

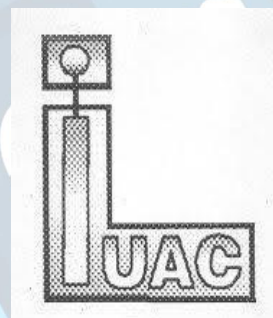
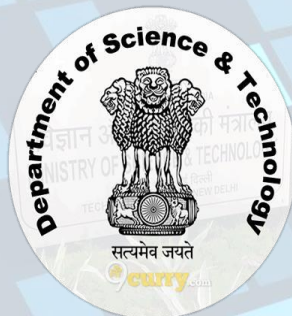


AMITY UNIVERSITY

UTTAR PRADESH

FUNDED PROJECTS

SPONSORED RESEARCH PROJECTS





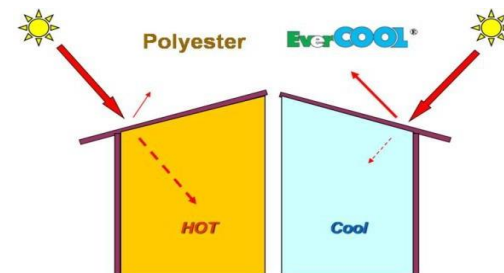
Modification of materials for their Use as Reflective Material in NIR Reflective Coatings for Energy Efficient Buildings



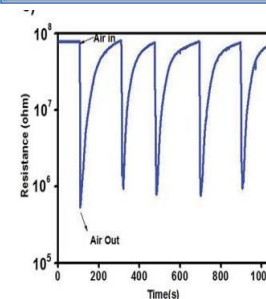
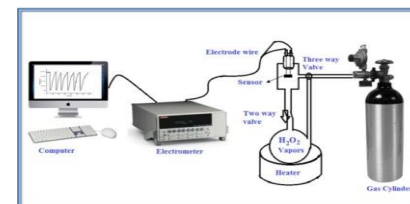
Conducting Polymer Nanocomposites as Sensors for Detection of Explosives



High Power Laser Absorption and Penetration in Metal Targets.



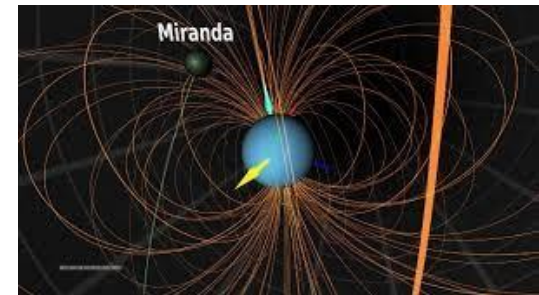
Cool Coatings for Energy Efficient Building



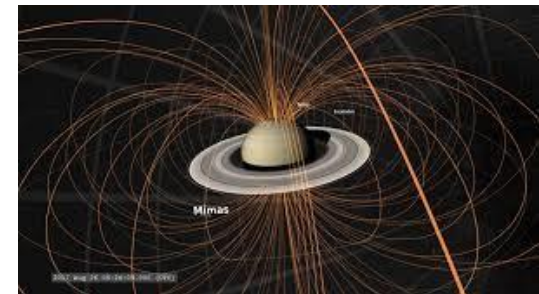


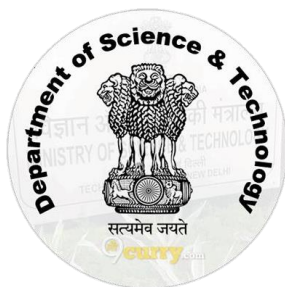
AN SPACE RESEARCH ORGANISATION

Interaction of electromagnetic wave with high energetic plasma in Uranus

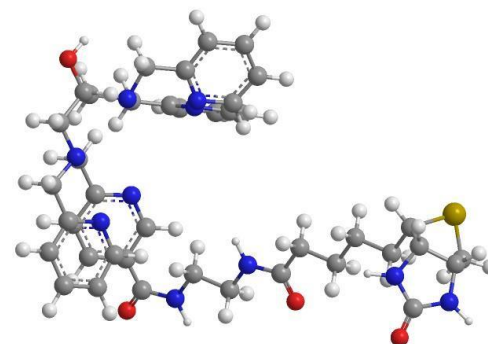


Study of low frequency plasma waves in the magnetosphere of Saturn

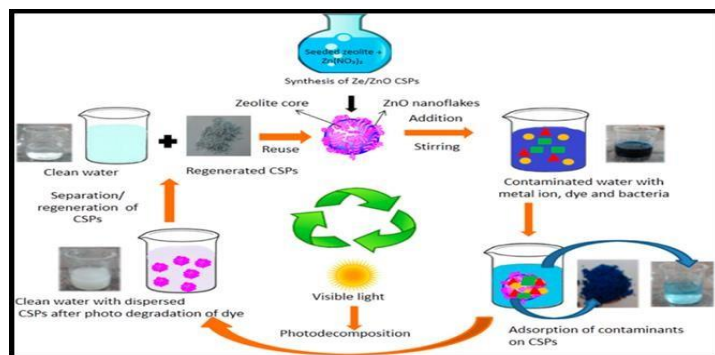




Immunosensors for Low Density Lipoprotein (LDL) detection



Development of Smart Materials for Rapid and Sustainable Water Treatment

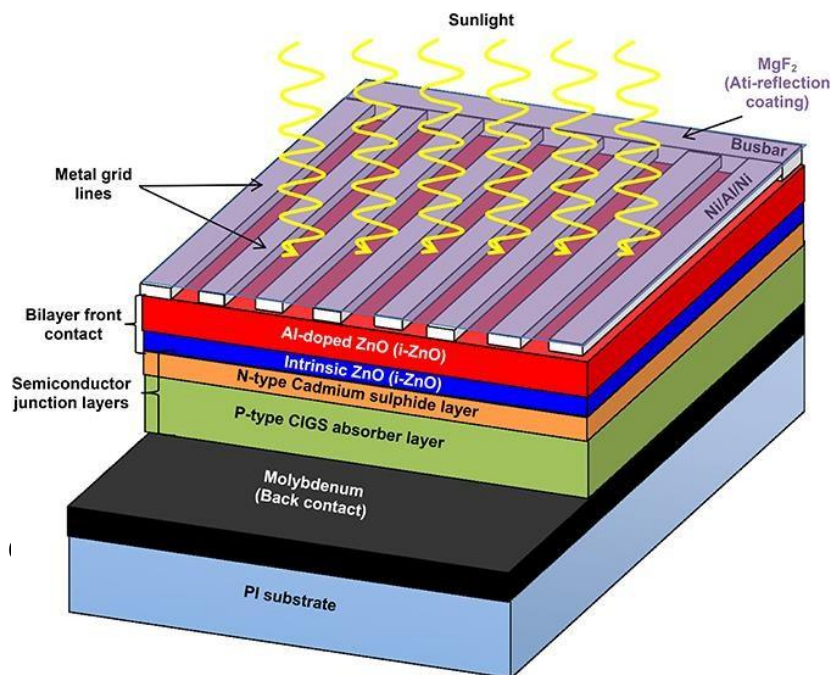


Hand held Devices for selective Detection of Explosives



PROJECTS FUNDED BY DST-SERB

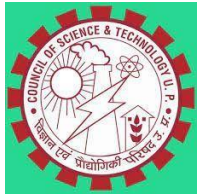
Modification in the chemical bath deposition setup, growth and characterization of semiconducting thin films for photovoltaic applications



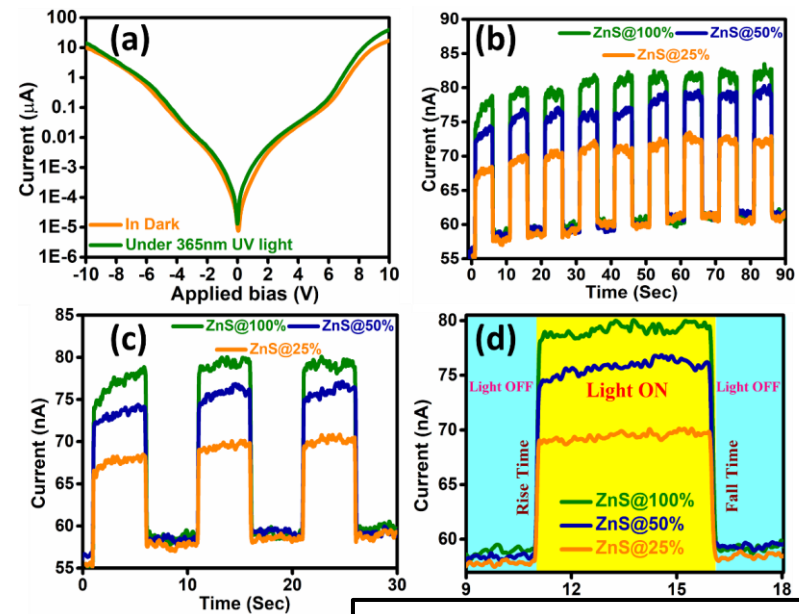
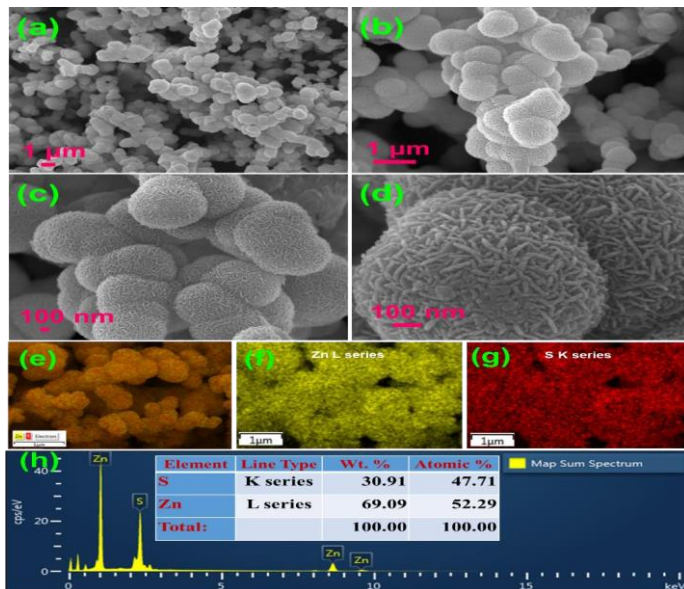
❖ Total Project Cost: 23,52,000/-

❖ Project duration: 3 Years

PROJECTS FUNDED BY CST



Fabrication of low-cost Visible/ultraviolet sensor based on ZnS/p-Si heterojunction grown by chemical bath deposition



- ❖ Total Project Cost: 9,94,000/-
- ❖ Project duration: 3.5 Years



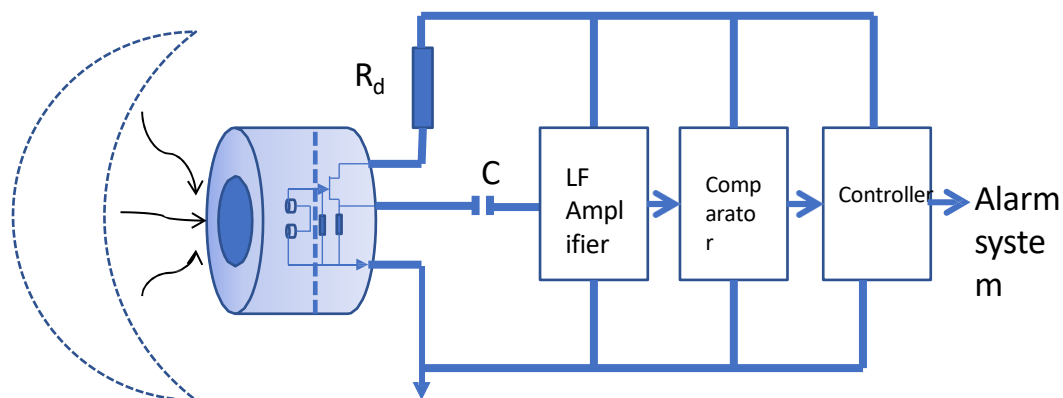
Development of lead free pyroelectric ceramic based mid-IR sensor for intruder detection

- Pyroelectric materials can sense the change in temperature
- Change in the temperature alters the spontaneous polarization

- Intruder alarm
- Fire alarm
- Gas analysis
- Laser sensors
- Thermal imaging
- Target recognition
- Thermal energy harvesting
- Infrared Search and Track System

Doped BZT-A	1752 $\mu\text{Cm}^{-2}\text{K}^{-1}$
Doped BZT-B	1841 $\mu\text{Cm}^{-2}\text{K}^{-1}$

Typical IR sensor



One of the largest value of pyroelectric coefficients reported so far at RT by our group

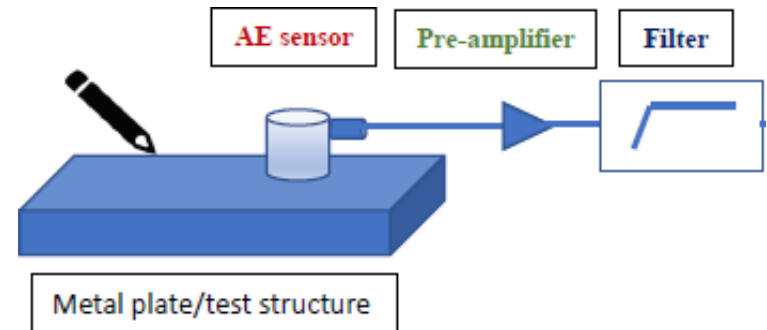
Amount: Rs. 32.85 lakhs, Duration: Three Years (Ongoing)

Development of doped barium zirconate titanate (BZT) based piezoelectric ceramics for acoustic emission sensor applications



Funded by Aeronautics Research and Development Board (ARDB), DRDO

- Development of high-quality doped $(\text{Ba,Ca})(\text{Zr,Ti})\text{O}_3$ (BCZT) piezoelectric ceramics for DMRL
- Acoustic Emission (AE) testing is mostly performed with piezoelectric elements for transduction
- Used for structural health monitoring of on-ground and in-flight aircrafts
- Monitoring the fatigue cracks, barely visible impact damage (BVID), delamination and corrosion



Amount: Rs. 24.90 lakhs, Duration: Two and half years (September 2021)

TARE(Teacher's Associate Research Excellence)

Project with Department of Science & Technology(DST)

Project Scheme: TARE(Teacher's Associate Research Excellence)

Funding agency: SERB(DST)

Project Title: Approximation Degree of Positive Linear Operators involving Orthogonal Polynomials

Duration of project: 36 months

Amount Sanctioned: Rs.18,30,000/-

Broad Area of research: Approximation Theory



**Science and Engineering Research Board (SERB)
Department of Science and Technology (DST)
Govt. of India**

Quality Assessment of Oilseeds (Sesame) using Dielectric Spectroscopy

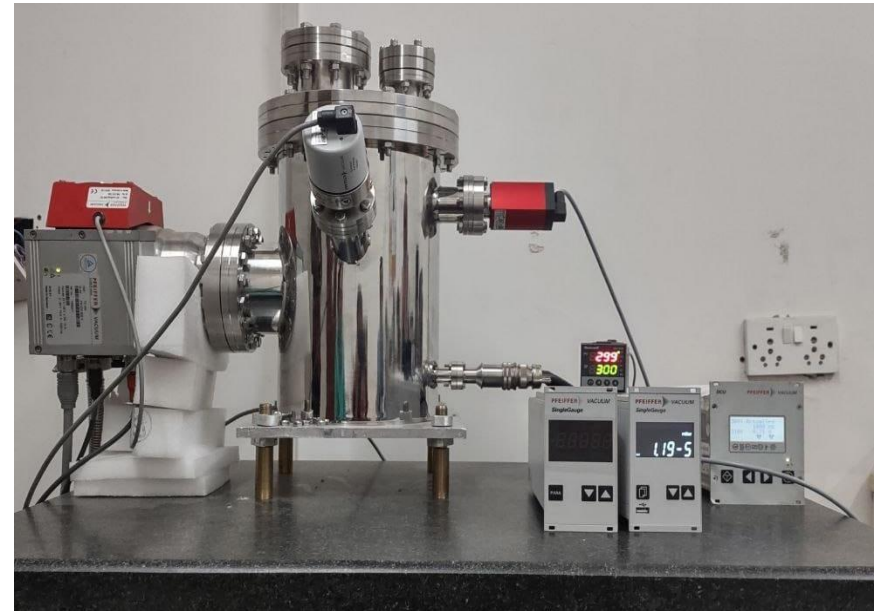
Funding Agency – CSTUP



Project with Department of Science & Technology(DST)

UHV annealing setup with optical windows

- Project Title: Study of interface magnetism in thin films and multilayers
- Funding agency: DAE-BRNS



INTERNATIONAL COLLABORATIONS

INDO-HUNGARIAN PROJECT

Green synthesis of novel BiOX (X = Cl, Br, I) and BiOXs composites, their immobilization on activated carbon fibers/ceramic paper and their applications as recyclable photocatalysts

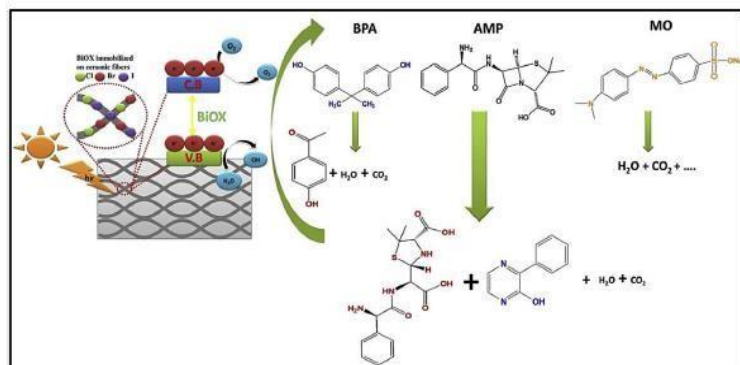


Fig. 7. Photocatalytic degradation mechanism of MO and BPA and AMP by BiOX-CerF.

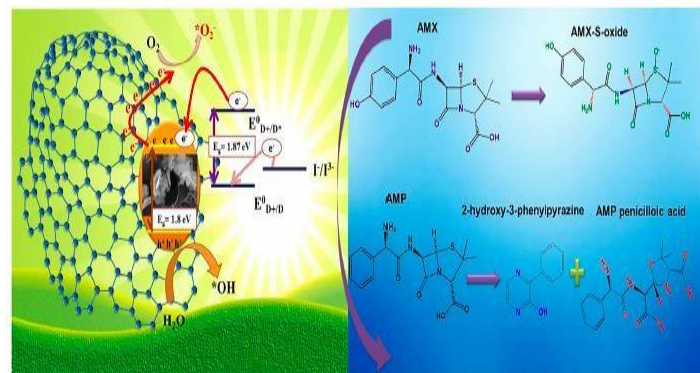
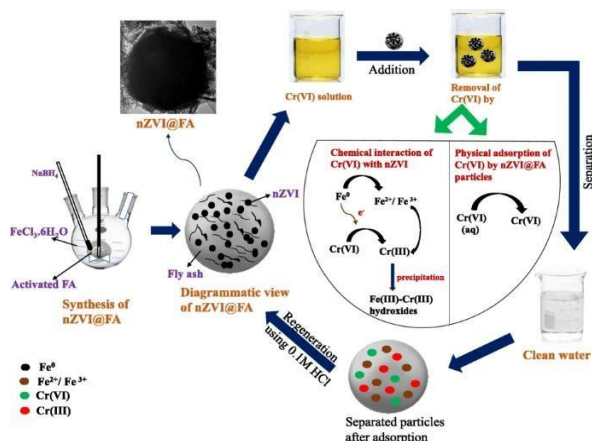


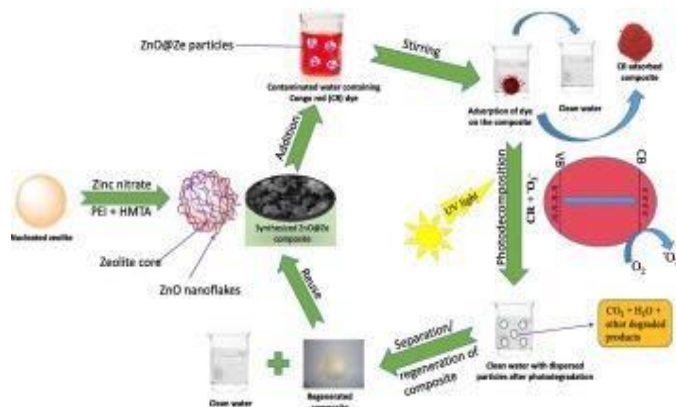
Fig. 7. Photocatalytic degradation mechanism of AMP and AMX with 1% BiOI-G-CB.



Design and development of composite particles for rapid and sustainable water treatment



Removal of toxic metal ions from water using nZVI(nano zero valent iron) modified fly ash composite particle



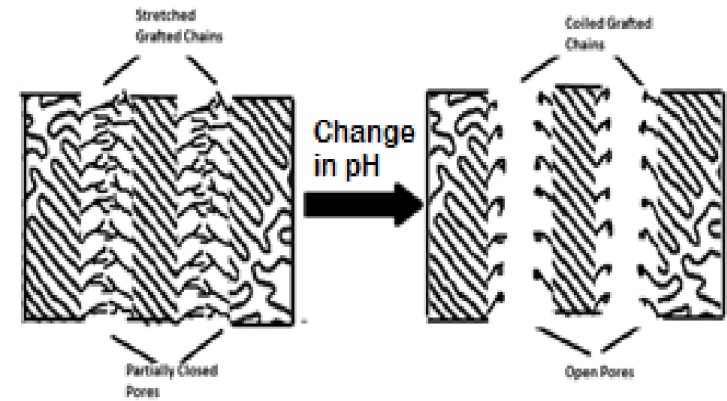
Removal of organic contaminants from waste water using ZnO modified high silica Zeolite



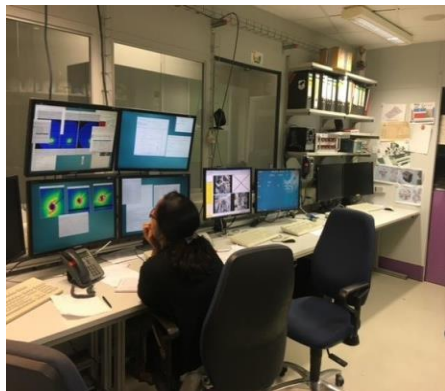
SAXS studies of the dynamics of the stimulus responsive pores in Grafted Track Etched Membranes: a new paradigm for controlled Drug Delivery Applications

DESY-GERMANY
DEUTSCHES ELEKTRONEN-
SYNCHROTRON

*A Research Centre Of The Helmholtz
Association, Germany*



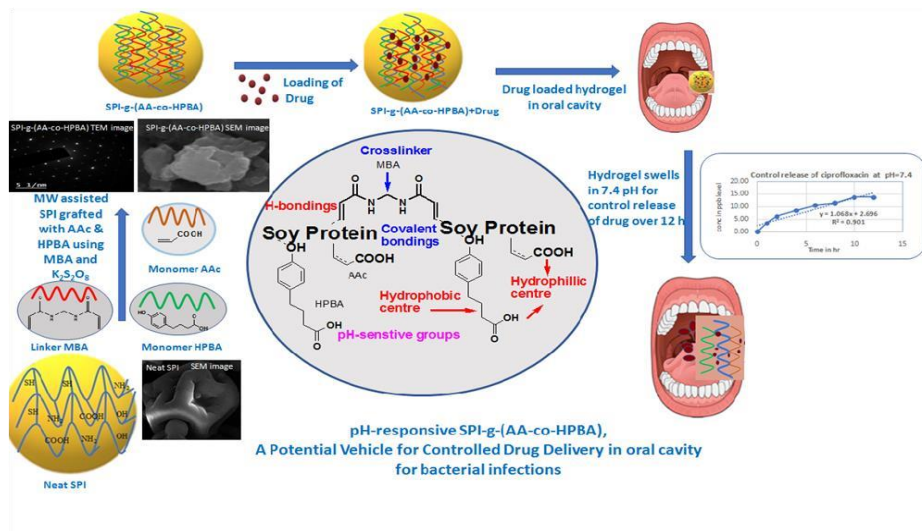
Pictorial Representation of On –Off Switching as a Function of External Stimuli.



Among proteins, plant proteins are more profusely used as they have high polar amino acids that make them hydrophilic and are non-immunogenic, non-allergic and have the huge potential to be fabricated for diverse healthcare applications.



Soy Protein



pH Responsive Grafted Soy Protein Isolate for Controlled Drug Delivery

Soy protein isolate\grafted[acrylic acid-co-4-(4-hydroxyphenyl)butanoic acid] [SPI-g-(AA-co-HPBA)].

PUBLICATIONS:

1) Soy Protein-Based Hydrogel under Microwave-Induced Grafting of Acrylic Acid and 4-(4-Hydroxyphenyl)butanoic Acid: A Potential Vehicle for Controlled Drug Delivery in Oral Cavity Bacterial Infections:

ACS Omega, 2020, 5 (34), 21610-21622. DOI: 10.1021/acsomega.0c02287 **IF: 3.52**

2) A dual stimuli responsive natural polymer based superabsorbent hydrogel engineered through a novel cross-linker;

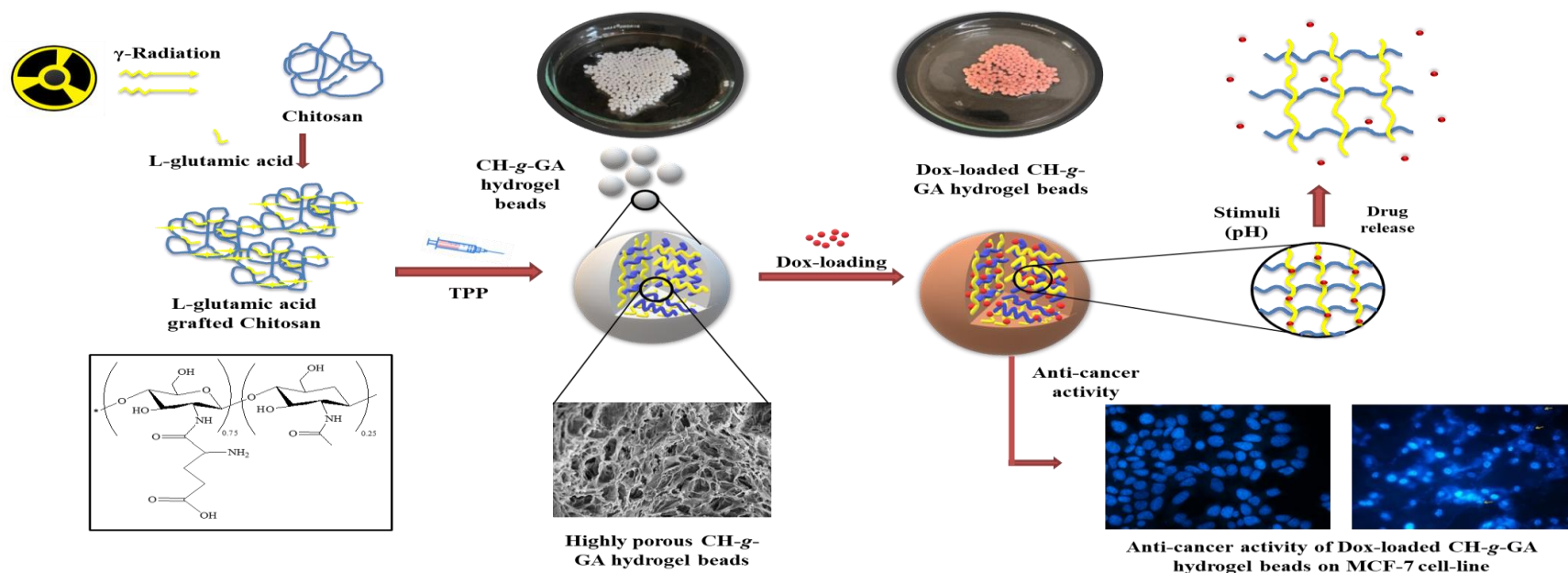
Polym. Chem., 2021, 12(16), 2404–2420

<https://doi.org/10.1039/D0PY01729A> **IF: 5.582**

PATENT:

“Dual Responsive Superabsorbent with [2-(4-((acrylamido)methyl)-1H-1,2,3-triazol-1-yl)-4-vinylbenzoic acid], novel linker, **Saloni Mehra** Sunita Rattan, 2020. Patent filed

pH-responsive hydrogels through γ -Radiation Induced Graft Copolymerization of Chitosan for Controlled Drug Delivery

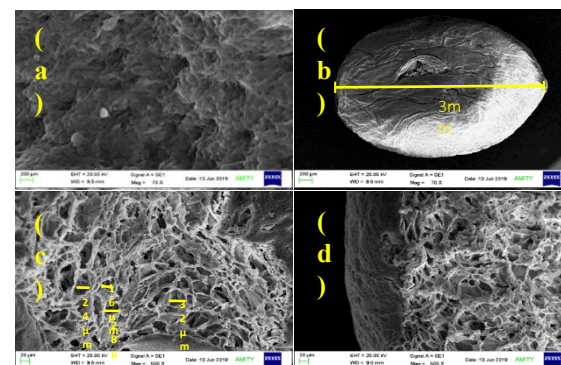


“ γ -Radiation induced L-glutamic acid grafted highly porous, pH-responsive chitosan hydrogel beads: A smart and biocompatible vehicle for controlled anti-cancer drug delivery”, *International Journal of Biological Macromolecules*, 2021, **182**, 37–50.
<https://doi.org/10.1016/j.ijbiomac.2021.03.134>

International Journal of Biological Macromolecules
 Volume 182, 1 July 2021, Pages 37–50

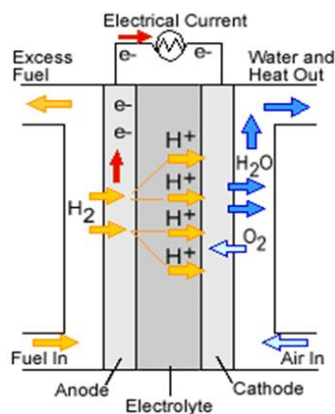
γ -Radiation induced L-glutamic acid grafted highly porous, pH-responsive chitosan hydrogel beads: A smart and biocompatible vehicle for controlled anti-cancer drug delivery

Safiya Nisar^a, Ashiq Hussain Pandit^b, Masood Nadeem^c, Altaf Hussain Pandit^d,
 M. Muneer Ahmad Khan^e, Sumita Rattan^a

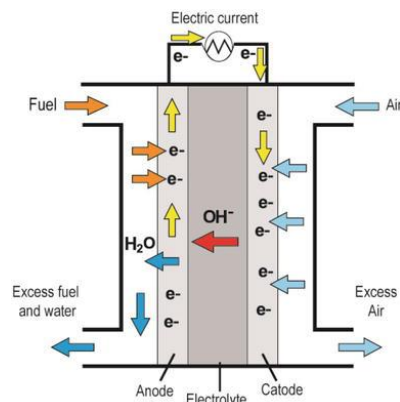


Anion Exchange Membrane (AEMs) through Radiation Induced Grafting of Polymers for Fuel Cell Applications : Towards Cleaner Energy & Environment

Proton Exchange Membranes	Anion Exchange Membranes
Pure Hydrogen as Fuel	Use of Organic Fuels
Platinum Based Catalyst	Elimination of precious metal catalysts.
Corrosion	Elimination of corrosive environment..



Proton Exchange
Polymer Membrane Fuel Cell



Anion Exchange
Polymer Membrane Fuel
Cell



A new **Anion Exchange Membrane, AEM** for fuel cell applications through dynamic radiation grafting technique (RGT) that will operate in an alkaline environment, thus lowering the activation losses, possibility of using non-noble metal catalysts, lower membrane cost and cheaper cell components due to less corrosive alkaline environment.

Soy protein for Sustainable Packaging

- Demand for advanced and eco-friendly sustainable packaging material with good physical, mechanical and barrier properties is increasing.
- We developed films that address the limitations of biodegradable options, offering enhanced durability and cost effectiveness while maintaining eco friendliness and renewability for future applications.



Biodegradable packaging

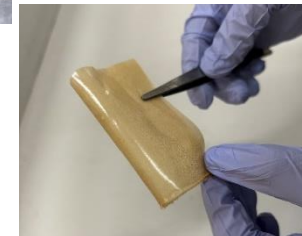
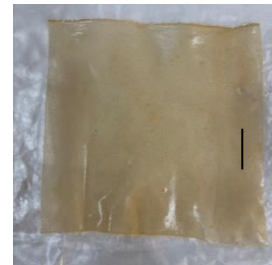
Edible packaging



Capsules



Carry bags



Amalgam free Glass Ionomer Cements

Glass Ionomer Cements

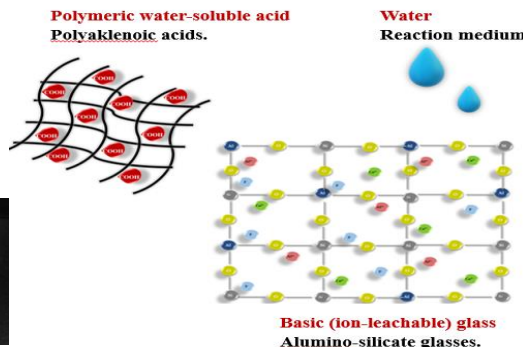
A material that acts as an adhesive to hold together the casting to the tooth structure.

Highlights



- The polyelectrolyte and the glass powder were developed wherein the limitation faced in present GICs were dealt.
- Gamma ray-initiated polymerization was used for the preparation of the polyelectrolyte, in order **to overcome the use of toxic initiators and catalysts, which are known to cause allergies to severe health problems.**
- Simultaneously, **CMC was incorporated into the glass powder for enhanced mechanical strength and antibacterial properties.**
- In vivo studies conducted on animals indicated that the **GIC did not induce any toxicity.**
- Thus, the **developed GIC has high potential to be an aesthetic replacement for Amalgam and Resin-based cements.**

Composition in Glass Ionomer Cements



PUBLICATIONS

"Biocompatible carboxymethyl chitosan-modified glass ionomer cement with enhanced mechanical and anti-bacterial properties." *International Journal of Biological Macromolecules* (2022). Volume 223, Part A, Pages 1506-1520 <https://doi.org/10.1016/j.ijbiomac.2022.11.028> (I.F.-8.025)

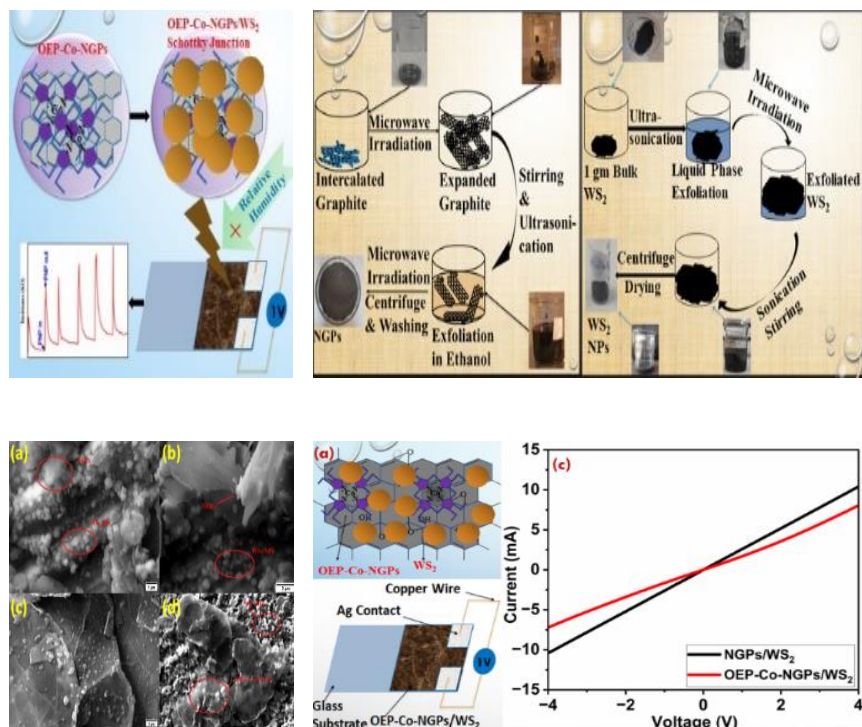
"Chemical initiator-free synthesis of Poly (acrylic acid-co-itaconic acid) using radiation-induced polymerization for application in dental cements." *Radiation Physics and Chemistry* (2022): Volume 198, 110243. <https://doi.org/10.1016/j.radphyschem.2022.110243> (I.F.-2.776)

PATENT FILED:

An Initiator-free Carboxymethyl Chitosan modified Glass Ionomer Dental Cement Composition and Method".

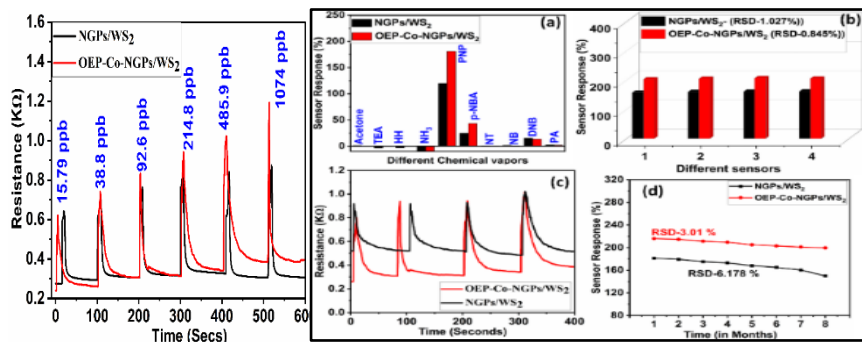


Rapid chemiresistive detection of para Nitrophenol through Porphyrin functionalized 2D materials: A step toward environmental monitoring.



Figure

1. Demonstrates the graphical representation of octa ethyl cobalt porphyrin functionalized NGPs and WS₂ nanocomposite,
2. Synthesis process of NGPs and WS₂ nanoparticles,
3. SEM images of porphyrin functionalized nanocomposite,
4. Nanocomposite ,Device fabrication and I-V characteristics (p-n junction),
5. Interaction between gas molecules and functional species,
6. Selectivity of functional nanocomposite film,
7. camera image of published paper.



Journal of Materials Science

Rapid detection of para Nitrophenol through Porphyrin functionalized 2D materials: A step toward environmental monitoring.

--Manuscript Draft--

Manuscript Number:	JMSC-D-23-04367
Full Title:	Rapid detection of para Nitrophenol through Porphyrin functionalized 2D materials: A step toward environmental monitoring.
Article Type:	Manuscript (Regular Article)
Keywords:	p-nitrophenol; Chemiresistive Sensor; Environmental Pollutant; porphyrin functionalized NGPs; p-n junction
Corresponding Author:	Sunita Rattan, Ph.D Amity University Uttar Pradesh Noida, Uttar Pradesh INDIA
Corresponding Author Secondary Information:	
Corresponding Author's Institution:	Amity University Uttar Pradesh
Corresponding Author's Secondary Institution:	
First Author:	Jyoti Gupta, M.Sc.



Dr Manoj Raula
Associate Professor

SERB-SIRE Project:

Research Title: Reactivity of colloidal metal oxide surfaces: Role of high energy trap states as reactive intermediates

Sponsoring Agency: SERB-DST (Govt of India)

Duration: 6 months (2022-2023)

Visiting University: Department of Chemistry,
Yale University, New Haven, USA



Yale University

AIAS

Sponsored Project:

Title: Visible-light hybrid photocatalysts for solar energy harvesting: Synthesis and applications in photo-mediated water splitting to generate “Hydrogen” and photopolymerization of “Carbon-dioxide” into “Biodegradable Polycarbonate”

PI: Dr. Manoj Raula, Associate Professor

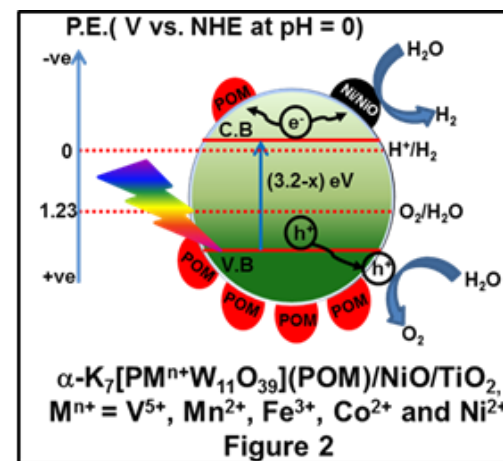
Co-PI: Dr. Sanjib Banerjee, IIT Bhilai

Sponsoring Agency: CSIR (Govt of India)

Duration: 3 years (2022-2025)

Amount: 6.5 lakh

Highlights: Schematic representation of charge separation in the proposed using reduced TiO₂, Ni/NiO and POM hybrid photocatalysts for the production of H₂ and O₂ gas.



AIAS

Sponsored Project:

Title: Tuneable Redox Reactivities of Colloidal Aqueous Polyoxometalates-Metal Oxide Hybrid Nanocrystals towards hydrogen evolution

PI: Dr. Manoj Raula, Associate Professor

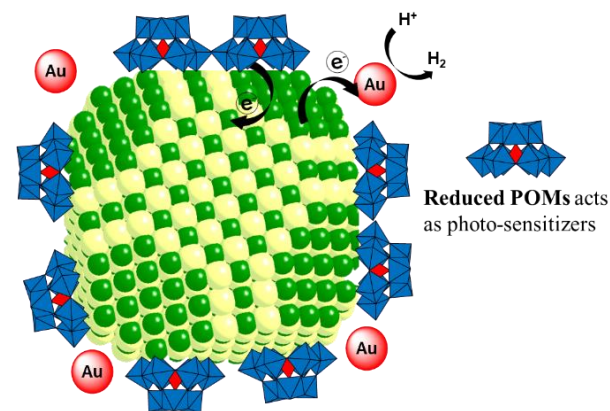
Co-PI: Dr. Sucheta Sengupta, AIARS

Sponsoring Agency: SERB-SURE (Govt of India)

Duration: 3 years (2023-2026)

Amount: 28 lakh

Highlights: Schematic representation of the path of electrons and holes following under photo irradiation conditions. The Proposed aqueous dispersion of the synthesized novel catalysts {Metal-oxides-POMs/Au}.



AIAS

Sponsored Project:

Title: Synthesis of porous carbon foam for the development of piezoresistive flexible pressure sensors (Project ID-2630)

PI: Dr. Tejendra Kumar Gupta, Assistant Professor

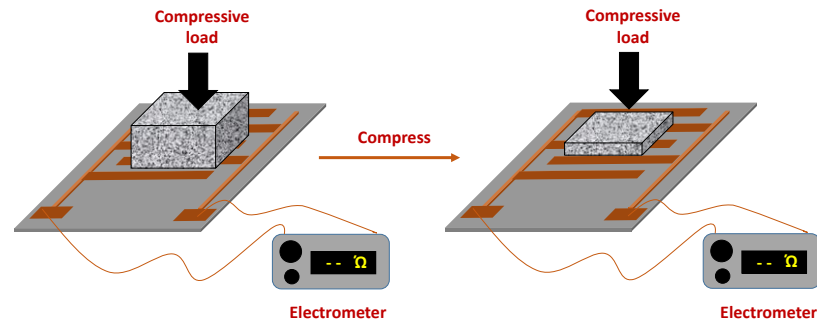
Co-PI: Dr. Ravikant Choubey, AIAS, Amity University, Noida

Sponsoring Agency: Council of Science and Technology,
Uttar Pradesh (CSTUP)

Duration: 3 years (2023-2026)

Amount: 13.36 Lakhs

Sanction date:- 01/11/2023



Highlights: The project aims to design flexible pressure sensors with self-healing capability, which could be useful in wearable fabrics, health care devices, robotics, and artificial intelligence systems.

AIAS

Sponsored Project:

Title: Fabrication of high performance Ultraviolet/Visible photodetectors based on thin films heterojunction (Project ID- 2070)

PI: Dr. Ravikant Choubey, Associate Professor, AIAS, Amity University, Noida

Co-PI: Dr. Tejendra Kumar Gupta, AIAS, Amity University, Noida

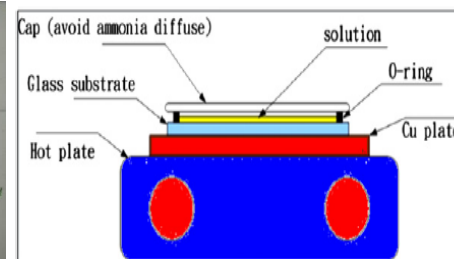
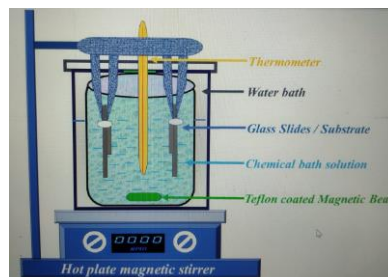
Sponsoring Agency: Council of Science and Technology, Uttar

Pradesh (CSTUP)

Duration: 3 years (2023-2026)

Amount: 13.86 Lakhs

Sanction date:- 01/11/2023



Highlights: The project aims to deposit semiconducting thin films using low cost deposition methods, and fabricate the detector, which will certainly reduce the cost of the fabricated photodetectors.