoscience and technology.

I take this opportunity to wish the conference every success.

(S. A. Walawalkar)
Chairman,
GSS College Managing Committee

South Konkan Education Society's
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RE-ACCREDITED AT 'A' GRADE BY NAAC (3rd Cycle 3.16 CGPA)

Ref. No. _____ Date : 28 JAN 2019

Principal's Message

South Konkan Education Society is a premier educational organization that has been in the service of the Society for the last 75 years since 1944 with the sole vision of 'Empowering the Individual with Knowledge'. We are proud to be celebrating the year 2019 as the Platinum Jubilee Year of S. K. E. Society. During this year, Govindram Seksaria Science College has planned several programs as a part of the Platinum Jubilee Celebrations of the society. It gives me immense pleasure to note that the Department of Physics of has taken the responsibility of organizing a National Conference on the topic 'Nano Materials for Sustainable Development, NMSD 2019' that has been in the forefront of research and development in the last few years.

The present day development has been lopsided that has been leading to the problems like climate change, environmental degradation, global warming and so on. Nanotechnology is a field of research and innovation concerned with building 'things' - generally, materials and devices - on the scale of atoms and molecules. We are presently looking forward to nanoscience and technology to come to our rescue in the sustainable development that takes care of all our issues especially the environment. Therefore, I am extremely happy that the Department of Physics is conducting a 'Two day National Conference on Nano Materials' that would discuss and deliberate certain issues of global importance. I am sure all the delegates, faculty and participating students will be benefitted by the proceedings of the seminar.

I wish the conference all the very best.

(Dr. Nagaraja D. Hegde)
Principal

Message

I am very happy to acknowledge the National Conference on "Nano Materials for Sustainable Development" on 1st and 2nd February 2019. As a part of Platinum Jubilee Celebration Physics Department of G. S. Sc. College has organized this National Conference.

Nanotechnology has emerged as a versatile platform for addressing global sustainability challenges faced by the world. These challenges include, rising demands for basic commodities like food, water, energy, shelter, healthcare and finished goods like cell phones, cars, aeroplanes etc. It can provide efficient, cost – effective and environmentally acceptable solutions to the global sustainability challenges.

The Goal of the conference is to highlight recent advances in nanotechnology and to discuss opportunities of utilizing nanomaterials for water treatment, food decontamination, harnessing energy from renewable resources, targeted drug delivery, biocompatible devices, treating industrial effluents, etc.

The global sustainability challenges facing the world are complex and involve multiple inter disciplinary areas. The conference aims to bring together academicians, researchers, professionals, scientists and young minds from various disciplines, share their views, ideas and new trends to chalk out a road map for sustainable future. This conference will promote research culture amongst faculty and students in UG level and the overall growth and development of students and faculty members.

Mrs. S. V. Kulkarni
Convener and HOD of Physics

Message

Nanomaterials for sustainable development' a two day conference organised by Department of Physics, G.S.S College is a step towards searching for ideas for a sustainable future. The rising world population in the past few decades has been stretching existing resources of food, water shelter and energy. Supplying potable water, clean water for agriculture, food processing, energy generation, mineral extraction, chemical processing and industrial manufacturing are some challenges towards sustainable development. Increasing contamination and salinization of fresh waters, depletion of groundwater aquifers and loss of water stored as snowpacks and glaciers due to global warming are posing major challenges. Viable solutions to fulfilling food demands require a major transformation of agriculture by growing more food while minimizing the environmental impact of the food industries, global climate change and ensuring the safety and security of the food supply . This makes it imperative for searching for a sustainable model for global development which will meet today's needs, yet enable the future generations to meet their own demands without any apprehension of limited resources.

The science of the very small, i.e. nanotechnology could play a key role in tackling many of these issues to provide efficient, cost-effective, and environmentally sustainable solutions ranging from fresh water supply for human use, clean water for agricultural and industrial uses, food decontamination and energy generation. Technologies to utilise nanoabsorbents need to be developed to remove ions, organic solutes and toxins from water to provide an effective solution to water contamination issues. The potential of renewable natural sources like wind, sunlight and biomass need to be harnessed to provide cheaper, feasible and sustainable energy. Devices with high efficiency and low power consumption based on nanomaterials need to be devised.

The large number of papers we have received from different quarters addressing a plethora of sustainability issues shows that the purpose of the conference has been served and we are moving in the right direction.

I thank patrons and management members of SKE Society for encouraging and supporting us to organise this conference as a part of Platinum Jubilee celebrations.

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Dr.Smita S.Kalagi
Organising secretary

Programme Schedule

DAY 1	**01 February 2019**
9:00am	Registration
10:00am	Inauguration
10:45am	Keynote Address: **From mud crack templates to Optoelectronic devices – translating an Invention to a disruptive Technology** **Prof. Giridhar U. Kulkarni**, *Director, CeNS, Bengaluru*
12:00Noon	Tea Break
12:15pm	Invited Talk: **Next generation photovoltaic solar cells based on Nanomaterials** **Prof. P. S. Patil,** *Dean, School of Nanoscience & Technology, Shivaji University, Kolhapur*
1:30pm	Lunch Break
2:30pm	Paper Presentation
DAY 2	**02 February 2019**
9:30am	Paper Presentation
11:30am	Tea Break
11:45am	Invited Talk:**Optical fiber sensors coupled with green nanotechnology for food industry, chemical and biomedical applications** **Prof. U. S. Raikar**, *Dept. of Physics, Karnatak University, Dharwad*
1:00pm	Lunch Break
2:00pm	Invited Talk: **An Overview of Magnetic Nanomaterials** **Prof. B. G. Hegde,** *Dept. of Physics, Rani Channamma University, Belagavi*
3:30pm	Tea Break
3:45pm	Valedictory

Key Note Address

Dr. G. U. Kulkarni,
Director, Centre for Nano and Soft Matter Sciences (CeNS), Bangalore,
Professor (on lien) at Chemistry and Physics of Materials Unit, Jawaharlal Nehru Centre for Advance Scientific Research (JNCASR)
Email: guk@cens.res.in; kulkarni@jncasr.ac.in

From mud crack templates to Optoelectronic devices- Translating an Invention to a disruptive Technology

Abstract:

Visibly transparent yet electrically conducting materials are rare. Conventionally used tin doped indium oxide (ITO) glass plates are not only expensive but are also not suitable for flexible displays due to brittle nature of the coating itself. In recent years, many alternative transparent conductors are being developed, some important ones being doped ZnO and conducting polymer films, graphene, carbon nanotube networks, metal nanowire networks and lithographic patterns. Replacing the well established ITO foundry is not all that trivial [1-3]. In the recent past, we have developed a method which makes use of crack network in desiccated colloidal layer as template for growing metal nanowires [4]. From early efforts of optimizing the method [5,6] to fabricating and successfully demonstrating almost all optoelectronic devices without the aid of ITO, has been a journey filled with excitements and challenges. The recipe has been extended to many other devices, essentially realizing a world of transparent electronics; the most recent example is a transparent and flexible supercapacitor [7].

The presentation will begin with an introduction to the topic providing unique aspects of ITO and an overview of the efforts being made in the literature to replace ITO. The benchmarking parameters will be discussed in relation to various applications already available. This will be followed by a description of the results obtained from the laboratory including theoretical understanding of the process [8,9]. The presentation will also bring out our herculean efforts in translating this invention into a technology potentially attractive to industry.

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Invited Talk

Prof (Dr). Pramod S. Patil
Dean, Science & Technology, Founder Coordinator, School of Nanoscience and Technology,
Thin Film Materials Laboratory, Department of Physics,
Shivaji University, Kolhapur-416 004. (M.S.), India.
Email: psp_phy@unishivaji.ac.in

Next generation photovoltaic solar cells based on Nanomaterials

Abstract:

A solar cell is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect. It is made up of a junction of semiconducting materials that absorbs photon energy, converts it into the electron-hole pairs or excitons, and separates them to generate power at the output. Solar cells were first used prominently for an extra-terrestrial application, since they offered the best power-to-weight ratio. Currently, the best crystalline silicon solar cells have efficiencies between 20 % and 25 %. However, this is at the cost of increased complexity and manufacturing prices. Their higher price and price-to-performance ratio have limited their use and subsequently their market penetration.

The next generation solar cells are being developed to make their fabrication simple and low cost, without compromising photon conversion efficiency. Consequently, several nanomaterials based solar cells are being investigated.

In this talk, the device designs, photo-physics, operating principles, photovoltaic performance and overall assessments of the next generation solar cells like Dye sensitized solar cells, Quantum dot sensitized solar cells, Organic photovoltaics and Pervoskite based solar cells will be presented. The quest in the pursuit of higher efficiency and bottlenecks in their commercialisations will be discussed.

Invited Talk

Dr. Uday S. Raikar
Professor,
Department of Physics
Karnatak University, Dharwad - 580003
Email: usraykar_kud@yahoo.co.in

Optical fiber sensors coupled with green nanotechnology for food industry, chemical and biomedical applications

Abstract:

The 21st century is predicted to become the century of Photonics and Nanotechnology. Fiber optic sensors based upon grating technology are one of the most exciting developments in the field of optical fiber sensors in recent years. The research field in optical fiber grating technology has opened a new platform in both communication and sensor field. Compared with conventional sensors, optical fiber grating sensors have number of advantages such as non conductivity, fast response and immunity to electromagnetic interference and are now being widely used in the field of sensors such as to measure strain, pressure, temperature, concentration and as chemical sensors.

These days nanoscience-nanotechnology has become one of the exciting and important multi disciplinary field which has the capacity to create more new materials and devices with many applications. The technological developments in nanotechnology have been extensively ground breaking and urging the researchers to look for more sustainable and green nanotechnology to address the problems connected to adulteration in food stuff. The green nanotechnology has implications in agriculture, chemical, medical and engineering fields.

Metal nanoparticles are widely used in the field of chemical sensors using fiber optic grating technology to enhance the sensitivity of fiber grating sensors. Chemical sensors are used to detect and determine the concentration of impurities present in drinking water and adulterated food at ppm/ppb level. Designed sensors will be used for effective antibacterial, antifungal, anticancer therapy and food industry applications.

Invited Talk

Prof. B G Hegde
Professor and Chairman, Department of Physics
Dean, School of Basic Sciences
Rani Channamma University, Belagavi

An Overview of Magnetic Nanomaterials

Abstract:

Recently study on magnetic nano materials have gained momentum due to their scientific and technological importance in many areas, such as spintronics, magnetic data storage, magnetic fluids, catalysis, magnetic resonance imaging, biomedicine, hyperthermia, giant magnetoresistance (GMR) and colossal magnetoresistance (CMR) effects etc. The unique effects induced by the nano-scale distinguish the magnetism of the nano-materials from their bulk counterparts. In this talk, an attempt will be made to present the theory of magnetic nanomaterials such as superparamagnetism, spintronics, GMR and CMR effects and their potential applications. Also, the material synthesis and instrumentation design and development taking place in author's lab to measure magnetic properties of nano materials will be discussed.


ORAL
PRESENTATION

OP – 1

Synthesis and Spectroscopic Properties of Novel pyrene substituted 1, 3, 4-oxadiazole derivative

G. H. Pujar[a,*], Sushma G Katti[b], Narahari Deshapande[c], Sanjeev R. Inamdar[d,] and Imtiyaz Ahmed M. Khazi[c]

[a]Department of Engineering Physics, GM Institute of Technology, Davangere 577 006, Karnataka, India
[b]Department of Physics and Electronics, KLE Society's Raja Lakhamagouda Science Institute, Belagavi-590001, Karnataka, India
[c]Department of Chemistry, Karnatak University, Dharwad 580003, Karnataka, India
[d]Laser Spectroscopy Programme, Department of Physics and UGC-CPEPA, Karnatak University, Dharwad 580003, India.
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Abstract

A new class pyrene substituted 1, 3, 4- oxadiazole derivative (abbreviated as 3a) was synthesized through palladium catalysed Suzuki−Miyaura cross coupling reaction. The chemical structures of the probes ware characterised using analytical techniques viz., ^{1}H, ^{13}C NMR, FT-IR and GC-MS. The novel bipolar molecule consist of pyrene as an electron donor unit (D) and electron-deficient 1,3,4-oxadiazole as an acceptor unit (A) linked via extending π conjugation through a phenyl spacer with para linkages (D-π-A). The detailed photophysical/solvatochromic properties of newly synthesised derivative have been studied employing steady state spectroscopic techniques. The photophysical studies revealed that compound emit near blue fluorescence and efficient blue emission in solid phase with high quantum yields. Thermal and morphological stabilities of the derivative were studied employing DSC and TGA measurements. The results demonstrates that the novel pyrene containing oxadiazole derivative could be used as small organic molecule for multifunctional organic light-emitting devices (OLED)/optoelectronic devices.

OP – 2

Graft Poly vinyl alcohol and Acryl amide membranes for the Direct Methanol Fuel Cells

[a]M. B. Patil[†] and [b]P. I. Mandi
[a]P. G. Department of Chemistry,
[b] Department of Electronics,
Basaveshwar Science College, Bagalkot, INDIA
Email: mallupatil04@gmail.com

Abstract

The direct methanol fuel cell (DMFC) has been considered as the ideal fuel cell system since it produces electric power by the direct conversion of the methanol fuel at the fuel cell anode. This is more attractive than the conventional hydrogen fuelled cells, particularly for transportation applications, which rely on bulky and often unresponsive reformer systems to convert methanol, or other hydrocarbon fuels, to hydrogen. The present research work describes some key work developing and tackling the above limitations and suggests that the DMFC is approaching the stage where it may become a commercially viable alternative to hydrogen/air systems.

Pure and grafted polymeric membranes were prepared using poly vinyl alcohol and polyacrylamide. The prepared membranes were assed for degree of swelling and it shoes remarkable changes in particularly at higher composition of water. The Arrhenius apparent activation parameters have been estimated. The activation energy values for permeation and diffusion are studied extensively and fund almost equally. The negative heat of sorption values (ΔH_s) for water transportation suggests the Langmuir's mode of sorption.

OP – 3

High Concentrated III-V Multi junction Solar Cells

Alfaz M.Bagawan, Harsha C. Upadhye, A. S. Pujar
Faculty Physics Department. R.L.Science Institute, Belagavi. Karnataka, India
Email: alfiabin@gmail.com

Abstract:

Concerns about the changing environment and fossil fuel depletion have promoted much controversy and scrutiny. With looming energy crisis across the globe, achieving high efficiency and low cost solar cells have long been the key objective for photo voltaic researches. III – V Compound semiconductor based MJ solar cell have been dominant choice for space power due to their superior performance compared to any other existing solar cell techniques. This Article is III – V Compound multijunction (MJ) Tandem solar cells are an alternative to flat plate module to produce cost competitive electricity. HCPV have the potential for achieving high conversion efficiency of over 50%. The photovoltaic device is today well established in space applications and recently has entered the Terrestrial market.

OP – 4

Photovoltaics and Photocatalysis: Applications of Lanthanide doped Luminescent Materials

R P Kage and B L Doddannavar
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Abstract:

Photovoltaics and photocatalysis are two most promising approaches for harvesting clean and sustainable solar energy. Solar cell is the most promising pollution free renewable energy source in this modern society to easily replace the fossil fuels. Photo catalysts are very efficient for photo catalytic degradation of harmful and toxic organic substances, dyes, and chemicals and also for photo catalytic water splitting to produce H_2 and O_2 under UV. The efficiency of solar energy conversion is still low due to limited light absorption and rapid charge recombination in semiconductors. Thus several strategies have been proposed to improve the efficiency of solar energy conversion. This review is focused on the recent advances on semiconductor based photovoltaics and photocatalysis integrated with lanthanide doped luminescent materials.

OP – 5

Renewable energy in India: current status and future potentials

Kalpana. M. Painagoni
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Abstract

The present paper, efforts have been made to summarize the availability, current status, major achievements and future potentials of renewable energy options in India. This paper also assesses specific policy interventions for overcoming the barriers and enhancing deployment of renewable for the future. Renewable energy sources and technologies have potential to provide solutions to the long-standing energy problems being faced by the developing countries. The renewable energy sources like wind energy, solar energy, geothermal energy, ocean energy, biomass energy and fuel cell technology can be used to overcome energy shortage in India. To meet the energy requirement for such a fast growing economy, India will require an assured supply of 3 to 4 times more energy than the total energy consumed today. The renewable energy is one of the options to meet this requirement. Today, renewable account for about 33% of India's primary energy consumptions. India is increasingly adopting responsible renewable energy techniques and taking positive steps towards carbon emissions, cleaning the air and ensuring a more sustainable future. In India, from the last two and half decades there has been a vigorous pursuit of activities relating to research, development, demonstration, production and application of a variety of renewable energy technologies for use in different sectors.

OP - 6

Biosynthesis of zinc oxide nanoparticles characterization and its evaluation on tree seedling growth in nursery stag

Shri S V Salimath, Smt K B Hiremath
Raja Lakhamagouda Science Institute, Belagavi
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Abstract:

Green synthesis of zinc oxide nanoparticles was carried out using *Calotropis* leaf extract with zinc acetate salt in the presence of 2 M NaOH. The combination of 200 mM zinc acetate salt and 15 ml of leaf extract was ideal for the synthesis of less than 20 nm size of highly monodisperse crystalline nanoparticles. Synthesized nanoparticles were characterized through UV–Vis spectroscopy, dynamic light scattering (DLS), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), EDX (energy dispersive X-ray), and AFM (atomic force microscopy). Effects of biogenic zinc oxide (ZnO) nanoparticles on growth and development of tree seedlings in nursery stage were studied in open-air trenches. The UV–Vis absorption maxima showed peak near 350 nm, which is characteristic of ZnO nanoparticles. DLS data showed that single peak is at 11 nm (100%) and Polydispersity Index is 0.245. XRD analysis showed that these are highly crystalline ZnO nanoparticles having an average size of 10 nm. FTIR spectra were recorded to identify the biomolecules involved in the synthesis process, which showed absorption bands at 4307, 3390, 2825, 871, 439, and 420 cm^{-1}. SEM images showed that the particles were spherical in nature. The presence of zinc and oxygen was confirmed by EDX and the atomic % of zinc and oxygen were 33.31 and 68.69, respectively. 2D and 3D images of ZnO nanoparticles were obtained by AFM studies, which indicated that these are monodisperse having size ranges between 1.5 and 8.5 nm. Significant enhancement of growth was observed in Neem (*Azadirachta indica*), Karanj (*Pongamia pinnata*), and Milkwood-pine (*Alstonia scholaris*) seedlings in foliar spraying ZnO nanoparticles to nursery stage of tree seedlings. Out of the three treated saplings, *Alstonia scholaris* showed maximum height development.

OP – 7

Application of nanotechnology in medicine

Nagaraj C Gudasi
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Abstract:
Today, nanotechnology is one of the most innovative, cutting-edge areas of scientific study and it continues to advance at staggering rates. To say that nanotechnology is tiny would be an understatement - a single nanometer is one-billionth of a meter. A sheet of paper is around 100,000 nanometers thick. A single-walled carbon nanotube with a diameter of 1 nanometer is 100,000 times smaller than a strand of hair. In comparison, a strand of hair is 100,000 times smaller than a house 10 meters wide.It can be difficult to visualize just how small this is, but the benefits that come with applying nanotechnology to medicine are much easier to see.

Nanosensors - a new form of technology that will be able to monitor the build-up of bacteria on implants and warn clinicians when treatment is required before the problem escalates. Nanosensors are made from carbon nanotubes, each 100,000 times smaller than a strand of hair.It describes the progression of this field of research from its birth up to the present, with emphasis on the techniques of sensor construction and their application to biomedical systems. Nanomedicine is an emerging and rapidly evolving field and includes the use of nanoparticles for diagnosis and therapy of a variety of diseases, as well as in regenerative medicine. In this mini-review, leaders in the field from around the globe provide a personal perspective on the development of nanomedicine. The focus lies on the translation from research to development and the innovation supply chain, as well as the current status of nanomedicine in industry. The role of academic professional societies and the importance of government funding are discussed. Nanomedicine to combat infectious diseases of poverty is highlighted along with other pertinent examples of recent breakthroughs in nanomedicine. Taken together, this review provides a unique and global perspective on the emerging field of nanomedicine. Applications of various noon systems in cancer therapy such as carbon nano tube, dendrimers, nano crystal, nano wire, nano shells etc.

OP – 8

Novel pH-sensitive blend microspheres of succinylated gelatin and poly(vinyl alcohol) for controlled release of theophylline

Keerti V. Phadke, Lata S. Manjeshwar*, Tejraj M. Aminabhavi† and [a]Sathisha M. P
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Abstract

Novel pH-sensitive blend microspheres were prepared from succinylated gelatin (SGE) and poly(vinyl alcohol) (PVA) via water-in-oil emulsion cross-linking method using glutaraldehyde (GA). The microspheres were loaded with theophylline (THP), an antiasthmatic drug, in varying ratios of SGE and PVA, % drug-loading and concentration of GA that showed a maximum THP encapsulation of 94 %. The formulations were characterized by Fourier transform infrared (FTIR) spectroscopy to assess the formation of semi-IPN structures and to confirm the absence of drug-polymer interactions. Particle size analysis measured by mastersizer suggested an average particle size of 13-52 μm. Scanning electron microscopy (SEM) showed smooth morphology, while differential scanning calorimetry (DSC) and X-ray diffraction (XRD) techniques were used to understand the amorphous nature of THP after encapsulation. Equilibrium swelling and *in vitro* drug release experiments in pH 1.2 and pH 7.4 buffer media, indicated the dependence of pH.

OP - 9

Synthesis of SnO_2 Nanoplates for Degradation of Orange – G dye

P. S. Patil
Dept. of Physics, Govindram Seksaria Science College, Belagavi
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Abstract:

The Tin oxide (SnO_2) nanoparticles were synthesized using simple chemical reduction method. Acetonitrile is used as the solvent for the preparation of nanoparticles where as sodium borohydride acts as reducing agent to produce Tin oxide nanoparticles. Synthesized nanoparticles were subjected to optical and morphological studies using UV – Visible spectrometer and Transmission electron microscopy techniques. The absorption peak at 290nm with a satellite peak at 320nm indicates the formation of tin oxide nanoparticles. The TEM images show the poly dispersed nanoparticles with size ranging from the 20 – 150nm nanoparticles. The catalytic activity of the synthesized nanoparticles was explored by studying the catalytic degradation of Orange - G dye. The catalytic process follows first order Langmuir – Hinshelwood kinetics. The apparent rate constant 'k' of $0.005s^{-1}$ has been observed. The synthesized nanoparticles clearly demonstrate the catalytic behaviour. Synthesized nanoparticles may be used in industrial waste water treatment plants.

STUDENT TALKS

OP – 10

Organic-inorganic hybrid nanocomposite gas sensors

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INTRODUCTION:

In recent years demand for Gas Sensors for safety control equipments and Environmental monitoring has expanded enormously. For example Ammonia (NH_3) , Methane(CH_4), Alcohol gas sensors are extensively used, as these gases can be extremely harmful to Humans and other living species. The use of Conducting polymers as sensing elements in these sensors is gaining popularity mainly due to their high sensitivity in change of electrical properties when exposed to different types of gases. The ease in the synthesis and sensitivity of conducting polymers at room temperature add to the sensors advantages.

CONDUCTING POLYMERS:

Conducting polymers, moreover intrinsically conducting polymers are the types of polymers which have a unique property of Electric Conductivity. They have metallic conductivity or can be semiconductors. This conductivity is due to the presence of alternating single and double bonds in the backbone (Conjugated double bonds). Which are formed due to controlled polymerisation. The greatest advantage of Conducting polymers is that they are not Thermoplastics hence are not thermoformable. They behave like thermally insulating polymers and are purely organic materials. But the flow of electric charges takes place only when electrons are either removed (Oxidation) or added (Reduction). This process is known as doping. The process of doping is different for inorganic semiconductors and organic conducting polymers. In inorganic semiconductors either electron rich or electron deficient sites are formed without charge transfer occurring between these two sites. On the other hand in organic polymers doping reaction is a charge transfer reaction in which partial oxidation and reduction of polymer occurs, rather than creation of holes. Some of the widely used conducting polymers are Polyanniline, Polypropyle etc. One of the most effective Conductive Polymers is,

PANI: Polyanilline (PANI) is one of the most studied conductive polymers. Especially Emeraldine Base is the most useful form of PANI due to its high stability at room temperature and on doping with acid Emaraldine salt is formed which is highly electrically Conductive.

Organic-inorganic nanocomposites:

Nanocomposites: The materials that incorporate nano-sized particles into the matrix of standard materials which results in drastic improvement in the properties of the materials. Addition of nano-composite Metal Oxides to Conductive polymers results in the production of free electrons in the polymers, which further results in the High electrical conductivity of the Conductive Polymers.

For example:

- Polyannaline (PANI) shows a great increase in the conductivity when oxidised with CuO nano particles.
- Similarly nanocrystalline TiO_2 is one of the extensively use3d material for detection of Ammonia (NH_3) gas. As it shows sensitivity in its electrical conductivity even at room temperature.

The need for organic inorganic nanocomposite gas sensors.

Commercial Solid state gas sensors based on inorganic metal oxides have been marketed for more than fifty years.

- These sensors show low performance with respect to sensitivity and selectivity.
- They also require an elevated temperature ranging from 100-350°C.

On the other hand,

- Gas sensors based on Organic Inorganic nanocomposites like PANI, polypyrrole, metapthalocynides have a high sensitivity even at room temperature.
- These sensors also have a unique ability of regaining their properties after repeated use which can be advantageous.

The nanocomposites have a high potential of increasing this sensitivity and selectivity in Conducting Polymers. And the addition of nanocomposites to Conductive polymers increases the long term stability of the sensors. Therefore the combination of nano sized metal oxides and conducting polymers could be an approach to the most effective gas sensors.

Gas sensors based on organic inorganic nanocomposites.

GAS SENSORS: These are the devices which detect the presence of gasses in the surrounding and send the information to other electronic devices. The Organic Inorganic nanocomposite based gas sensors work on the property of chemiresistors.

CHEMIRESISTORS: The materials which change their electrical resistance with response to the change in the chemical environment are known as chemiresistors. The Organic Inorganic nanocomposites show this property.

The gas sensor unit contains-

Sensing materials- This consists of the Organic Inorganic nanocomposites which show sensitivity to the gas. And change in the resistance is observed.

Amplifier- The signals obtained from the sensor are amplified with the help of these instruments.

ADC (Analogue to digital converter) - This device converts the analogue signals obtained by the Amplifier in to a digital signal.

Output system: The output system relays the obtained information through a number of devices like a digital monitor, Buzzer, An Alarm etc.

Applications: There is a huge range of Applications of the organic Inorganic nanocomposite gas sensors in many fields.

In Industrial processes, Laboratory, Food technology. Clinical diagnosis, Farms. Environment pollution monitoring. Alcohol detection.

Conclusion:

There is a great need for gas sensors, especially Ammonia (NH_3) gas sensors as Ammonia gas can be extremely harmful for Humans.

The use of Organic conductive polymers doped with nanocomposite metal oxides increases the effectiveness of the sensors tenfold. And is a perfect solution to the corrosive metal sensors which do not provide longevity.

These gas sensors are also economically efficient when compared to other materials used and as these are organic materials so environmentally safe too.

Thus the Organic Inorganic nanocomposite gas sensors can effectively replace the existing sensors with minimal disadvantages.

The most recent development – Detection of Ammonia in patients breath in diagnosis of Chronic Kidney disease.

OP - 11

Nanotechnology and Water Management

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Abstract:

The water crisis looms large as we step into the third decade of the 21st Century. Six hundred million people across the world today face the problem of water scarcity. With the current rate of population growth, it is estimated that about 2.7 billion to 3.2 billion people face the possibility of living in water scarce conditions by 2025. In challenging times that call for efficient management of available fresh water resources and the mining of fresh water on the planet through desalination, "Nanotechnology" has emerged as a promising solution. Harnessing the unique behaviour of materials at "nano" particle sizes has enabled us create several materials like nano-sorbents, nano filtration media and nano membranes which have found widespread application both creation and reclamation of potable water. The impact areas for nano-technology in water treatment are mainly classified into three main categories namely:

• Sensing and detection • Treatment and remediation and • Pollution prevention

The increasing trends of researches which have been discussed so far have made it clear that nanotechnology holds an immense potential to be developed into a very potent water treatment tool of the 21st century. However, most of techniques involving nanotechnology have to date been investigated almost exclusively at the laboratory scale and the feasibility and efficacy studies pertaining to scaling up to real time applications is an issue that would shed light upon the actual utility and economic viability of this technological marvel. While this paper sheds light upon the types of nano materials, their importance and the advantages of nano-particles in the field of water management it also provides valuable insights into the limitations and consequent viability. The environmental fate of nano material along with toxicity and other relevant issues are also given due consideration.

OP – 12

Nanocomposites

Poonam Kelaginmani
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Introduction:

A Composite is a combination of two or more different materials that are mixed in order to blend the best properties of both.

NANOCOMPOSITE: A Nanocomposite is a material in which one of the components ha s at least one dimension that is around 10^{-9}m. Inserting nanomaterials in polymers is a new strategy to improve the physical properties of polymers including mechanical strength, thermal stability, barrier properties to gaseous and bio degradation. The most frequently used strategies to enhance barrier properties are the use of polymer blends, coating articles with a huge barrier materials and the use of multilayer films containing a high barrier films. An effective high barrier material is aluminium coil. Polymers can also be added with the suitable fillers to form composites of enhanced barrier properties.

General characteristics:

Nano-composites consist of one or more discontinuous phases which are distributed in one continuous phase called 'matrix' whereas discontinuous phase is called 'reinforcement' or reinforcing material.

Classification of nanocomposites:

Polymer based (PNC)- Consists of a polymer or co polymer having nanoparticles or nanofillers dispersed in the polymer matrix.

- Polymer-Ceramic: Eg: Barium trinitrate with polymers.
- Inorganic-organic polymers (Nanocrystal-clusters): Eg: Polymer nanofibers.

Non polymer based- Consists of a nonpolymer based material having nanoparticles.

- Metal-Metal: metal in the form of alloy. Eg: Pt-Ru.
- Metal-Ceramic: In the form of nanotube. Eg:Polysilazane-Polysiloxane.
- Ceramic-Ceramic: Alloy or Ceramic Eg: Zirconia(Toughened Allumina).

Application: Marine Industry, Fuel Tanks. Electro catalyst in batteries for energy saving, Environmental protection, Flame ability reaction, Food packing.

Application of nanocomposites in marine industry:

Carbon fibre nano-composite vessels and components are widely used in marine industry. Carbon nano-materials technology allows us to teach the cutting edge of weight and durability requirements.

Carbon nano-tubes (CNTS): There are single layer of graphite that are rolled to form a cylindrical tube

Advantages:

These materials have extremely high strength and are the stiffest materials discovered to date in terms of tensile strength. They are many times higher in strength than steel but at much lighter weight making them useful materials. Carbon nano- tubes have shown great promise as an economical alternative to making transparent conductive oxide layers (TCO) commonly used with organic and biosynthesized cells as well as several other electronic applications. Carbon-fibres: Materials consisting of fibres about 5-10 micro metres diameter and composed mostly of carbon atoms.

Advantages:

1. Very light fibres resulting in lightweight structures.
2. Can resist very high temperatures.
3. Thermal expansion is basically zero.
4. Do not suffer any fatigue issue.

Applications:

L.R.V-17: It is built from Arovex (A carbon-fibre nano-composite system) which is a Carbon fibre reinforced plastic enhanced with carbon nanotube also known as (CFRPCNT)

Boats designers and manufacturers benefit from carbon-fibre technology such as Arovex because it provides a stiff, tough durable composite material that is lighter in weight.

Conclusion:

Nano-composites ware upcoming materials which show great changes in all the industrial fields and it is also going to be a economical barrier for developing countries as a tool of nanotechnology.

OP – 13

Smart Materials

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Abstract:

Smart materials are common name for a wide group of different substance. The general feature of all of them is the fact that one or more properties might be significantly altered under controlled condition. The present age is considered to be smart materials era. Earlier, which responds to its environments in a timely manner However, the definition of smart materials has been expanded to the` materials that receive, transmit, or process a stimulus and respond by producing a useful effect that may include a signal that the materials are acting upon it. This study focuses on the introduction of smart materials and their classifications. Different application of smart material in various fields is also being discussed starting from engineering to the present environment.

OP – 14

Optical Sensors

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Abstract:

An optical sensor is a device that converts light waves into electric signals .Similar to a photo resistor; it measures the physical quantity of light. This change is most often based around alterations to the intensity of the light. Other features of optical sensors include the distinctions of whether it is placed internally or externally in a device. Research and development in optical sensor field motivated by the expectation that optical sensors have significant advantages compared to conventional sensor types, in terms of their properties. According to optical sensing technology, all the physical measurements of interest and large number of chemical applications such as for quality and process control, medico technologies, metrology, imaging and remote sensing. Since a large percentage of today's optical sensors involve optical fibres in the some forms.

OP – 15

Synthesis of Nano Crystalline Li-Ni-Cu Ferrites by Chemical Method

Aishwarya A Khot
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Abstract:

Nano sized Li-Ni-Cu ferrites with general chemical formula $\mathbf{Li_{0.5}\ Ni_{0.75-x/2}Cu_{x/2}\ Fe_2O_4}$ Where x = 0, 0.1, 0.3, 0.5, 0.7& 0.9.have been synthesized by chemical route. The role of sucrose and PVA is also explained. X-ray diffraction pattern confirms the formation of single phase simple cubic structure of all the samples. The grain diameter calculated with the help of XRD patterns are of the order of nanometers. This confirms the formation of nano particles.

OP – 16

Ferroelectric Materials

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Abstract:

Ferro electricity is the phenomenon where spontaneous electric polarization of the materials takes place. The reverse electric polarisation of the materials takes place. The reverse electric polarization is possible by applying an electric field. Ferro electricity is used in various field's of electronics the materials exhibiting the phenomenon of Ferro electricity are called ferroelectric materials Examples for ferroelectric materials are BaTio3, PbTio3, lead zirconate titanate. Ferro electricity used in various field like ferroelectric capacitors, ferroelectric ceramics, here waveguide is a device which control the propagation of light within the device. It carries the electromagnetic wave here ferroelectric materials are used. Latest optical memory display's technologies are device using the ferroelectric materials and these are used in pressure sensors which are also termed as displacement transducers. Physics of ferroelectric ceramics used in electronic device present world production of such device is more than 1010 per year.

OP – 17

Applications of Nanotechnology

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Abstract:

The 2000s have seen the beginnings of the **applications of nanotechnology** in commercial products, although most applications are limited to the bulk use of passive nanomaterials . Examples include titanium dioxide and zincoxide nanoparticles in sunscreen, cosmetics and some food products; silver nanoparticles in food packaging, clothing, disinfectants and household appliances such as Silver nano; carbon nanotubes for stain-resistant textiles; and cerium oxide as a fuel catalyst. As of March 10, 2011, the Project on emerging Nanotechnologies estimated that over 1300 manufacturer-identified nanotech products are publicly available, with new ones hitting the market at a pace of 3–4 per week.

Nanotechnology is being used in developing countries to help treat disease and prevent health issues. The umbrella term for this kind of nanotechnology is Nanomedicine

Nanotechnology is also being applied to or developed for application to a variety of industrial and purification processes. Purification and environmental cleanup applications include the desalination of water, water filtration , wastewater treatment groundwater treatment, and other nanoremediation. In industry, applications may include construction materials,military goods and nano-machining of nano-wires, nano-rods, few layers of graphene, etc. Also, recently a new field arisen from the root of Nanotechnology is called Nanobiotechnology. Nanobiotechnology is the biology-based, application-oriented frontier area of research in the hybrid discipline of Nanoscience and biotechnology with an equivalent contribution.

OP – 18

Nanostructured Materials

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Abstract:

The immense use of Nanoparticles due to its small size and change in size affects the properties enormously. These can be synthesized by different physical, chemical and biological methods. But biological approach is more convenient, ecofriendly, low cost, less time consuming. A microwave irradiation synthesis of silver nanoparticles were carried out biological approach using extracts of Neem leaves (Azadirachta Indica) and bitter gourd (Momordica Charantia**)** fruit .We synthesized silver nanoparticles by mixing two different extracts along with silver nitrate solution and comparative study has been done. Structural characterization of synthesized sliver nanoparticles was performed by uv-vis and FTIR spectroscopy. The synthesized silver nanoparticles exhibit energy absorption band at 300nm-420nmfor different samples. The FTIR spectra of synthesized silver nanoparticles showed strong bands at 3400, 1500, 1350,500 cm^{-1} to identify the compounds for the reduction of silver ions to silver atoms, the functional groups present in plant fruit extract were investigated by FTIR.

OP – 19

Cheap Nanotech Filter Device

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Abstract:

About 780 million people–a tenth of the world's population do not have access to clean drinking water. Water laced with contaminants such as bacteria, viruses, lead and arsenic claims millions of lives each year. But an inexpensive device that efficiently clears such contaminants from water may help to solve this problem.

The water purifier developed for Rs.1000 nano particle water filtration system that promises potable water even for the poorest communities in India.

Although cheap filtration systems have been developed previously, this is the first to combine microbe killing capacity with the ability to remove chemical contaminants such as lead and arsenic. In this microbes filter relies on silver nano particles embedded in a cage mode of Aluminium and chitosan, a carbohydrate drived from the chitin in crustacean shells. The cage blocks macro scale water contaminants as well as protects nano particles from sediments that would otherwise accumulate on their surfaces, thereby preventing from microbe-zapping.

"This is a room-temperature green synthesis, which means it can be developed in any part of the world"

OP – 20

Nanomaterials for Sustainable Development

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Abstract:

Over the past few decades, the fields of science and engineering have been seeking to develop new and improved types of energy technologies that have the capability of improving life all over the world. In order to make the next leap forward from the current generation of technology, scientists and engineers have been developing **energy applications of nanotechnology**. Nanotechnology, a new field in science, is a technology that contains components smaller than 100 nanometers. Nonmaterial's are composed of structurally definable particles in the size range of 1-100 nanometres (1nm = 10-9m) in at least one dimension.

Use of Nonmaterial's in Environment: Nonmaterial's have always been present in our environment, though the ability to control material properties at the nanoscale and to incorporate these nanomaterials in consumer products at large scale is relatively new. Consequently, nanomaterials are likely to be released to the environment during manufacturing, transport or at the end of the life of the nano-enabled products, resulting in increased exposure of nanomaterials in the environment, where they are likely to cause concerns to environmental and human health.

Use of Nanomaterials in Energy Storage: Description of the Application a sustainable energy supply requires a stepped-up change to renewable sources of energy. By 2050, assuming the demand on the security of supply remains the same; at least 60 percent of the gross final consumption of energy in Germany is to be covered by renewable energy sources. A major challenge is the natural fluctuation in power output, particularly with wind and solar power. In order to guarantee a consistent supply of electrical energy, there are a number of flexibility options available to help balance out the difference between energy supply and demand.

In addition to grid expansion, load management and the use of highly flexible conventional power plants, this includes the utilization of suitable storage methods.

Conclusion: Applications of nonmaterials is necessary for sustainable development i.e. by its applications in Energy and Environment and also in medical, military, agriculture etc…And thus National challenges can be accepted by the e positive impacts of Nanotechnology.


POSTER
PRESENTATION

PP – 1

Influence of cadmium substitution in $Co_{0.5}Zn_{0.5}Fe_2O_4$ on structral and mechanical properties

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Abstract:

The work had the objective of synthesis of cadmium doped cobalt zinc ferrite ($Co_{0.5}Zn_{0.5}Fe_2O_4$) series with x=0.0, 0.2, 0.4, 0.6, 0.8, 1.0 by solid state method and analysis of structural properties using XRD, FTIR, and SEM characterization. To understand the decomposition behavior of the precursors of samples TG/DTA analysis carried out. TG/DTA/DSC shows that reaction is endothermic in nature and the reaction completion temperature at around 730°C. The XRD characterization of the samples confirms the cubic spinel structure. In XRD analysis, the shrinkage of unit cell is observed at higher doping concentration. The peak (311) shown the maximum intensity for x=0.0, whereas peak (310) shown maximum intensity for x=1.0. WH and SSP plot results show the variation in the grain size with change in doping concentration. Grains in the samples are having nature of octahedron, tetrahedron and granular depicted by SEM images. The doping of cadmium plays an important role in crystal growth as observed in SEM images. The FTIR spectra of synthesized ferrites showed two strong absorption bands (ν_1 and ν_2) in the range 400–600 cm^{-1} belonging to tetrahedral (A) and octahedral (B) interstitial sites. In FTIR analysis, peaks shift towards lower wave number with increase in doping concentration

PP - 2

Synthesis and Study copper doped nano $NiMn_2O_4$ NTC ceramics by coprecipitation method

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Abstract:

Here we report the synthesis and structural study of Copper substituted Nickel Manganite ($Ni_{0.55}Cu_{0.45}Mn_2O_4$) NTC ceramic, prepared by co-precipitation method. The XRD pattern confirms the cubic spinel structure with lattice parameter a=8.4674Å. In continuation we report crystallite size (*D*), micro strain (ε), dislocation density (ρ_D), and hopping lengths (*L*A and *L*B), preferential orientation by texture coefficients [*T*c (*h k l*)]. Also surface morphology was studied by SEM measurements and absorption bands observed in FTIR spectra at 597.58 cm^{-1} (ϑ_1) and 407.54 cm^{-1} (ϑ_2) corresponds to vibrations of tetrahedral and octahedral complexes respectively.

PP – 3

Polymer Electrolyte Membranes in Fuel Cells: A new dimension in Energy Technology

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Abstract:

Polymer electrolyte membrane (PEM) fuel cells, which efficiently changes the chemical energy in hydrogen gas directly and efficiently to electrical energy and water as the byproduct. These membranes have the potential to reduce the energy consumption, harmful emissions and reduce drastically dependence on fossil fuels. Factors such as durability and cost still remain as the major barriers to fuel cell commercialization. Breakthroughs are urgently needed to overcome these barriers. In this regard, fundamental studies play an important and indeed critical role. The major problems such as water and heat management and still efficient material development remain the focus of fuel-cell performance improvement and majorly cost effectiveness in commercialization of fuel cell. The objective of this research is: (1) to present the latest status of PEM fuel cell technology development and its applications in the (a) transportation, (b) stationary, and (c) portable/micro power generation sectors. Moreover the needs for fundamental research for the near future and prior to fuel cell commercialization.

Nafion is a sulfonated tetrafluoroethylene based fluoropolymer-copolymer. It is the best of its class of synthetic polymers with ionic properties and is generally reffered as ionomers. These sulfonated membranes exhibits unique ionic properties are a result of incorporating perfluorovinyl ether groups terminated with sulfonate groups onto a tetrafluoroethylene (Teflon) as backbone. Sulfonated tetrafluoroethylene has received a considerable amount of attention as a proton conductor for proton exchange membrane (PEM) fuel cells because of its excellent thermal and mechanical stability.

PP – 4

Optical Sensors

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Abstract:
Optical sensors are a broad class of device for detecting light intensity. This can be just a simple component for notifying when ambient light levels rise above or fall below a prescribed level, or a highly sensitive device for detecting single photons. Most optical sensors produce an electrical output.

•Examples for optical sensors- lamps, position sensors, photographic flash, photoelectric sensors, etc.,

Function An optical sensor converts light rays into electronic signals. It measures the physical quantity of light and then translates it into a form that is readable by an instrument. An optical sensor is generally part of a larger system that integrates a source of light, a measuring device and the optical sensor. This is often connected to an electrical trigger. The trigger reacts to a change in the signal within the light sensor. An optical sensor can measure the changes from one or several light beams. When a change occurs, the light sensor operates as a photoelectric trigger and therefore either increases or decreases the electrical output. An optical switch enables signals in optical fibres or integrated optical circuits to be switched selectively from one circuit to another. An optical switch can operate by mechanical means or by electro-optic effects[1], magneto-optic effects as well as by other methods. Optical switches are optoelectronic devices which can be integrated with integrated or discrete microelectronic circuits.

•Photoelectric sensors:

A photoelectric sensor, or photo eye, is an equipment used to discover the distance, absence, or presence of an object by using a light transmitter, often infrared, and a photoelectric receiver. They are largely used in industrial manufacturing. There are three different useful types: opposed (through beam), retro-reflective, and proximity-sensing (diffused).

A through beam arrangement consists of a receiver located within the line-of-sight of the transmitter. In this mode, an object is detected when the light beam is blocked from getting to the receiver from the transmitter.

A retroreflective arrangement places the transmitter and receiver at the same location and uses a reflector to bounce the inverted light beam back from the transmitter to the receiver. An object is sensed when the beam is interrupted and fails to reach the receiver.A proximity-sensing (diffused) arrangement is one in which the transmitted radiation must reflect off the object in order to reach the receiver. In this mode, an object is detected when the receiver sees the transmitted source rather than when it fails to see it. As in retro-reflective sensors, diffuse sensor emitters and receivers are located in the same housing. But the target acts as the reflector, so that detection of light is reflected off the disturbance object. The emitter sends out a beam of light (most often a pulsed infrared, visible red, or laser) that diffuses in all directions, filling a detection area. The target then enters the area and deflects part of the beam back to the receiver. Detection occurs and output is turned on or off when sufficient light falls on the receiver.Some photo eyes have two different operational types, light operate and dark operate. Light operate photo eyes become operational when the receiver "receives" the transmitter signal. Dark operate photo eyes become operational when the receiver "does not receive" the transmitter signal.

Sensing modes:

The detecting range of a photoelectric sensor is its "field of view", or the maximum distance from which the sensor can retrieve information, minus the minimum distance. A minimum detectable object is the smallest object the sensor can detect. More accurate sensors can often have minimum detectable objects of minuscule size.

•Applications:

The purpose of an optical sensor is to measure a physical quantity of light and, depending on the type of sensor, then translates it into a form that is readable by an integrated measuring device. Optical Sensors are used for contact-less detection, counting or positioning of parts.

PP – 5

Optical sensors and their applications

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Abstract:

Optical Sensors are used in numerous research, and commercial applications today. These sensors are used for quality and process control, medico technologies, metrology, imaging, and remote sensing tomention a few examples. Today there are many types of optical sensors; many based on the use of lasers, imaging systems,and/or fibers. In this article , development of devices to implement the various sensor types and their configuration into sensing elements are presented. Some of the enabling technologies discussed include advances in short pulsed high power lasers, imaging methods, microand nano structured optical sensing systems, and THz sensing. This article addresses various sensor types, and include all aspects of optical sensors from the components employed, their configuration through detection schemes and algorithms, and application of sensors.

PP – 6

Nanotechnology and its applications

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Abstract:

Nanotechnogy is the techniques that involve the manipulation of a matter at the smallest scale 1/10000 th width of a human hair.Nanotechnolgy is an extremely powerful emerging technology now days and it has many applications in future. One application is in **electronics**-the critical length scale of IC is already at the nanoscale (below 50 nm) regarding the length of transistors is packs into a single chip. In memory storage M-RAM is nanometer scale can quickly and effectively save the data during a system shutdown. In **communication technology-** like displays, televisions and radios in those carbon nana tubes/silicon nana wires used in field emitters and quatumdots(nanoscale objects used in construction of lasers) to produce more vibrant colors which being more energy efficient. Solar cells and super capacitors are examples of areas where nanotechnology plays an major role in **energy generation** and storage. Nano materials also help in a personal care **consumer products-**nanoscale titanium dioxide and zinc oxide have used in sunscreen to provide protection from sun radiations affect on skin and silver nanoparticles in fabric that kill bacteria making clothing odor-resistant. In **medical field -** it has a great application nano medicine currently being developed involves employing nanoparticles to deliver drugs, heat, light or other substances to specific types of cells, such as cancer cells, Particles are engineered so that they are attracted to diseased cells. This technique reduces damage the healthy cells in the body and allows for earlier detection of disease (chemotherapy). In summary all these nanostrutral materials in number of aspects and several applications. This technology having a attractive future in daily life and this special issue will inspire the ideas to syntheses new nanostructure materials and the applications.

PP – 7

Nanotechnology in smart materials

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Abstract:

The paper is about the nanotechnology in field of Smart materials. Smart materials are the materials that can significantly alter one or more of their inherent properties owing to the application of external stimuli in control fashion and the several external stimuli. And the smart materials are sensitive are –temperature, moisture, electric and magnetic field.

Nanotechnology is a rapidly developing entering a world of smart materials and taking them to the next level. They incorpated nanosensors, nanocomputers and nano machines into their structure which a my enable them to response direct their environment

Smart materials have various properties such as sensing materials and devices, activation material, control diviser,self detection, self correctness etc.In the paper components of smart materials are explained such as data transmission , command control unit ,data instruction and active devices. Also small materials are classified into piezoelectric material, thermo responsive materials, Fullerenes etc.The smart materials have mainy applications in various fields such as Aircraft, robotics, dental branching, smart fabric etc. These materials may be able to shape shift comfortable , flexible clothing for motorcyclists could go rock hard if it detects an impact or similar material worn by police office could detect and approaching projectile and turn itself bullet proof.

Today the most promising technology for life time efficiency and improved realibity include the use of smart materials and structures.

PP – 8

Nano Materials for Sustainable Development

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Abstract:

Over the past century, we have learned how to create specialized materials that meet our specific needs for strength, durability, weight, flexibility, and cost. Smart materials can come in a variety of sizes, shapes, compounds, and functions. They can also alter their physical form, monitor their environment, and even diagnose their own internal conditions.

Smart materials are the materials that can significantly alter one or more of their inherent properties owing to the application of external stimuli in a controlled fashion. The several external stimuli to which the smart materials are sensitive are: stress; temperature; moisture; ph; electric fields; magnetic fields. They can also do all of this while intelligently interacting with the objects and people around them. Different applications of smart materials in various fields are also being discussed starting from engineering to the present environment. The use of smart materials mainly shape memory alloy is useful because it bents at low temperature and on heating regains its initial shape.

This paper consists of types of smart materials and there advantages and disadvantages. This paper also consists of applications of various smart materials.

PP – 9

Nanomaterials in Medicine

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Abstract:

Advancement in the field of nanotechnology and its application to the field of medicines and pharmaceuticals has revolutionized the twentieth century. Nanotechnology is the study of extremely small structures. The prefix 'nano' is a Greek word which means 'dwarf'. The word "nano" means very small. Nanotechnology is currently one of the fastest growing scientific fields. Nano medicine is the application of nanotechnology to the field of medicine by the use of a material at the nanometer scale. The most common application of nano medicine involves employing nano particles to enhance the action of drugs in treatment. There has been a considerable research interest in the area of drug delivery systems using nanoparticles. Nanostructured biomaterials have unique physiochemical properties such as ultra-small and controllable size, large surface area to volume ratio, high reactivity and functionalizable structure. It alter and improve the pharmacokinetic and pharmodynamic properties of various types of drug molecules that are capable of targeted delivery of both imaging agents and anticancer drugs and early detection of cancer lesions, determination of molecular signatures of the tumor by noninvasive imaging and most importantly molecular targeted cancer therapy. Along with this I have mentioned the other applications of nanomaterials in medicine such as use of Bismuth nanoparticles, nanospongers, nanotubes, nanogenerator technologies, nanoparticles for early detection and diagnosis of infectious diseases, early detection of kidney damage, cardiovascular imaging, chemotherapy and tumor detection.

PP – 10

Cellulose Nanocrystals: Preparation and application

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Abstract:

Cellulose constitutes the most abundant renewable resource available today. Nano crystals of cellulose have many applications that make the material desirable in material science and biology. In our study nano crystals of cellulose can be prepared by acid-hydrolysis of cotton linters. Hydrolysis was performed completely and solid aggregation done by centrifugation at 4900 rpm speed. The obtained cellulose nano crystals particle size can be analyzed by Zetasizer laser light scattering equipment and particle size found to be 74.31 nm as well as scanning electron microscopy (SEM) images showed the nanocrystalline size of obtained cellulose crystals. General applications of these nano crystals were reviewed. Here we have reviewed application of these nano crystals especially in the polymeric dense composite membrane preparation as a filler material for pervapouration application; these cellulose nanocrystals can be used.

PP – 11

Synthesis and characterization of pH-sensitive guar gum based hydrogels for effective removal of divalent metal ions

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Abstract:

The modification of Guar gum with acrylamide via grafting by free radical polymerization. The hydrogels have been characterized by FTIR, Elemental Analysis, DSC, and TGA techniques. The nature and extent of swelling behavior of the hydrogels is observed to be dependent on gel structure and pH. The pH dependence of uptake capacity of the hydrogels for metal ions such as Cu, Ni, Pb, and Zn has been studied. The results reveal a very high metal uptake capacity of modified hydrogel attributed to the presence of carboxylic acid functionality. The metal adsorption is found to follow pseudo- first-order kinetics under pH 1.2 and pseudo-second-order kinetics under pH 7.0. The synthesized gel is good candidate for metal adsorption application.

PP – 12

Environmental Nanotechnology

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Abstract:

Environmental nanotechnology is the application of nanotechnology techniques to reducing or preventing damage to our environment. Nanotechnological products, processes and applications are expected to contribute significantly to environmental and climate protection by saving raw materials, energy and water as well as by reducing greenhouse gases and hazardous wastes. Using nanomaterials therefore promises certain environmental benefits and sustainability effects.

One way in which nanotechnology can affect our environment is by providing tools for cleaning up existing pollution. For example discuss the removal of arsenic from well water could provide needed drinking water in certain areas of our world.

Another way that nanotechnology can improve our environment is by enabling cleaner processes for the production of energy or materials. . For example, do you have a foundry that produces pollution in its manufacturing processes or air pollution from traffic causing smog? Research to see if nanotechnology is being explored as a way to solve that problem and discuss.

PP – 13

Effect of Aluminium-Chromium Co-doping on Structural Properties of Nickel Ferrite Nanoparticles

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Abstract

The structural properties of the Al^{3+} and Cr^{3+} co-substituted cubic spinel ferrite series $NiAl_xCr_xFe_{2-2x}O_4$(x=0.0 to 0.6) were synthesized through a sol-gel auto-combustion method and was characterized by means of x-ray powder diffraction (XRD) and scanning electron microscopy (SEM),. Lattice constants (a) determined from x-ray diffraction (XRD) measurements exhibit a decrease with increasing $Al^{3+}$and Cr^{3+}ions in the Nickel ferrite system. Crystallite size (t), Unit cell volume (V), Porosity (%) and density of each sample (for x=0.0 to 0.6) was calculated using XRD data. The SEM images clearly show the crystalline structure (for x = 0.0 and x = 0. 4)

PP – 14

The photo-catalytic behavior of Cu based metal chalcogenide nanoparticles

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Abstract:

Cu based metal chalcogenides such as Cu_2ZnSnS_4 (CZTS), $Cu_2ZnSnSe_4$ (CZTSe), $Cu_2ZnSn(SSe)_4$ (CZTSSe), etc. has attracted much attention in solar photo-voltaic applications due to their non-toxicity, lower band gap energy, high optical absorption coefficient and amply existing of its constituents in the earth. However, the lower band gap energy of Cu based metal chalcogenides exposed a new field of its application such as photo-catalysis. In the present study, we were synthesized CZTSe nanoparticles by using a hydrothermal route and further the product were characterized by X-ray powder diffraction (XRD), Raman spectroscopy, transmission electron microscope (TEM), and UV–Vis absorption spectroscopy. Then the as synthesized CZTSe nanoparticles were used as photo-catalytic material to degrade the dyes. Meanwhile, the structural and morphological results showed the well-organized polycrystalline nanoparticles of CZTSe having size ~80 to 90 nm. The Raman spectroscopy showed phase purity of as synthesized CZTSe nanoparticles. Owing to the low band gap energy, we successfully used CZTSe nanoparticles as a photocatalyst to degrade cango red (CR) dye under visible-light irradiation. We found that the particle size and morphology along with the band gap energy of CZTSe played vital roles on the photocatalytic properties of CZTSe nanoparticles.

PP – 15

Energy and Environment

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Abstract:
The major objectives of energy and environment is to act as a forums for constructive and professional debate between scientists and technologists, social scientists and economist from academia , government and the energy industries on energy and environment. It aims to include the informed and environmentally concerned public and their organization. Particular attention is given to ways of resolving conflicts in the energy and environment. Research ass ociated with this theme will explore current and new technologies to improve the efficiency of various emphasized energy systems, which includes four areas of research Fossil fuels and geothermal energy. Solar energy, wind energy bio fuels Solar energy is radiant light and heat from the sun that is harnessed using a range of ever evolving technologies such as solar heating, photovoltaic, solar thermal energy. Which has practical application.

PP – 16

Condensed Matter Physics

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Abstract:

Condensed matter physics is a branch of physics that deals with the physical properties of condensed phase of matter where particles (either micro or macro particles) adhere to each other. Condensed phases are solid and liquids held by electromagnetic force in between the molecules or atoms of substance.

Macroscopic: phonon spectrum, heat capacity, hardness, superconductivity, Raman and IR spectroscopy, thermoelectricity bulk molecular spectra Microscopic: crystal structure, growth and phase transition. Applications: .Raman spectroscopy: identification of elements as fingerprint of molecule, to find crystallographic orientation of sample.

Superconductivity: high temperature superconductor is made and even the resistivity can be easily calculated. In various fields and concepts like phonon dispersion, soft and hard condensed matter, quantum mechanics.

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