Annual Report
2023-2024

CSIR-Advanced Materials and Processes Research Institute, Bhopal

From Director's Desk

CSIR-Advanced Materials and Processes Research Institute (AMPRI), Bhopal is a constituent laboratory of Council of Scientific & Industrial Research, carries out advance research in frontier and multidisciplinary research areas of lightweight metallic and polymeric materials, smart and functional materials, advanced radiation shielding materials, cement free concrete, materials of biomedical interest and hybrid green composites towards industrial benefit for the masses.

During the last few years, this institute has special focus on the institute–industry amalgamation and commercialization of technologies through NDAs, MOUs and technology transfer. The sustained efforts in this direction have resulted in transfer of significant technologies for commercialization which include Lead Free X-Ray Shielding Tiles to M/s Prism Johnson Ltd Mumbai, Surface Plasmon Resonance (SPR) Raman substrates to M/s Technos Instruments Jaipur, Multifunctional Bamboo Composite Material for Modern Housing and Structures to M/s Permali Wallace Pvt Ltd Bhopal and to M/s Asili Bamboo Products, Meerut, Cement Free Concrete to M/s JSPL Raigadh, Hammer Tips for Sugar Mills to M/s Asugar Pvt. Ltd Pune, High Performance Hybrid Composite Materials to M/s Chauhan Fly Ash Products Ballarpur, Silicon Carbide Reinforced Composite to M/s Exclusive Magnesium Hyderabad, Hybrid Wood Substitute Composite Materials (CM-Wood) to M/s VSM Industries Pvt Ltd Surat, Advanced Hybrid Composite Wood and Wood Substitute Materials (AC Wood) to M/s Eco Bright Sheet Company Pvt. Ltd. Bhilai, Nano Alumina Adsorbent based Water Filter for Arsenic and Fluoride removal to Marcus Projects Pvt Ltd Lucknow, Defluoridation of Drinking Water using Nano Adsorbent based Domestic Filter, AMPRICARE - Sanitizer and Face Mask to M/s MSW Social Enterprises Pvt. Ltd. Indore, A novel process for making advanced radiation shielding materials for board application spectrum to M/s ASSURAYS Noida ,U.P., Evergreen hybrid composite of Parali-Agro waste and industrial waste to M/s Shubh Green Sheet Pvt Ltd, Durg, Chhatisgarh and M/s Amit Densified (Doors) Private Limited, Sonipat, Haryana, Eco-friendly red mud-based X-ray radiation shielding panels to M/s NATURE'S GLOBAL SERVICE (Brand: X-Shield), New Delhi, Nanoadsorbent-Nano biocides based membrane filter for the removal of arsenic, fluoride, micro-organisms etc of drinking water to M/s IBS Water Nano Purifier LLP, Bhopal, AMPRICARE-Disinfectant Box (UV Rays Hybrid Technology) to M/s Apt Medical System Pvt. Ltd., Pune, Makeshift Buildings for Hospitals, Housing and other purposes to M/s Janta Tent & Events, Bhopal, AMPRICARE: Instantaneous hypochlorite generator using Kitchen salt to M/s HES Water Engineers (India) Private Limited, Nagpur and Process for making Light Weight AL-SI Alloy-SiC Composite Manhole Cover to M/s VS Enterprises, Bhopal Further, the institute is progressing well in terms of quantity and quality of publications and patents.

Besides these, the Scientists of this Institute are very actively involved in mission mode activities for improvement of the livelihood of the society through various interactive programs, adoption of villages under CSIR-800 program, waste to wealth programme, skill development programmes and strategy for social development.

The dedicated team of Scientific, Technical and Administrative staff strives for achieving excellence and contribute to the needs of the industry, social sector and the Nation at large. We expect to keep this spirit high in the coming year also and make every effort to take CSIR-AMPRI, Bhopal to newer heights and to position it globally as a leading materials research laboratory.

Dr.Avanish Kumar Srivastava
Director

CSIR – AMPRI: An Overview

Advanced Materials and Processes Research Institute (AMPRI), Bhopal was instituted in May 1981 as "Regional Research Laboratory" (RRL) and officially started functioning from CSIR, New Delhi. The institute was then shifted to Bhopal and was located in Bhopal (now Barkatullah University campus). It subsequently found a place in the present premises in December 1983. The laboratory initially had about 15 scientists, with 10 of them specialized in metallurgy/materials science. This was the core strength of the institute at that time.

The institute initially undertook R&D on the synthesis and characterization of aluminium-graphite metal matrix composites and natural fibres. Gradually the scope of R&D broadened to include waste to wealth (building materials and wood substitute), mineral processing, environmental impact assessment, water resource modelling and problems related to agricultural, mining, sugar mill and thermal power plant machinery components. Health assessment, improvement and failure analysis of engineering components/systems and development of lightweight materials/components/products and processes for the automobile sector constituted other activities of significance. The work was extended with FEM simulation and modelling which became an integral part of the studies in many cases. Through its activities on water resource modelling, surface treated agricultural implements, bell metal artefacts, handicrafts using sisal fibre, use of fly ash for building materials and agricultural soil reclamation, etc., the institute became visible as a promising institute for rural technologies related to the specific problems of Madhya Pradesh.

The Governing Body of the Council of Scientific & Industrial Research renamed all its five Regional Research Laboratories (RRLs) to enable them to reflect a futuristic outlook. The changed profiles of the laboratories with respect to their direction of growth, orientation of expertise and accumulated excellence have all been weighed in while rechristening them. The name changed from Regional Research Laboratory, Bhopal to Advanced Materials and Processes Research Institute (AMPRI) with effect from March 6, 2007. In consonance with the new identity, R&D programmes in lightweight materials such as Al and Mg alloys, metallic and polymer-based composites, foams, and functional materials, microfluidics for point of care diagnostics, nanomaterials, new materials based on industrial wastes such as fly ash and red mud, and CSIR-800 projects of societal relevance have been undertaken. These programmes have an industry/user link from inception stage. A state-of-the-art processing and characterization facility and simulation modelling capabilities are being set up to trigger new materials development, innovations and improvements.

CURRENT PROGRAMMES AND FUTURE PERSPECTIVES

The present manpower includes scientists that are well trained in different disciplines of material science and other related areas along with supporting staffs. The number of scientists is planned to increase in the near future in view of the widened range of R&D activities. AMPRI is equipped with modern facilities for material synthesis, processing and property characterization such as SEM, HR-TEM, pressure die casting machine, semisolid processing unit, rolling mill, Mg melting unit, FESEM, Electromagnetic forming/joining unit, cryomilling unit, DTA, XRF, FT-IR, Raman Spectrophotometer, X-ray attenuation testing machine, electrochemical analyzer, UV-Visible spectrophotometer, AAS and those related to nanoscale R&D have been added in past few years.
The current activities of AMPRI are broadly categorised under

- Lightweight Materials,
- Nanostructured Materials,
- Smart and Functional Materials,
- Integrated Approach for Design and Product Development,
- Waste to Value added Materials
- Jigyasa and Skill Development Activities.

These activities and have been performed in different divisions as under

- Industrial Waste Utilization, Nano and Biomaterials
- Alloys Composites and Cellular Materials
- Intelligent Materials and Advanced Processes
- Hybrid Building Materials and Manufacturing Division
- Advanced Centre for Radiation Shielding & Geopolymeric Materials
- Green Engineered Materials and Additive Manufacturing
- Water Resource Management & Rural Technology Division

In the category of lightweight materials, important activities are related to Al metal matrix composites, polymer matrix composites, Al foam and Mg-based alloys. CSIR-AMPRI has laid a major emphasis on lightweight materials development like Al foam, Mg-based alloys, *in-situ* MMCs and

nanostructured materials. Also, activities on electromagnetic forming, smart and functional materials, steel and Ti foams, and materials modelling and design are being carried out since the last 12th Five-year Plan.

Under the research theme of nanostructured materials, lab is constantly working for the development of nanostructured material for different applications like nano-adsorbent, capacitor application, energy related areas, for sensors etc. Under this theme the lab has already established a process for the bulk scale synthesis of nanoalumina by a cost-effective process. The developed nano adsorbents possess significantly high fluoride and arsenic adsorption capacity. The sediment domestic water filter device has also been developed using this nanoalumina and the know-how is transferred to the industries.

Institute is employing integrated approach for design and product development in the area of shape memory polymer composites, natural fibre polymer composites, hierarchical carbon fibre reinforced composites, graphene-metal composites, coating materials, metallic foam, sandwich panel and metal matrix composite, brake drum component, bamboo composites etc. Advanced techniques like 3D surface scanning, 3D printing and selective laser melting processes, CVD techniques, micro compounding of nano-materials with smart polymers, universal bamboo shaping machine, design & analysis software, advanced characterization equipments are being used to develop products and processes. A dedicated team of scientists and technical staff along with students and project staff are working coherently to contribute significantly in S&T advancement.

In the area of Waste to Wealth, the institute is mainly engaged on the utilization of fly ash and red mud. The institute has developed wood substitute technology using red mud, fly ash and natural fibres and has potential applications for making doors, panels, partitions and furniture. CSIR-AMPRI has developed radiation shielding materials from red mud and holds a US Patent on the work. The potential applications of this technology are for the shielding of gamma and neutron in nuclear power plants and for diagnostic X-ray shielding in X-ray and CT scan rooms. This material has been started for use by the hospitals to shield diagnostic X-rays.

CSIR-AMPRI has worked on various rural development and dissemination activities which will have large implications for CSIR-800. The institute has taken up a project under Rural Sector Projects – Sisal Fibre Technologies for Rural Employment Generation. Sisal plant produces the hardest vegetable fibre which will have applications in cordage and handicrafts. The yarn and textile made out of this fibre is used for making composites for applications in sectors like housing, automobile, geotextiles, etc.

CSIR-AMPRI is actively engaged in microfluidic electrochemical &fluorescence-based biosensors which have recently been advanced for portable point-of-care diagnostics by integrating

lab-on-a-chip technology and electrochemical analysis. Institute have developed several automated procedures for electrochemical detection of biomarkers, pharmaceutical and environmental samples using micro liquid, capillary gas chromatographic and capillary electrophoretic separation techniques and micro-chip-based separation under the concept of lab-on-a-chip. The microfluidic electrochemical & fluorescence-based biosensors approach offers a new platform for a rapid, miniaturised, and sensitive diagnostic sensor in a single device for various human diseases.

The overall objective of AMPRI is to achieve a world-class status in the area of engineering materials, components and process development. Accordingly, the HR Profile and S&T infrastructure aims to address the needs of both fundamental and applied research, technology development and business development in the area of materials of the future. The present resource base being created would not only provide commercial tractability for the present but also provide a root for more lucrative, elite and innovative areas for the future. It is envisaged to make the institute a place of pilgrimage for top material scientists and the stakeholders.

Vision

CSIR-AMPRI, Bhopal is committed to develop innovative, cutting edge, internationally competitive, energy efficient and environmentally friendly technologies /products in the area of advanced materials for societal benefits and to contribute to the Nation's Economy.

Mandate

- Research & Development on Engineering Materials for Strategic, High Performance and Societal Applications
- Materials, Processes and Technology Development for Component/Products for a variety of engineering materials, including Metals & Alloys, Composites, Polymers, Building Materials and materials from Waste to Wealth
- To undertake consultancy, sponsored, grant-in-aid, network & other national, international projects for both public and private sectors in above areas.

Research Council

Prof. Shreekant Lele Former Professor, Department of Metallurgical Engg.,Indian Institute of Technology (Banaras Hindu University), Varanasi	**Chairman**
Prof. N. Ravi Shankar Department of Materials Research Centre Indian Institute of Science, Bangaluru	**External Member**
Prof. ShampaAich Department of Metallurgical and Materials Engineering Indian Institute of Technology, Kharagpur	**External Member**
Er. Udayan Pathak Head & Deputy General Manager World Class Quality Engineering Research Centre, Tata Motors – Pune	**External Member**
Dr.Dheepa Srinivasan Chief Engineer Pratt and Whitney R&D Center IISc UnitedTechnologies Corporation India Pvt. Ltd., Bangaluru	**External Member**
Shri Vilas Tathavadkar Senior Vice President Aditya Birla Science & Technology Company Ltd., Navi Mumbai	**External Member**
Dr. K. Gopinath Programme Director Metallurgical Research Laboratory, Hyderabad	**Agency Representative**
Dr. S. Manjini Associate Vice President Technical Services &BusinessExcellence JSW Steel Ltd., Tamil Nadu	**DG's –Nominee**
Prof. SuddhasatwaBasu Director CSIR-Institute of Minerals and Materials Technology, Bhubaneshwar	**Sister Laboratory**
Dr. R.M. Mohanty Principal scientist Technology Management Directorate (Socio-economic Ministry Interface), CSIR-New Delhi	**CSIR Headquarters Invitee**
Dr.Avanish Kumar Srivastava Director CSIR-Advanced Materials and processes Research Institute, Bhopal	**Member**
Dr. Satish Kumar Director National Institute of Technology, Kurukshetra, Haryana	**Special Invitee**
Dr. S.K.S. Rathore Sr. Principal Scientist CSIR-Advanced Materials and Processes Research Institute, Bhopal	**Secretary**

Management Council

1st April 2023 to 31st December 2023

Dr.Avanish Kumar Srivastava, Director AMPRI	Chairman
Dr.Atul Narayan Vaidya, Director, CSIR-NEERI, Nagpur	Member
Dr.P. Asokan, Chief Scientist, AMPRI	Member
Dr. J.P. Chourasia, Senior Principal Scientist	Member
Dr.Deepti Mishra, Senior Principal Scientist, AMPRI	Member
Dr.Vandana, Principal Scientist	Member
Dr. Tilak Joshi, Scientist AMPRI	Member
Shri Deepak Kashyap, Technical Officer	Member
Finance &Accounts Officer, AMPRI	Member
Controller of Administration, AMPRI	Member-Secretary

1st April 2024 to 31st March 2024

Prof. Avanish Kumar Srivastava, Director, AMPRI	Chairman
Prof. Venugopal Achanta, Director CSIR-NPL, New Delhi	Member
Dr. Manish Mudgal, Chief Scientist, AMPRI	Member
Dr. J. P. Chaurasia, Senior Principal Scientist & Head PPD, AMPRI	Member
Dr. Kirti Soni, Principal Scientist, AMPRI	Member
Dr. Chetna Dhand, Senior Scientist, AMPRI	Member
Mr. Narendra Singh, Senior Scientist, AMPRI	Member
Dr. E Peters, Principal Technical Officer, AMPRI	Member
F&AO, AMPRI	Member
COA /AO, AMPRI	Member-Secretary

MoU with Academic/R&D Institutions

S.N.	Party/Institute	Date of Signature
1	Combat Vehicle Research & Development Establishment (CVRDE), DRDO, Chennai (NDA)	18/04/2023
2	Vikram University, Ujjain	18/05/2023
3	Madhya Pradesh Bhoj Open University, Bhopal	18/05/2023
4	The President of India through Joint Mission Director (R&I) NTTM, Ministry of Textiles, New Delhi	12/04/2023
5	Eaton India Innovation Centre LLP, B6 & B7, S1 & S2, Magapatta SEZ Entrance, Magarpatta, Hadaspur, Pune Maharastra 411028	07/11/2023
6	Secretary, Department of Biotechnology, Ministry of Science & Technology, Government of India, New Delhi	11/12/2023
7	Indian Institute of Technology Roorkee	10/01/2024
8	Variable Energy Cyclotron Centre (VECC) Kolkata	02/02/2024
9	President of India, acting through Secretary, Department of Biotechnology, Ministry of Science and Technology, Government of India, New Delhi & AIIMS, Bhopal & IISER Bhopal	14/11/2023

Knowhow Transfer

Sr.No.	Name of Knowhow	Name of Party	Date
1	Bamboo Composites for Modern Housing Structures	M/s Ecological Fibre Composites Private Limited, Jabalpur, Madhya Pradesh	14/05/2023
2	Evergreen Hybrid Composites of Parali (Agro Wastes) and Industrial Wastes	M/s Amit Densified Doors Pvt. Ltd, Sonepat, Haryana	11/08/2023
3	Eco friendly red mud-based X-ray radiation shielding panels	Mr. Tarun Bhateja-Director Nature's Global Service (ISO Certified), New Delhi	27/12/2023

Projects

List of Ongoing Projects as on 01/04/2024

Project Code	Title of the Project	Sponsorer	Date of Start	Date of completion	Project Cost (In Rs.)	Project Leader
GAP0107	Development of Advanced Composite Pressure Vessels for Hydrogen Storage (ADHERE)	DST, New Delhi	2021-08-09	2024-08-08	5492106	Dr. Surender Kumar
GAP0108	Multiplexed Non-invasive Aptamer Based Electrochemical Biosensors for Early Detection of Cancer seeking signals in biological fluid	DST, New Delhi	2021-08-06	2024-08-05	3493800	Dr. Aparna Parihar (Dr. Raju Khan)
GAP0111	Synthesis, characterization and applications of Lead-free Heavy Metal Oxide based Glass systems	DST-INSPIRE, New Delhi	2021-03-10	2026-03-31	2774644	Dr. Rezaul Karim SK (Dr. Mohammad Ashiq)
GAP0116	Advanced Multi-Functional Asbestos-Free Thermal Insulating Material-A Gizmo for Energy Conservation	Central Power Research Institute, Bangalore	2022-03-02	2024-11-30	8906000	Dr. Sarika Verma
GAP0118	Red Mud Valorization to achieve zero waste, Conversion of residue into diagnostic X-Ray Shielding tiles after recovery of scandium	Ministry of Mines, Governme nt of India	2022-04-19	2024-04-18	4397384	Dr. Shabi Thankaraj Salammal
GAP 0119	Double heterojunction magnetic nanoparticles for textile industry waste water purification	DST, New Delhi	2022-04-22	2025-04-21	3239601	Dr. Angelin Ebanezar John (Dr. Deepti Mishra)
GAP0120	Nature inspired fractal patterned Micro-Nano structured catalyst modified electrodes: A novel approach for efficient hydrogen production by electrolysis of water	DST, New Delhi	2022-05-27	2025-05-26	3440480	Dr. Archana Singh

GAP0121	Upscaling of carbon foam technology for lead-acid battery development and grapheme foam for flexible Li-ion batteries	DST-SERB, New Delhi	2022-07-01	2024-06-30	4600000	Dr. Rajeev Kumar (Dr. D P Mondal)
GAP0122	Studies on Utilization of inert broken tiles, sanitary wares & polishing dust/slurry for Development of Advanced Geopolymeric Prefabricated Precast Pathway Components for Infrastructural Applications	Central Pollution Control Board, Regional Directorate (West), Vadodara (Gujrat)	2022-07-06	2024-04-05	8351760	Dr. Manish Mudgal
GAP0124	Pilot Scale Development of "AMPRICARE – Instantaneous Hypochlorite Generator Using Kitchen Salt"	DST NECTAR	2022-01-11	2024-05-29	1554000	Dr. Archana Singh
GAP0126	Exploration of 2D MXene for Energy Applications	DST, New Delhi	2022-03-21	2027-03-20	2866156	Ms. Shilpee Chauhan (Dr. Pradip Kumar)
GAP0127	Development of High-Performance Ultrathin Overcoats for Hard Disk Media and Tape Head Devices for Futuristic High Storage Capacity Magnetic Memory Systems	DST, New Delhi	2022-03-21	2027-03-20	2865920	Mr. Rajesh Kumar (Dr. Neeraj Dwivedi)
GAP0128	Development and Scale up (TRL 5) of cost effective Copper-Graphene materials using in-situ synthesis & coating in Fluidized Bed Process Systems	Ministry of Mines, Governme nt of India	2023-03-06	2025-03-05	2295960	Dr. Tilak Chandra Joshi
GAP0130	Development of Aerospace Components Through Electromagnetic Welding	AR&DB, Room No. 411, 4th Floor, NTB Building, DRDO HQ Annexe, Metcalfe House, Civil Lines, New elhi - 110054	2023-08-25	2026-08-24	4633216	Dr. Meraj Ahmed

GAP0131	Monitoring and Analysis of Atmospheric Boundary Layer height over Bhopal region using SODAR (Sound Detection and Ranging) System	MPCST Bhopal	2023-10-10	2025-10-09	550000	Dr. Kirti Soni
GAP0132	Silicon-based nanostructures for SERS applications	DST-SERB, New Delhi	2023-02-03	2028-02-02	2932000	Sh. Keshendra Kumar (Mentor: Dr. Vandana)
GAP0133	Development of Carbon Nanofiber materials from Cow Dung/ Bio-sludges for Smart Fabric Textile and Selective CO2/H2 energy storage applications by 3D printing technology	National Technical Textiles Mission, Ministry of Textiles	2023-11-09	2026-11-08	5850000	Dr. Sarika Verma
GAP0134	Development of Antiviral and antimicrobial textile based Personal Protective equipment (PPE) using polymer nanocomposites with metal and metal oxide nanoparticles immobilized proteolytic enzymes	DST	2023-11-08	2025-11-07	1122000	Dr. V Sorna Gowri
GAP0135	Designing and Development of Multifunctional light weight carbon allotropes based nanostructured material viz. Bandage for radiation shielding and biomedical applications	DST	2023-11-07	2026-11-06	4336680	Dr. Sarika Verma
GAP0136	Novel sub-1.7nm Thick Overcoats for Beating Friction, Wear and Corrosion of Hard Disk Media: Boosting Storage Capacity of Hard Disk Drives via Reducing the Thickness of Commercial Protective Overcoats from 2.5-3.0nm to sub-1.7 nm	DST	2024-01-01	2025-12-31	3788640	Dr. Neeraj Dwivedi
GAP0137	Development of Highly Sensitive and Selective Aptasensor for Early Diagnosis of Parkinson Biomarker Alpha-Synuclein using MXene-based Nanocomposites	DBT, New Delhi	2023-12-11	2026-12-10	3320000	Ms. Mansi Chaturvedi (Dr. Chetna Dhand)
GAP0138	Development of Bio-inspired Superhydrophobic Antimicrobial Nanocoatings on the Urinary Catheters to Impede Microbial Biofilm Formation and Catheter-	SERB, 3rd & 4th Floor, SERB Block II, Technolog	2023-12-04	2026-12-03	5195059	Dr. Chetna Dhand

	Associated Urinary Tract Infection	y Bhavan, New Mehrauli Road, New Delhi-110016				
GAP0139	Additive Manufacturing of Emerging 2D Mxene Derived Printed Composite Materials for Electromagnetic Interference Shielding Applications	SERB, 3rd & 4th Floor, SERB Block II, Technology Bhavan, New Mehrauli Road, New Delhi-110016	2024-03-14	2027-03-13	3265920	Dr. Sarika Verma
GAP0140	Development of 2D Mxene-based Materials for Efficient Reversible Hydrogen Storage at Ambient Conditions	SERB-CRG 3rd & 4th Floor, SERB Block II, Technology Bhavan, New Mehrauli Road, New Delhi-110016	2024-03-16	2027-03-15	2917080	Dr. Pradip Kumar
GAP0142	Development of Hand-Held Immunosensor Device using Bio-inspired Graphene-Based Nanocomposites for the detection of Parkinson's disease Biomarkers	ICMR, New Delhi	2024-03-15	2028-03-14	13660000	Dr. Chetna Dhand
SSP0062	Design and Development of Gold foam for jewelleries Applications	Titan Company Limited, Bengaluru	2022-02-25	2024-04-30	2006000	Dr. D P Mondal
SSP0063	Design and Development of Technology and processes of specialize Aluminium and graphene foam for electrode in High Performance extra fast recharging Light Weight Al-ion battery	M/s. Nordische Technologies Private Limited, Bengaluru	2022-05-09	2024-05-08	3481000	Dr. D P Mondal

SSP0064	Monitoring of Mixing Height Profile of atmosphere for Jamshedpur City using SODAR System	Tata Steel, Jamshedpur (Through NEERI Nagpur)	2023-03-01	2024-08-30	3200000	Dr. Kirti Soni
SSP0066	Development of Manufacturing Methodology/Process and supply of samples of High strength aluminum foam for blast mitigation	Combat Vehicle Research & Development Establishment (CVRDE), DRDO, Chennai	2023-04-18	2025-04-17	2496054	Dr. D P Mondal
SSP0068	Development of Aluminium hybrid composite foams core sandwich structures for Boot Anti Mine Applications	Defence Material and Store Research and Development Establishment (DMSRDE), DRDO, Govt. Of India, GT Road, Kanpur	2023-06-09	2025-06-08	3444420	Dr. Venkat AN Ch
SSP0069	Assessment of Impact of Leaching from existing ash pond for identification of piezometric points for Sanjay Gandhi Thermal Power Station Birsinghpur (MP)	M/s Sanjay Gandhi Thermal Power Station, Birsinghpur, District Umaria (MP)	2023-11-03	2025-05-02	1585920	Dr. Mohd. Akram Khan
SSP0070	Investigating the Leachability Studies and Utilization Potential of Ferro-Molybdenum Slag generated at M/s Boon Metal & Alloys Corporation, GIDC Sarigam, Valsad, Gujarat	M/s Boon Metal & Alloys Corporation, Plot No. 3002, GIDC	2024-02-19	2025-05-18	1116280	Dr. Mohd. Akram Khan

		Sarigam, District Valsad, Gujarat				
SSP0072	Design and Development of Aluminium alloy (AA 6061) open-cell foam core sandwich panels for space applications	M/s U R Rao Satellite Centre, HAL Airport Road, Vimanpura, Bangalore	2024-01-29	2026-01-28	2205000	Mr. Sriram Sathaiah
HCP0044	Catalyst Development for Electrolysers (FBR): Development of non-noble Ni-Fe and Ni-Fe-GO modified large area anodes for efficient hydrogen production by alkaline water electrolysis	CSIR New Delhi	2022-04-01	2024-09-30	3360000	Dr. Archana Singh
HCP0047	Phenome India-CSIR Health Cohort Knowledgebase	CSIR New Delhi	2022-03-08	2027-03-30	2575000	Dr. Raju Khan
HCP0054	Pilot Scale Fabrication of Joint Free Brick Size Gamma and Neutron Shielding Blocks (WP4)	CSIR, New Delhi	2023-09-04	2026-03-31	15262000	Dr. Shabi Thankaraj Salammal
HCP0054	Up-Scaling of Fly Ash based Advanced Geopolymeric Roller Compacted Concrete for all Weather Road Applications (WP2)	CSIR, New Delhi	2023-09-04	2026-03-31	14975000	Dr. (Eng.) Manish Mudgal
HCP0054	E-waste from spent nickel metal hydride battery: promising materials for hydrogen generation by alkaline electrolysis of water and water treatment application (FBR1)	CSIR, New Delhi	2023-09-05	2026-03-31	6790000	Dr. Archana Singh
HCP0054	Semi Pilot Demonstration for Conversion of Fly ash and Pond ash into Synthetic Aggregates – An alternative to River Sand (WP1)	CSIR, New Delhi	2023-09-05	2026-03-31	15365000	Dr. Prabha Padmakaran

HCP0101	CSIR-Jigyasa 2.0 Virtual Lab Integration	CSIR New Delhi	2022-07-27	2026-03-31	20042000	Dr. Satanand Mishra
MLP0301	Centre of Excellence in Graphene & its Applications	CSIR New Delhi	2022-04-27	2025-03-31	148000000	Dr. Sathish N
MLP0302	Development of Fly Ash based Advanced Geopolymeric Radiation Shielding Concrete utilizing Industrial Byproducts	CSIR New Delhi	2022-09-13	2024-09-12	10000000	Dr. Manish Mudgal
MLP0303	Engineered Shape Memory Polymer based Portable Heat/Fire Alarm Devices	CSIR New Delhi	2022-09-13	2024-09-12	9820000	Dr. Neeraj Dwivedi
MLP0304	Up Scaling & Demonstration of Advanced Brine Sludge-Based Flexible and Mouldable Polymeric Composite sheets for circular economy	CSIR New Delhi	2022-09-13	2024-09-12	11520400	Dr. Sarika Verma
MLP0306	Design and Development of Aligned Steel Fiber Cementitious composite using Electromagnetic Field along with its Mechanical Characterization	CSIR New Delhi	2022-09-09	2024-08-09	6100000	Dr. Sanjay Kumar Panthi
MLP0307	Graphene reinforced metal matrix composites through powder bed additive manufacturing for aerospace and defense applications	CSIR New Delhi	2022-09-20	2024-09-19	79812000	Dr. Sathish N
NWP0100	CSIR Integrated Skill Initiative-Phase II	CSIR New Delhi	2021-01-25	2025-03-31	22360000	Dr. J P Shukla (Upto 31/07/2024), Dr. Sandeep Singhai (31/07/2024 Onwards)
OLP0201	Development of flexible Piezoelectric two dimensional nanostructures based hybrid nanogenerator for harvesting mechanical energy	CSIR New Delhi	2021-07-02	2026-07-01	2500000	Dr. Manoj Kumar Gupta

OLP0301	Nature inspired fractal patterned Micro-Nano structured catalyst modified electrodes: A novel approach for efficient hydrogen production by electrolysis of water	CSIR New Delhi	2022-05-27	2025-05-26	2950000	Dr. Archana Singh
OLP0302	Designing and Development of Multifunctional light weight carbon allotropes based nanostructured material viz. Bandage for radiation shielding and biomedical applications	CSIR-AMPRI	2023-11-07	2026-11-06	2373949	Dr. Sarika Verma
OLP0303	On-Site Cultivation of Bamboo and Sisal at CSIR-AMPRI, Bhopal For Eco-Friendly Bamboo/Sisal Biocomposite Development – A Green and Sustainable Approach	CSIR, New Delhi	2024-02-19	2029-02-18	100000	Dr. Sarika Verma
OLP0304	Additive Manufacturing of Emerging 2D Mxene Derived Printed Composite Materials for Electromagnetic Interference Shielding Applications	SERB, 3rd & 4th Floor, SERB Block II, Technology Bhavan, New Mehrauli Road, New Delhi-110016	2024-03-14	2027-03-13	800000	Dr. Sarika Verma

List of Projects Completed between 01/04/2023 to 31/03/2024

Project No.	Title	Funding Agency	Date of Start	Date of Completion	Funding	Project Leader
GAP0095	Hydrogen Powered desalination system using recycled aluminium: A novel process to extract potable fresh water from seawater (joint project with CIIRC-Jyothy Institute of Technology)	DST, New Delhi	2020-03-20	2024-03-31	5035737	Dr. Surender Kumar
GAP0097	Electrochemical additive manufacturing process for sculptures, statues and decorative arts applications	DST-SEED, Technology Bhavan, New Mehrauli Road, New Delhi - 110016	2020-02-28	2024-02-27	6909753	Dr. Surender Kumar
GAP0098	Development of experimental setup for investigation, recording, and testing of electromagnetic signals from magnetic photons in homeopathy medicines and other test samples	Government Homeopathic Medical College & Hospital, Ayush Parisar, MANIT Hills, Nehru Nagar, Bhopal-462003	2020-05-05	2023-05-04	3100000	Dr. H N Bhargaw
GAP0101	Development of Rapid Electrochemical based diagnostics for detection of SARS-COV-2 Infection	DST-SERB, New Delhi	2020-09-07	2024-03-01	4600240	Dr. Raju Khan
GAP0103	Lab to field demonstration of the domestic electricity free filter device for fluoride free drinking water	DST, New Delhi	2020-11-10	2023-11-09	6262434	Dr. Archana Singh
GAP0104	Fabrication of carbon nano-tube metal oxides based nano architecture as a flexible anode for lithium batteries	DST-WOSA, New Delhi	2021-01-13	2024-01-12	1849210	Ms. Anushi Sharma (Dr. D P Mondal)

GAP0110	Installation of SODAR system for Maharashtra Pollution Control Board (MPCB)	Maharastra Pollution Control Board	2021-10-26	2023-12-20	3500000	Dr. Kirti Soni
GAP0113	Design of molecular complexes derived high temperature electrodeposited catalyst for improved water oxidation reaction in electrolysis of water	DST-SERB, New Delhi	2021-12-20	2023-12-19	2329114	Dr. Archana Singh
GAP0114	Vehicle exhausted soot based component electrodes for bioelectrochemical system in waste to wealth concept	DST-SERB, New Delhi	2022-01-13	2024-01-12	3009960	Dr. Shiv Singh
GAP0115	Development of Smart Tribological and Corrosion Protective Coatings for Magnetic Storage Devices and Defence systems	DST-SERB, New Delhi	2022-02-09	2024-02-08	3030480	Dr. Neeraj Dwivedi
GAP0129	Training and Internship on Artificial Intelligence in Hydrological & Environmental Applications	SERB, 3rd & 4th Floor, SERB Block II, Technology Bhavan, New Mehrauli Road, New Delhi-110016	2023-06-30	2023-12-29	150000	Dr. Satanand Mishra
GAP0117	Design and Development of an instrument for real time assessment of ferromagnetic phase fraction in ferrous alloys	DST, New Delhi	2022-03-22	2024-03-21	2411279	Dr. H N Bhargaw
GAP0123	Setting up COVID-19 upsurge facility: Design, development and demonstration of 6 bed Makeshift hospital (based on know-how of CSIR-	BILL & MELINDA GATES FOUNDATION, Seattle, Washington, United States	2022-11-21	2023-09-15	5068010	Dr. J P Shukla

	CBRI & CSIR-AMPRI at Sarangi Village, Tehsil Petlawad, District Jhabua, Madhya Pradesh					
GAP0125	Advanced Hybrid Nanomaterials and their Photocatalytic Efficiency towards Solar Fuel Generation through CO2 Reduction: A Quantum Chemical exploration	DST-SERB, New Delhi	2022-08-16	2023-11-20	1293011	Dr. Supriya Saha
SSP0061	Design and Development of Ballistic Helmet with Blast Attenuating Capability	Ordinance development cell, Ordinance Cloth Factory, OCFAV-Avadi, Chennai	2021-10-18	2023-10-17	4720000	Dr. D P Mondal
SSP0065	Evaluation of Microplastic Contamination in 12 water bodies in Bhopal and Indore District	Office of the Accountant General (Audit II) 53, Hoshangabad Road, Arera Hills, Bhopal MP 462011	2023-03-07	2023-09-06	330400	Dr. Archana Singh
SSP0067	Design and Development of dual carbon foam based lightweight high energy density lead acid battery	Nordische Energy Systems Pvt. Limited, 91 Springboard, 1st Floor, 45/3 Residency Road, Bengaluru	2023-08-29	2024-02-28	1770000	Dr. D P Mondal

In-House Projects Completed During 23-24

Project No.	Title	Funding Agency	Date of Start	Date of Completion	Funding	Project Leader
HCP0030	Development of Advanced materials and devices for opto, electronic, bio medical and strategic applications	CSIR New Delhi	2020-08-07	2023-06-30	19737000	Dr. Sathish N

HCP0031	Real time portable electrochemical sensor array for simultaneous detection of antibiotics and pesticides: for Assuring safety of food (ATLAS)	CSIR New Delhi	2021-02-04	2024-03-31	7454500	Dr. Shiv Singh
HCP0042	Integration of thermo-responsive Smart Material Linear Displacement Actuator for position control of 3D printer Extruder using AI-based self-sensing technique	CSIR New Delhi	2022-06-27	2024-03-31	5394800	Dr. H N Bhargaw
MLP0305	Manufacturing red mud waste based X-Radiation Shielding doors/panels in pilot scale	CSIR New Delhi	2022-09-09	2024-03-08	7476000	Dr. Manoj Kumar Gupta

Patents

Patents Granted in India

SNo	NFNO	Country	Lab	Title	Inventors	Prov. Filing Date	Comp. Filing Date	Application No.	Status	Grant Date	Patent No.
1	0115NF2019/IN	IN	AMPRI	LEAD FREE RED MUD BASED X-RAY SHIELDING TILES	Shabi Thankaraj Salammal, Sunil Kumar Sanghi, Deepti Mishra, Avanish Kumar Srivastava, Rini Paulose, Varsha Agrawal, Rahul Arya, Akshay Singh Tomar, Rathore Sanjai Kumar Singh	20-Aug-2019	10-Aug-2020	201911033448	IF/2025	05-Apr-2023	428365
2	0223NF2015/IN	IN	AMPRI	A process for preparation of Cu-based Shape Memory Alloys using Elemental Powders	GAURAV KUMAR GUPTA, MUHAMED SHAFEEQ M, OM PRAKASH MODI	---	12-Feb-2016	201611004950	IF/2025	07-Nov-2023	466763
3	0185NF2015/IN	IN	AMPRI	CHEMICALLY DESIGNED MULTIFUNCTIONAL ADVANCED MATERIALS FROM GEOPOLYMERIZED BRINE SLUDGE	Amritphale Sudhir Sitaram, Verma Sarika, Khan Mohammed Akram, Anshul Avneesh, Das Satyabrata	---	07-Jan-2016	201611000546	IF/2025	29-Nov-2023	474511

				AND A PROCESS FOR THE PREPRATION THEREOF							
4	0014NF2017/IN	IN	AMPRI	Lock-unlock Shape Memory Alloy (SMA) actuator device for Latch assembly	BHARGAW HARI NARAYAN, DASGUPTA RUPA, DAS SATYABRATA, HASHMI SYED AZHAR RASHEED	29-Mar-2017	26-Mar-2018	201711011149	IF/2025	27-Dec-2023	490252
5	0091NF2015/IN	IN	AMPRI	A process for the synthesis of homogenized nanonsized rare earth oxycarbonates using cytosine and microwave irradiation	Amritphale Sudhir Sitaram, Verma Sarika	---	06-Nov-2015	3622DEL2015	IF/2025	28-Dec-2023	490806
6	0201NF2014/IN	IN	AMPRI	A Novel Machine for Making Fine Thin Yarn from Sisal Fibre	Asokan Pappu, Goel Manmohan Dass, Morchhale Rajesh Kumar, Murali Shiramdas, Khan Mohammed Akram, Mishra Deepti, Kulshreshth Ajay, Amritphale Sudhir Sitaram, Lahiri Swati	26-May-2015	09-May-2016	1497DEL2015	IF/2025	24-Jan-2024	502977
7	0181NF2016/IN	IN	AMPRI	A COMPOSITION FOR POLYMERIC FOAM	SYED AZHAR RASHEED HASHMI, SATYABRATA DAS, PRASANTH	01-Sep-2016	26-Aug-2017	201611029845	AB/Potential licensor n	07-Feb-2024	508324

				STRUCTURE WITHOUT USING FOAMING AGENTS AND PROCESS THEREOF	NARAYANAN NAIR, AJAY NAIK						
8	0065NF2019/IN	IN	AMPRI	Radiation Shielding Material Capable of Attenuating X-Ray by Dual Mechanism and Process for Preparation Thereof	Verma Sarika, Rathore Sanjai Kumar Singh, Srivastava Avanish Kumar	---	20-Aug-2019	201911033451	IF/2025	09-Feb-2024	508968
9	0128NF2018/IN	IN	AMPRI	A glossy finish sandwich composite and process for preparing the same	ASOKAN PAPPU, GUPTA MANOJ KUMAR, MISHRA ALKA, PETERS EDWARD, KULSHRESHTH AJAY, RATHORE SANJAI KUMAR SINGH, SRIVASTAVA AVANISH KUMAR	---	14-Dec-2018	201811047389	IF/2025	06-Mar-2024	521012

Patents Granted in Foreign Countries

SNo	NFNO	Country	Lab	Title	Inventors	Prov. Fili	Comp. Filin	Application No.	Status	Grant	Patent No.

						ng Date	g Date			Date	
1	0090NF2020/US	US	AMPRI	ADVANCED LEAD FREE RADIATION PROTECTION MATERIALS UTILIZING MODIFIED BRINE SLUDGE COMPOSITION AND THE PROCESS THEREOF	VERMA SARIKA, MILI MEDHA, KHAN MOHAMMED AKRAM, SANGHI SUNIL KUMAR, HASHMI SYED AZHAR RASHEED, RATHORE SANJAI KUMAR SINGH, SRIVASTAVA AVANISH KUMAR	---	19-Oct-2021	17/451412	IF	11-Jul-2023	11699533
2	0121NF2016/US	US	AMPRI	DEVELOPMENT OF GRAVITY OPERATED LOW COST HOUSEHOLD DEFLUORIDATION DEVICE USING GAMMA NANOALUMINA INCORPORATED FILTER	INDRA BHUSHAN SINGH, ARCHANA SINGH, SWATI DUBEY, AKSHAY SINGH TOMAR, PRIYANKA ARYA, AVANISH KUMAR SRIVASTAVA	---	23-May-2019	16/421220	IF	26-Sep-2023	11766641

Patent Applications Filed in India

SNo	NFNO	Country	Lab	Title	Inventors	Prov. Filing Date	Comp. Filing Date	Application No.	Status	Grant Date	Patent No.
1	0077NF2023/IN	IN	AMPRI	Linearly Actuated Shape Memory Polymer Composite Reinforced with MAX Filler for Enhanced Heat and Fire Detection	Neeraj Dwivedi, Shubham Jaiswal, Chetna Dhand, Avanish Kumar Srivastava	---	01-Sep-2023	202311059078	PP	---	---
2	0144NF2023/IN	IN	AMPRI	Multilayer coating enabled flexible electrodes for lead detection and preparation thereof	Chetna Dhand, Neeraj Dwivedi, Monika Patel, Pradip Kumar, D. P. Mondal, Avanish Kumar Srivastava	---	21-Sep-2023	202311063611	PP	---	---
3	0224NF2022/IN	IN	AMPRI	Improved Shape Memory Polymer Composites Reinforced with Ti3C2 MXene and Preparation Thereof	Neeraj Dwivedi, Pankaj Bharti, Chetna Chand, Avanish Kumar Srivastava	---	29-Sep-2023	202311066059	PP	---	---
4	0048NF2023/IN	IN	AMPRI	FLEXIBLE AND MOLDABLE MATERIAL FROM BRINE SLUDGE AND BAMBOO-BASED	Sarika Verma, Medha Mili, Mohd. Akram Khan, Avanish	---	27-Oct-2023	202311074038	PP	---	---

				COMPOSITION AND THE PROCESS THEREOF	Kumar Srivastava						
5	0190NF2023/IN	IN	AMPRI	Hybrid PMMA/Liquid Silicone Rubber Polymer Nanocomposites Based Coating material for Lead-Free X-Ray Radiation Shielding Textile and the Process Thereof	Sorna Gowri Vijaya Kumar, Mohammed Akram Khan, Sarika Verma, Raju Khan, Abhijit Bijanu, Avanish Kumar Srivastava	---	06-Nov-2023	202311075855	PP	---	---
6	0197NF2023/IN	IN	AMPRI	GRAPHENE OXIDE-MXENE NANOCOMPOSITE FOR ROOM TEMPERATURE HYDROGEN STORAGE AND PREPARATION THEREOF	Pradip Kumar, Shankar Ghotia, Shiv Singh, Asokan Pappu, Avanish Kumar Srivastava	09-Nov-2023	---	202311076803	PP	---	---
7	0072NF2023/IN	IN	AMPRI	Heat/Fire and Smoke Alarm Device Based on Hybrid Technology Comprising Shape Memory Material and Infrared Detector	Neeraj Dwivedi, Jeet Vishwakarma, Shubham Jaiswal, Chetna Dhand, Avanish Kumar	---	07-Mar-2024	202411017189	PP	---	---
8	0208NF2023/IN	IN	AMPRI	Polydopamine functionalized Ti3AlC2 MAX phase modified	Neeraj Dwivedi, Sneh Nema,	---	15-Mar-2024	202411020305	PP	---	---

				electrode for simultaneous detection of lead and copper and preparation thereof	Chetna Dhand, Jamana Prasad Chaurasia, Avanish Kumar Srivastava						

Patent Applications Filed in Foreign Countries

SNo	NFNO	Country	Lab	Title	Inventors	Prov. Filing Date	Comp. Filing Date	Application No.	Status	Grant Date	Patent No.
1	0030NF2020/US	US	AMPRI	Bidirectional, Linear and Binary, Segmented Antagonistic Servomechanism-based Shape Memory Alloy (SMA) Actuator	Bhargaw Hari Narayan, Joshi Tilak Chandra, Hashmi Syed Azhar Rasheed, Srivastava Avanish Kumar, John Pretesh	---	20-Oct-2023	18/491436	PP	---	---

Research Publications

1. K. B. Patel, B. Parmar, K. Ravi, R. Patidar, J. C. Chaudhari, D. N. Srivastava, G. R. Bhadu, Metal-organic framework derived core-shell nanoparticles as high performance bifunctional electrocatalysts for HER and OER, **Applied Surface Science**, **616**, 156499, 2023. IF: 7.392.

2. R. Arya, R. Paulose, V. Agrawal, A. Pandey, D. Mishra, S. K.Sanghi, M. A. Khan, D.P. Mondal, M. M. Shafeeq, K. Banerjee, S. Chatterjee, S. Mukhopadhyay , P. Roy , R. Ravishankar , C. Bhattacharya , A. Bhisikar , P. Mondi , U. Si ngh , A. Agnihotri , A. K.Srivastava, S. T. Salammal, Next generation gamma ray shielding blocks developed using alumina industry waste, **Construction and Building Materials,** 373, 10, 130895, 2023. IF 7.693**.**

3. V. Soni, P. Singh, A. A. P. Khan, A. Singh, A. K. Nadda, C. M. Hussain, Q. V. Le, S. Rizevsky, V. H. Nguyen, P. Raizada, Photocatalytic transition-metal-oxides-based p–n heterojunction materials: synthesis, sustainable energy and environmental applications, and perspectives, **Journal of Nanostructure in Chemistry** , 13, 129, 2023. IF: 8.0.

4. A .Bhaduri, S. Singh, and M. K. Gupta, Self-Powered Fluoride Ion Detectors Based on Piezoelectric Nanogenerators with Filler Materials Comprising Mn-Doped BaTiO3 Nanostructures and Carbon Nanotubes, ,**ACS Appl. Nano Mater.**6 (8) , 6637,2023. IF: 6.140.

5. A. Maholiya, P. Ranjan, R. Khan, S. Murali, R. C. Nainwal, P. S. Chauhan, N. Sathish, J. P. Chaurasia and A. K. Srivastava, An insight into the role of carbon dots in the agriculture system: a review, **Environmental Science-Nano** 10 (4) , 959, 2023. IF:9.473.

6. A.Kaur, G Sahani, M. Mudgal, R K Chouhan, A.K. Srivastava, P. N Pawaskar, Studies on radiation shielding properties of newly developed high-density concrete for advanced radiotherapy facilities, ***Radiation Protection Dosimetry,*** 199(5), 399, 2023. IF: 0.954.

7. V. P. Giri , S. Pandey , S. Srivastava , P. Shukla , N. Kumar , M. Kumari , R. Katiyar , S. Singh , A. Mishra ,Chitosan fabricated biogenic silver nanoparticles (Ch@BSNP) protectively

modulate the defense mechanism of tomato during bacterial leaf spot (BLS) disease, **Plant Physiology and Biochemistry**, 197,107637, 2023. IF: 5.437.

8. K.R. Balaji, M.H. Abdellah, V.G. Dileep Kumar, M.S. Santosh , R. Reddy , S. Kumar , G. Szekely, Nanofiltration membranes composed of carbonized giant cane and Pongamia meal binder for ion sieving in water and molecular sieving in organic solvents, **Sustainable Materials and Technologies**, 35, , e00517, 2023. IF:10.681.

9. I. A. Saud , Y. Fatima. L., M Miloud, Marei M El-Ajaily, N.Elfadil, A. K. Sarangi, S. Verma, M. Azam, V. Seidel, R. K. Mohapatra, Synthesis, characterization, biological applications, and molecular docking studies of amino-phenol derived mixed-ligand complexes with Fe(III), Cr(III), and La(III) ion,. **Journal of Saudi Chemical Society** 27(3), 101622, 2023. IF: 4.712.

10. A.S. Nair, P. Singh, K. Soni, K Meena, R. Sharma, Sway of aerosol on Atmospheric Boundary Layer influencing air pollution of Delhi, **Urban Climate**, 49, 101478, 2023. IF 6.663.

11. K.P. Mehra, D.Tavar ,S. Prakash, R. K. Sharma, A. K.Srivastava, A.Paul and A. Singh, One-Step High-Temperature Electrodeposition of Fe-Based Films as Efficient Water Oxidation Catalysts, **Langmuir**, 39 (17), 6088, 2023.IF: 4.331.

12. T.K. Mandal, P.Yadav, M. Kumar, S. Lal, K. Soni, L. Yadav, Ummed Singh Saharan and Sudhir Kumar Sharma, Characteristics of volatile organic compounds (VOCs) at an urban site of Delhi, India: Diurnal and seasonal variation, sources apportionment, **Urban climate**, 49(12):101545, 2023. IF 6.663.

13. A. Srivastava, S.Badatya, A. K. Chaturvedi, D. K. Kashyap, A.K.Srivastava and M.K. Gupta, Paddy-Straw-Derived Graphene Quantum Dots Reinforced Vertical Aligned Zinc Oxide Nanosheet-Based Flexible Triboelectric Nanogenerator for Self-Powered UV Sensors and Tribotronics Application, **ACS Applied Materials and Interfaces**, 15 (20), 24724, 2023. IF: 9.5.
14. V. Hada, K. Chaturvedi, A.Singhwane, N. Siraj, A. Gupta, N. Sathish, J. P. Chaurasia, A. K. Srivastava & S. Verma, Nanoantibiotic effect of carbon-based nanocomposites: epicentric on graphene, carbon nanotubes and fullerene composites: a review, **3 Biotech**, 13(5) , Article number: 147 ,2023, IF: 2.8.

15. A. S Nair, K.Soni, P. Singh, K. Meena, R. Sharma, Aerosol Variability at Coastal Bhola Island (Bangladesh), an IGP Outflow Region, ***Journal of the Indian Society of Remote Sensing*** 51 (5) , 1013, 2023. IF: 2.5.

16. N. Singh, S. Tanwar, P. Kumar, A. L. Sharma, B. C. Yadav, Advanced Sustainable Solid State Energy Storage device based on FeOOH Nanorod Loaded Carbon@PANI electrode: GCD cycling and TEM Correlation, **Journal of Alloys and Compounds**, 947 169580, 2023 . I.F. = 6.371.

17. H.N. Bhargaw, M. Sharma, A.K. Srivastava, N. Nambison, M. K. Gupta, M. R. Jadhav, K. Singh Gavel, P.K. Baghel, M. Ahmed, Unraveling the low-frequency triggered electromagnetic signatures in potentized homeopathic medicine, **Materials Science and Engineering: B**, 292, 116365, 2023. IF: 3.407.

18. N. Bisht, M. Patel, N.Dwivedi, P.Kumar, D.P. Mondal, A.K. Srivastava, C. Dhand, Bio-inspired polynorepinephrine based nanocoatings for reduced graphene oxide/gold nanoparticles composite for high-performance biosensing of Mycobacterium tuberculosis, **Environmental Research**, 227, 115684, 2023.IF: 8.431.

19. D. K. Gupta, D. Choudhary, A.Vishwakarma, M. Mudgal, A. K. Srivastava, A. Singh, Microplastics in freshwater environment: occurrence, analysis, impact, control measures and challenges, **International Journal of Environmental Science and Technology,**20(6), 6865, 2023. IF: 3.519.

20. M.K. Rajak , D.P. Mondal , Y. Mehta , Effect of rolling on microstructure behaviour, and mechanical properties of Mg-Al-Si alloys, **Materialstoday Communications**, 35, 106320, 2023,.IF:3.8.

21. H. Siddiqui, H.N. Singh, K.Bhavani, S. Rao, S. Kumar, V. Chauhan, M. Goswami, M. Ashiq , N. Sathish, S. Kumar, Meniscus- confined electrochemical additive manufacturing of copper microstructures: Design, fabrication, characterization, and decorative art technology, **Materialstoday Communications** 35, 105796, 2023. IF: 3.8.

22. S.Kumar, M.Goswami , N. Singh , U. Deshpande , S. Kumar, N. Sathish, Flexible and lightweight graphene grown by rapid thermal processing chemical vapor deposition for thermal management in consumer electronics, **New Carbon Materials,**38, 534 ,2023.IF: 5.7.

23 S. Verma, H. Bajpai, S. Suresh, M. Mili, R. K. Gupta, R. Shetty, S. Kamble, M.. A. Khan, S. A. R. Hashmi & A. K. Srivastava, Synthesis of advanced asbestos-free material using rice husk ash and marble waste for thermal insulation applications. **Biomass Conversion and .Biorefinary**. **13**, 8985 , 2023. IF:4.0.

24 K. Sharma , A. Kumar , T. Ahamad , Q. Va. Le , P. Raizada , A.Singh , L. H. Nguyen , S. Thakur , Van-Huy Nguyen , P.Singh, Sulphur vacancy defects engineered metal sulfides for amended photo(electro)catalytic water splitting: A review, **Journal of Materials Science & Technology**, 152, 50, 2023. IF: 10.9.

25 S K Gupta , S P Tripathy, , D Bharti, , S K Pal , S Verma, K Pal, S S Ray, One pot synthesis of phosphate glass with in situ formed nanodiamonds from adenosine triphosphate for bone repair, **Ceramic International**, 49, 22537 ,2023. IF: 5.2.

26 S. Yadav, M. A. Sadique , P. Ranjan , R. Khan, Synergistically functionalized molybdenum disulfide-reduced graphene oxide nanohybrid based ultrasensitive electrochemical immunosensor for real sample analysis of COVID-19, **Analytica Chimica Acta**, 1265, 341326, 2023. IF: 6.2.

27 **.**A. Das , V.Yadav , B.Al Mangour , H.C. Prasad , N. Sathish, M. Ashiq , A. K. Srivastava, Additive manufacturing of graphene reinforced 316L stainless steel composites with tailored microstructure and mechanical properties, **Materials Chemistry and Physics**, 303, 15, 127826, 2023. IF:4.6.

28 S. Meena, N. Kumari, S. Mitra, R. Singhal, S. Verma, R. K. Choubey, U.Kumar Dwivedi**,** Dielectric study of CoFe2O4/MWCNT/epoxy nanocomposites: Effect of temperature, concentration and irradiation, **Polymer Composites**, 44 (7) , 3789,2023. IF: 3.531.

29 D.K. Gupta , A. Vishwakarma , A. Singh**,** Release of microplastics from disposable face mask in tropical climate, **Regional Studies in Marine Science**, 61, 102847, 2023. IF: 2.1.

30 D. Tavar, R. K. Sharma, M. Ashiq, M. Mudgal and A.Singh, rGO supported cobalt-manganese based nanocomposite with improved electrochemical water oxidation catalysis, **Journal of Materials Science**, 58, 11270, 2023. IF:4.5.

31 Z.Zaidi , Y. Gupta , S. L. Gayatri , A. Singh , A comprehensive discussion on fuel combustion and desulfurization technologies, **Inorganic Chemistry Communications**, 154, 110964, 2023. IF: 3.8.

32 S.Mehra, A.K.Chauhan, S. Dodeja, P.Kumar, L.Goswami, G. Gupta, A.K. Srivastava, S.N. Sharma, Study of charge-transfer and energy-transfer properties of methylammonium-based-Pb-halide perovskites, **Optical Materials**, 142, 114014, 2023. IF: 3.9.

33 S. Prakash, Kamlesh, D. Tavar, S. Bandyopadhyay, S. Singhai, A. K. Srivastava and A. Singh**,** Graphene Supported Pillared Ni–Co Metal–Organic Framework as an Efficient Electrocatalyst for the Water Oxidation Reaction, **ACS Applied Energy Materials**, 6, 16, 8422, 2023. IF:6.4.

34 R. Patidar, H. Gupta & A. Savita, Computational insight towards the binding affinity and participation of aliphatic unsaturated sidearms of aza-18-crown-6 extractants for Sr2+ encapsulation in different solvent medium, **Journal of Molecular Modeling** 29, 294, 2023. IF:2.2.

35 S.K. Srivastava, M.K.Gupta, G.K.Gupta, S.K.Gupta,T.C.Joshi, V. Shrivastava, D.P. Mondal, Fluidized spray driven polymer mediated ultra stable Aluminum metal coating with enhanced dielectric properties, **Materials Science and Engineering: B**, 294, 116490,2023. IF:3.6.

36. S. Sharma , S.R. Asolekar , V.K. Thakur , P. Asokan, Valorization of cellulosic fiber derived from waste biomass of constructed wetland as a potential reinforcement in polymeric composites: A technological approach to achieve circular economy, **Journal of Environmental Managemen**t, 340, 117850,2023.IF:8.7.

37. A. Badkul & S. Saxena , Developing metallic bond in aluminum foam in-filled sandwich composite panels and comparing normal and in-plane shear strengths performance with polymeric binders, **Sadhana** 48, 160, 2023 . IF: 1.6.

38. S. Kumar , M. Goswami , N.l Singh , H. Siddiqui , H.Chandra Prasad , M. Ashiq , Raju Khan , S.Natarajan , S.Kumar, Friction generated and Hele-Shaw cell designed facile alternative electrodes for high energy density supercapacitors, **Journal of Energy Storage**, 66, , 10740730, 2023. IF:9.4.

39. A. Bijanu, G.Rajak, , R. Paulose, R.Arya, V. Agrawal, V. S Gowri, M. A.Khan, Shabi T. S. & D. Mishra, Flexible, Chemically Bonded Bi-PVA–PVP Composite for Enhanced Diagnostic X-ray Shielding Applications, Journal of **Inorganic and Organometallic Polymers and Materials** , **33**, 2279, 2023. IF:4.0.

40. S.Das, P. Sarkar, M. Goswami, Sk. M. Ali, M. R.Mollah and Sk. M. Islam, A sustainable strategy for the visible-light-driven facile *N*-formylation of amines using a Co(II)-embedded covalent organic framework as an efficient photocatalyst, ,**Materials Chemistry Frontiers**, 7, 3349,2023. IF:7.0.

41. A. Kumar, S N Singh, Jyoti, S. Tomer, Vandana, S. K. Srivastava, M. Dutta, P.Pathi, A novel analytical method for determination of diode parameters from the dark forward I-V characteristics of a silicon solar cell, **Physica Scripta**, 98, 090001, 2023. IF:2.9.

42. A.S.Tomar, R. Gupta, A.Bijanu, D. Tanwar, A. Singh, T.S.Shabi, C. Dhand, D.Mishra,TiO2 - geopolymer based novel corrosion protective micro-coatings to emaciate mild steel oxidation in severe environments, **Construction and Building Materials**, 395, 132252, 2023. IF:7.4.

43. Bhawna , S.Kumar, R. Sharma, S.J. Borah, A. Gupta, M. K. Gupta, R. Kumar, K.K.Dubey, Y. K. Mishra and V. Kumar**,** Catalytic heterostructured materials for CO2 mitigation and conversion into fuels: a renewable energy approach towards a sustainable environment**,** **Sustainable Energy & Fuels** 7 , 4354, 2023. IF: 5.6.

44. S. Chauhan , P. N.Mohan , K.C.J.Raju, S.Ghotia , N.Dwivedi , C. Dhand , S.Singh , P.Kuma r, Free- standing polymer/multiwalled carbon nanotubes composite thin films for high thermal conductivity and prominent EMI shielding, **Colloids and Surfaces A: Physicochemical and Engineering Aspects**, 673, 13181120,2023. IF: 5.2.

45. S. Jaiswal, J. Vishwakarma, S. Bhatt, S. Karak, P. Bharti, C. Dhand, R. Kumar, P.Kumar, M.S.M. Saifullah, S. Saha, R. Mishra, N. Dwivedi, Layered Titanium Carbide-Mediated Fast Shape Switching and Excellent Thermal and Electrical Transport in Shape-Memory-Polymer Composites for Smart Technologies: MAX Versus MXene**,** **Advanced Engineering Materials**, 25, 2300233, 2023, IF: 4.122.

46. S. Tomer, M. Devi, A.Kumar, S. Laxmi, S.Satapath**y**, K.K. Maurya, P. Singh, P. Pathi and Vandana, High-Quality Silicon Surface Passivation by Thermal-ALD Deposited Hafnium Oxide Films, **IEEE Journal of Photovoltaics**, 13, 691,2023. IF: 3.0.

47. M.K. Shukla, A, Parihar, C. Karthikeyan, D. Kuman, R Khan, Nanoscale, Multifunctional GQDs for receptor targeting, drug delivery, and bioimaging in pancreatic cancer, **Nanoscale**, 15, 14698, 2023. IF:6.7.

48. D. Choudhary, A. Singh, A. Giri, H. C. Prasad, R. K. Sharma, A. Mishra, S. Singhai and A. Singh, Functional hBN decorated Ni(OH)(2) nanosheets synthesized for remarkable adsorption performance for the elimination of fluoride ions, **Dalton Transactions**, 52(37):13199,2023. IF: 4.0

49. M.Goswami, S.Kumar, H.Siddiqui, L. Atram, N. Singh, H.C.Prasad, M.Ashiq, N.Sathish, and S. Kumar, Morphology Variations in Copper Sulfide Nanostructures as Anode Materials for Na-Ion Capacitors, **ACS Applied Nano Materials** 6, 15498, 2023. IF:5.9.

50. M.K. Yadav, S.S. Kundale, S.S. Sutar, T.D. Dongale, P.Kumar and N. Panwar, Non-volatile resistive switching behavior and time series analysis of Ag/PVA-graphene oxide/Ag device**, Journal of Applied Physics**. 134, 105101, 2023, IF: 3.2

51. A. Sharma, A. Pandey, V. K.Patle, N. Sharma, H. Jain, A. Khare, N.Dwivedi, G.Gupta, D.P. Mondal, A.K. Srivastava, R.Kumar Sustainable lightweight multifunctional carbon foams derived from coal tar pitch using urea as a pore-forming agent**, Journal of Analytical and Applied Pyrolysis**, 174, 106145,2023. IF:6.0.

52. S.Jaiswal, J.Vishwakarma, S. Bhatt, S. Karak, P. Bharti, C.Dhand, R. Kumar, P.Kumar, M. S. M. Saifullah, S.Saha, R. Mishra, N.Dwivedi, Layered Titanium Carbide-Mediated Fast Shape Switching and Excellent Thermal and Electrical Transport in Shape-Memory-Polymer Composites for Smart Technologies: MAX Versus MXene**, Advanced Engineering Materials**, **25,** 2300233, 2023. IF:3.6.

53. S.Badola, J.Shah , A.Gaur , S.Khasa , D S Rawal , T K Mandal , A K Srivastava , R K Kotnala, Strategic enhancement of oxygen defects in ZnO from ZnS for water splitting to generate green electricity by hydroelectric cell, **Applied materialstoday** 34, 101904,2023. IF:8.3.

54. S. Tomer , A. Kumar , M. Devi , Vandana, ALD deposited bipolar HfO_x films for silicon surface passivation, **Surfaces and Interfaces,** 41, 103208, 2023. IF:6.2.

55. V. K. Patle , Yashwant Mehta , Rajeev Kumar, Effect of boric acid coating on the electrical, thermal, mechanical and oxidation-resistant properties of coke derived carbon foam**, Materials Chemistry and Physics**, 307, 1281971, 2023. IF:4.6 .

56. Y. Budania, S.Mishra, A. Mishra, A. Jana , A.Modi , A.Tyagi , P. Kumar, S, Singh, Multi-heteroatom doped vehicle exhaust soot derived nano-onion based economical and efficient electrodes for microbial fuel cell: A waste to wealth strategy, **Chemical Engineering Journal**, 474, 145627, 2023. .IF:15.1.

57. Kamlesh, Z.Zaidi, M. Mudgal, A.K.Srivastava and A. Singh, Recycled Steel from Waste Dead Nickel–Metal Hydride (Ni–MH) Batteries as Efficient Bifunctional Electrodes for Water Splitting: Ideal Way from Waste to Energy, **ACS Applied Energy Materials** , 6(20) 10610, 2023. IF:6.4.

58. V. Dutta , A. Sudhaik , Sonu , P.Raizada , A. Singh , T. Ahamad , S. ThakurQ. V. Le , Van-Huy Nguyen , P. Singh, Tailoring S-scheme-based carbon nanotubes (CNTs) mediated Ag-$CuBi_2O_4/Bi_2S_3$ nanomaterials for photocatalytic dyes degradation in the aqueous system, **Journal of Materials Science & Technology** 162, 11, 2023. IF: 10.9.

59. A. Singhal , R. Khan, Plastic antibodies integrated with graphene quantum dots for electrochemical sensing of bisphenol-A in real samples, **Materials Letters**, 350, 134880, 2023. IF:3.0.

60. K. Chaturvedi, A.Singhwane, A. Jaiswal, M. Mili, A. Tilwari , R.K. Mohapatra , A. K. Srivastava , S.Verma, Robust synthesis and characteristics of novel one-dimensional gadolinium oxide nanorods decorated multiwalled carbon nanotubes based antibacterial nanocomposites for health care applications, **Inorganic Chemistry Communications**, 157, 111324, 2023..IF:3.8.

61. N.Kumar, A.S. Nair, K. Soni, A AShingare, V. M Motghare, K. A Rajput, V K Soni, A. Kumar, A.K. Jha, Characteristics of atmospheric boundary layer structure using monostatic SODAR system over Mumbai region. **Journal of Earth System Science**, 132, 177 ,2023.. IF:1.9.

62. H. Goel , P. Gupta , K. Jha , Akshita , M. Patel , Shruti , N.Dwivedi , K.. Ranjan, C. Dhand , M. Das Mukherjee, Mxene-based nanocomposites for biosensing: Recent developments and future prospects, **FlatChem**, . 42, 100576,2023. IF:6.2.

63. S. Mehra , Mamta , V.N. Singh , G. Gupta , A.K. Srivastava, S.N. Sharma, Experimental analysis of methylammonium and Formamidinium-based halide perovskite properties for optoelectronic applications, **Heliyon**, 9, e21701, 2023. November 2023. IF:4

64. A. Jaiswal, K. Chaturvedi, M. Mili, K. Pal, R. K. Mohapatra, M. A. Khan, H. N. Bhargaw, A. K. Srivastava, S. Verma, Smart shape memory polymers and their significance in biomedical applications: A review, **Polymer for Advanced Technologies** 34(11), 3381,2023. IF:3.4.

65. M.Goswami ,H.Siddiqui, S. Kumar, L. Atram , N. Singh, N. Sathish, S. Kumar ,Self-supported, additive-, and binder-free CuS nanowire array for high performing Na-ion capacitor, **Journal of Energy Storage**, 72, 30, 108546, 2023. IF 9.4.

66. C. Sharma , A.K.Srivastava , M.K.Gupta, Structural, optical and temperature dependent electric modulus property of few layer MoS_2 nanosheets, **Physica B: Condensed Matter**, 669, 415290, 2023. IF: 2.8.

67. H.Siddiqui, N.Singh, P.Naid, K. B.S.Rao, S. Gupta, A.K.Srivastava,M.S. SantoshS. Natara jan, S. Kumar, L.F. Dumée, S. Rtimi, Emerging electrochemical additive manufacturing technology for advanced materials: Structures and applications, **materialstoday**,70, 161, 2023. IF:24.2.

68. N. Siraj , S.A.R. Hashmi , S. Verma, Thermo-mechanical and morphological studies of Hal-reinforced PEEK, **Applied Clay Scienc**e, 245, 107153,2023,. IF: 5.6.

69. A. Pandey, R. Dubey, S.K. Srivastava, H. Jain, A. Sharma, R. Raj, S. Sriram, B.N. Yadav, V. Chilla , G.K Gupta , R. Kumar , D.P. Mondal**,** Synergetic effect of reduced graphene oxide and reticulated open-cell aluminum hybrid composite foam for high-performance electromagnetic wave absorption, **Journal of Alloys and Compounds**, 968, 172065, 2023. IF:6.2.

70. D. Tavar, S. K. Ojha, Z. Zaidi, H. Prasad, R. K. Sharma, M. Ashiq, M.Mudgal and A. Singh, Amine-Functionalized Graphene-Rich NiFe Layered Double Hydroxide Nanostructure for Enhanced Electrocatalytic Water and Urea Oxidation, **ACS Applied Nano Materials** 24, 22517, 2023. IF: 5.9.

71. R. Kumar , P. Bharti , C. Dhand , R.J. Yeo , M.Zhang , N. Dwivedi, "It's team work": Multilayered wear-resistant and lubricating overcoats derived from the synergy of ultrathin carbon surface and interface chemistry, **Applied Surface Science**, 641, 158485, 2023.IF:6.7

72. Z.Abbas, N. Hussain, S. Kumar, **I***n situ* growth of a redox-active metal-organic framework on electrospun carbon nanofibers as a free-standing electrode for flexible energy storage devices, **Nanoscale**, 16 (2) , 868, 2024. IF:6.7.

73. S. Sharma , S. R. Asolekar , V. K. Thakur , P. Asokan, Unlocking the potential: A paradigm-shifting approach for valorizing lignocellulosic waste biomass of constructed wetland enabling environmental and societal sustainability**, Industrial Crops and Products**, 207, Part 1, 117709, 2024. IF:5.9.

74. M.M. Shafeeq, Hirshikesh, G.K. Gupta and D. P. Mondal, Influence of Mn on the Mechanical and Shape Memory Transformation Behaviours of Powder Metallurgy Processed Cu–Al–Ni SMAs, **Metals and Materials International**. 30, 211, 2024. IF:3.5.

75. S. Sharma, A.Pappu, and S.R. Asolekar, Sustainable recycling of paddy straw through development of short-fiber-reinforced composites: exploring gainful utilization of agricultural waste, **Clean Technology and Environmental Policy**, 26, 109, 2024. IF:4.3.

76. M. Chaturvedi, M. Patel, D.P. Mondal, A.K.Srivastava, N. Dwivedi, C. Dhand, Bio-inspired graphene nanocomposite enabled electrochemical immunosensor for detection and quantification of NS1 protein of dengue virus, **Electrochimica Acta**, 475 , 143630, 2024. IF:6.6.

77. Yi.H.Huang, B.N. Yadav , F.C.Lien, P.C. Lin, R. Kumar, G.Gupta, D.P. Mondal Exploring the impact of heat treatment on the microstructural and compressive properties of Al-SiC-MWCNTs hybrid nanocomposites foams, **Diamond and Related Materials**, 141, 110648, 2024. IF:4.1.

78. M.Chaturvedi, M. Patel, A.Tiwari, N.Dwivedi, D.P. Mondal, A.K.Srivastava , C.Dhand, An insight to the recent advancements in detection of Mycobacterium tuberculosis using biosensors: A systematic review, **Progress in Biophysics and Molecular Biology**, 186, 14, 2024. IF:3.8.

79. S.Ghotia, A.Kumar, V.Sudarsan, N. Dwivedi, S. Singh, P. Kumar, Multilayered $Ti_3C_2T_x$ MXenes: A prominent materials for hydrogen storage, **International Journal of Hydrogen Energy**, 52, Part B, 100, 2024. IF:7.2.

80. P. Kumari, Disha, R. Rani, M. K. Patel, S.Mishra, S. Singhai and M.K. Nayak, Reusable magnetic graphene oxide based anion exchanger for the separation and removal of anionic dyes, **New Journal of Chemistry,** 48, 674, 2024. IF:3.3.

81. K.G. Motora, V.G. D. Kumar , Chang-Mou Wu , R. Ashwini, Guan-Ying Chen , M.S. Santosh , S Kumar, Dong-Hau Kuo, Highly efficient and stable $NiSe_2$-rGO composite-based room temperature hydrogen gas sensor, **International Journal of Hydrogen Energy**, 50, 1174, 2024. IF:7.2.

82. P. Bharti, A. Neogi, R. Sharma, C. Dhand, R. Kuma, P. Kuma, S.K.R.S. Sankaranarayanan, N. Dwivedi, Decision trees within 1D/2D material systems for enabling highly lubricious and wear resistant surfaces, **Carbon**, 217,118603, 2024. IF:10.9.

83. D.K. Kashyap, A. K. Srivastava and M.K. Gupta, Lightweight, Self-Poled, Flexible Piezoelectric Tungsten Disulfide Quantum Dots-Reinforced PVDF-HFP-Based Nanogenerator, **ACS Applied Electronic Materials, 6**, 862, 2024. IF:4.7.

84. C. Vălean, M. Baban, D.K. Rajak , E. Linul, Effect of multiple process parameters on optimizing tensile properties for material extrusion-based additive manufacturing, **Construction and Building Material**s, 414, 135015, 2024. IF:7.4.

85. C.S.Chitransh and S.Saxena, Evaluating the effects of ball milling and 3D mixing on the synthesized stir and gravity casted ADC-12 MMC and comparing initiation fracture toughness of gravity cast with high pressure die cast ADC-12 MMC evaluated using FEM analysis, **Sādhanā** 49, 65, 2024. IF: 1.6.

86. H.Goel, M. Patel, M. Chaturvedi, G.K.Gupta, A. K.Khare, D.P. Mondal, A.K. Srivastava , N.Dwivedi , M.D.Mukherjee , C. Dhand, Polydopamine functionalized

Ti_3AlC_2 MAX based electrochemical biosensor for early and sensitive detection of *Mycobacterium tuberculosis,* **Microchemical Journal**, 197, 109899,2024. IF:4.8.

87. S. Ritu , M.Badatya , K.Patel , M. K. Gupta, Unveiling a robust and high-temperature-stable two-dimensional ZnAl layered double hydroxide nanosheet based flexible triboelectric nanogenerator**, Nanoscale**, 16 , 4176, 2024. IF:6.7.

88. V. Shrivastava, G.Gupta, R.Srivastava, D. Mangal, J. K.Tiwari, J.S. Shakya, I. B.Singh, Influence of α-Al_2O_3 Ceramic Nanoparticles on the Microstructure and Mechanical Properties of Pure Aluminium Based Nanocomposites, **Transactions of Indian Institute of Metals**, **77**, 533, 2024. IF:1.6.

89. S. Mehra, R.Pandey, J. Madan, R.Sharma, L.Goswami, G. Gupta, V. N. Singh, A.K Srivastava, S.N.Shar , Experimental and Theoretical Investigations of MAPbX3 -Based Perovskites (X=Cl, Br, I) for Photovoltaic Applications, **ChemistryOpen**, 13, e202480201,2024. IF:2.3

90. Kamlesh, R. K. Sharma, M. Mudgal A. K. Srivastava and A. Singh, Investigation of 2D graphite support for development of iron–graphite composite as electrocatalyst for alkaline water oxidation reaction, **Journal of Materials Research** 39, 663, 2024. IF:2.7.

91. A. Kumar, Vandana, M. Dutta, S. K. Srivastava & P. Pathi, Interface study of molybdenum oxide thin films on n- and p-type crystalline silicon surface, **Journal of Materials Science: Materials in Electronics**, 35, 472, 2024. IF:2.8.

92. S. Jaiswal, J. Vishwakarma, N. Dwivedi, Enhancing the lubricity and wear resistance of shape-memory-polymer via titanium carbide-based MAX and MXene, **Carbon**, 219(3), 11, 8790, 2024. IF:10.9.

93. A. Kumar, M. Dutta, S. Tomer, P. Rao, Vandana, Sanjay Kumar Srivastava, , S. N. Singh & P. Pathi, Tuning of structural and optical properties of reactively sputtered MoO_x films, **Journal of Materials Science: Materials in Electronics**, 35, 612 ,2024. IF:2.8.

94. K.B.Patel , M.Mariyaselvakumar , G.Vyas , J.C. Chaudhari , R. Patidar, K.Srinivasan , D. N. Srivastava, G. R. Bhadu, Nickel oxide doped ceria nanoparticles ($NiO@CeO_2$) for boosting oxygen evolution reaction and enhancing stability, **Applied Surface Science**, 649, 159212, 2024. IF:6.7.

95. S. Mishra , S. Singh, Effective removal of Cu(II) ions using graphene Oxide-Based surface imprinted polymeric Beads: Implications for water purification, **Inorganic Chemistry Communications**, 161, 112090, 2024. IF:3.8.

96. R. Chaturvedi, A. Pappu, M. K.Gupta, Exploring the synergistic effect of inorganic and organic particulates in polyvinyl chloride composites through comparative analysis and accelerated weathering, **Journal of Vinyl & Additive Technology**, 30, 470, 2024. IF: 2.7.

97. Ritu, M. K. Patel, M.K.Gupta, Remarkable tailoring of thermal and dielectric properties of poly(vinyl alcohol) nanocomposite via hydrothermal grown ZnAl layer di hydroxide nanostructures and graphene fillers, **Journal of Vinyl & Additive Technology** , 30, 410, 2024. IF:2.7.

98. Sk Rezaul**,** Karim , S**.** Khan, G**.**F. Ansari , D. Mishra , S**.** Kumar, M**.** Ashiq, X-ray attenuation performance of a newly synthesized tellurium based lead-free radiation shielding glass system, **Radiation Physics and Chemistry,** 216, 111477,2024. IF:2.9.

99. A. Singh, D.Choudhary, A.Giri, D. K. Gupta & A. Singh, Deterministic health risk assessment, spatial analysis and hydrochemical assessment to toxic fluoride in groundwater of Dhar District, M.P, India, **International Journal of Environmental Science and Technology**, 21, 5529, 2024.IF:3.1.

100. S.Chauhan , B. Arun , K.C.J.Raju, M.Shafeeq M, D.P. Mondal, A.K.Srivastava P. Kumar, An ultrathin and flexible polymer composite film at a low fraction of reduced graphene oxide for Ku-band electromagnetic interference shielding, **Surfaces and Interfaces**, 46, 103961, 2024. IF:6.2.

Early Access

101. M. A. Sadique, S.Yadav, R. Khan and A.K. Srivastava, Engineered two- dimensional nanomaterials based diagnostics integrated with internet of medical things (IoMT) for COVID-19, **Chemical Society Reviews**, March 2024. DOIhttps://doi.org/10.1039/D3CS00719G. IF:46.2.

102. A.Bijanu, R. Arya, G. Rajak, V.S.Gowri, R.Shil, K.Banerjee,S.Bhattacharyya, S.Mukhopadhyay,S.Chatterjee, R.Ravishankar, Shabi .T. S. D.Mishra, Flexible, chemically bonded bismuth/tungsten-based polyvinyl alcohol-polyvinyl pyrrolidone composite for gamma and neutron shielding application, **Journal of Applied Polymer Science**,, https://doi.org/10.1002/app.55435. IF:3.0.

103. A. Parihar and R. Khan, Yttrium Functionalized Reduced Graphene Oxide Nanocomposite-Based Aptasensor for Ultrasensitive Detection of a Breast Cancer Biomarker, **ACS Applied. Nano Materials.** https://doi.org/10.1021/acsanm.3c03234 2023.IF: 5.9.

104. S.Patidar, J.K. Tiwari, A.Das, N. Sathish, S. Mishra, M.Ashiq, and A. K. Srivastava, Study on Microstructure and Tribological Behavior of Additively Manufactured Graphene/AlSi10Mg Composite, **Journal of Materials Engineering and Performance**,. IF:2.3. https://dx.doi.org/10.2139/ssrn.4399086.

105. S. K. Srivastava, G. K. Gupta, T. C.Joshi, D. K. Rajak, Insight into classifications and manufacturing processes of metallic foams: A review, **Proceedings of the Institution of Mechanical Engineers Part E Journal of Process Mechanical Engineering** DOI:10.1177/09544089231190551, IF:1.62.

106. P. Ranjan, MA Sadique, S.Yadav, R.Khan, A.K. Srivastava, Electrochemical Nanobiosensor of Ionic Liquid Functionalized MoO_3-rGO for Sensitive Detection of Carcinoembryonic Antigen **CHEMPLUSCHEM,** https://doi.org/10.1002/cplu.202300625 **.** IF:3.4.

107. A. Ali, M. Ahmed, S.Kumar, M.Soni, K.Singh Gavel &. V. Chilla, Formability of Aluminum AA5754 Using Electrohydraulic Forming Process, **Arabian Journal for Science and Engineering**, https://doi.org/10.1007/s13369-024-08789-x. IF: 2.9.

108. P. Sarkar, I. H.Chowdhury, A.Chakraborty, M. Goswami, M.K. Naskar, A.Khan and Sk. Manirul Islam, Visible-Light-Assisted Photocatalytic CO_2 Reduction and N_2-Fixation over TiO_2/Covalent Organic Framework Heterojunction Photocatalyst, **Industrial & Engineering Chemistry Research**, 2024. IF: 4.2. https://doi.org/10.1021/acs.iecr.3c03776.

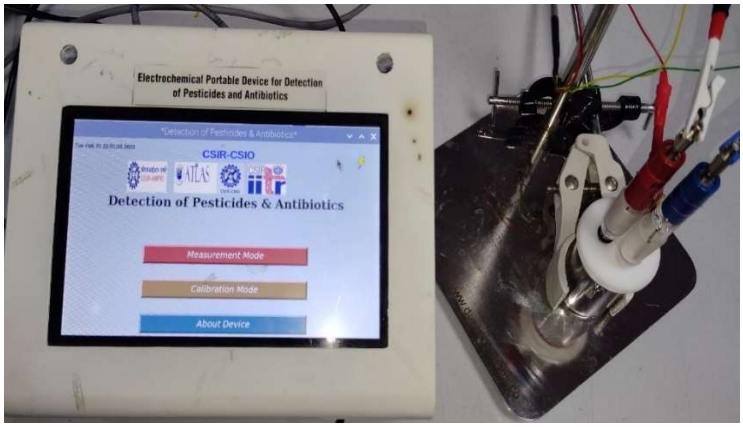
109. M. Patel, P. Bharti , P. Prabhakar, S. Shrivastava , P. Mehar, P. Kumar , D.P. Mondal, A. K. Srivastava , C. Dhand, N. Dwivedi, Functionally gradient multilayer coating enabled flexible sensors for lead detection in water and soil, **Chemical Engineering Journal**, 483, 1, 149441, 2024. IF: 13.6.

R & D Activities
Industrial Waste Utilizations, Nano- and Bio-Materials Division

Real-time portable electrochemical sensor array for simultaneous detection of antibiotics and pesticides

Optimized all the relevant parameters of electrochemical characterisations

- LC-MS/MS based method for quantification of pesticides and antibiotics is ready for cross-validation.
- Device trials conducted at lab scale by Team AMPRI on the device developed by CSIO. Samples of pesticides and antibiotics tested on the device with satisfactory results. AMPRI Bhopal team tested device successfully for the sensor array that can identify pesticides and antibiotics
- Indigenous potenntiostat developed to process micro/nano current measurements associated with different analytes. The developed potenntiostat tested with standard calibrator for varying current from nano to micro range.
- the GUI development under progress
- A new advanced Prototype has been developed and is able to identify one antibiotic and one pesticide, however, some sensitivity issues occurred when we compared it with the standard costly instrument as we want to develop an economical device.
- We have done rigorous testing for one antibiotic (Chloramphenicol) and pesticide (Imidacloprid)
- Developed device easily detected the type of Antibiotics and pesticides individually as well as simultaneously.
- The new fabricated prototype test results match with the Standard reference Metrohm workstation
- Developed instrument have a wide potential range from -5V to 5V. So it can easily detect multiple pesticides and antibiotics.
- Current range of the developed device has a ± 1µA-1000µA detection range with auto arranged facility.
- Revised patents (2) are submitted.



Device for simultaneous detection of antibiotics and pesticides.

Phenome India-CSIR Health Cohort Knowledgebase

The CSIR-AMPRI, Bhopal has conducted one day awareness program for the Phenome India-CSIR Health Cohort Knowledgebase on December 19 2023. Phenome India-CSIR Health Cohort Knowledgebase (PI-CHeCK) is a project initiated by the Council of Scientific and Industrial Research (CSIR) to identify India specific risk factors for cardiometabolic diseases. This unique study will provide scientific insights as a step towards personalized and precision medicine. The overall aim of the project is to increase the predictive accuracy of diagnosis and prognosis of complex disorders like cardio-metabolic diseases

Pilot scale fabrication of joint free brick size gamma and neutron shielding blocks

- The red mud's were collected from various plants and the samples were send for naturally occurring radioactive nuclide analysis.
- It is mandatory to determine the curvature of the shields through simulation to have uniform compaction. So, finite element modelling was carried out to identify the curvature of the bricks.

A 90x90x190 mm^3 blocks with arced structure was designed and its front, back, top and bottom faces are shown in Figure below

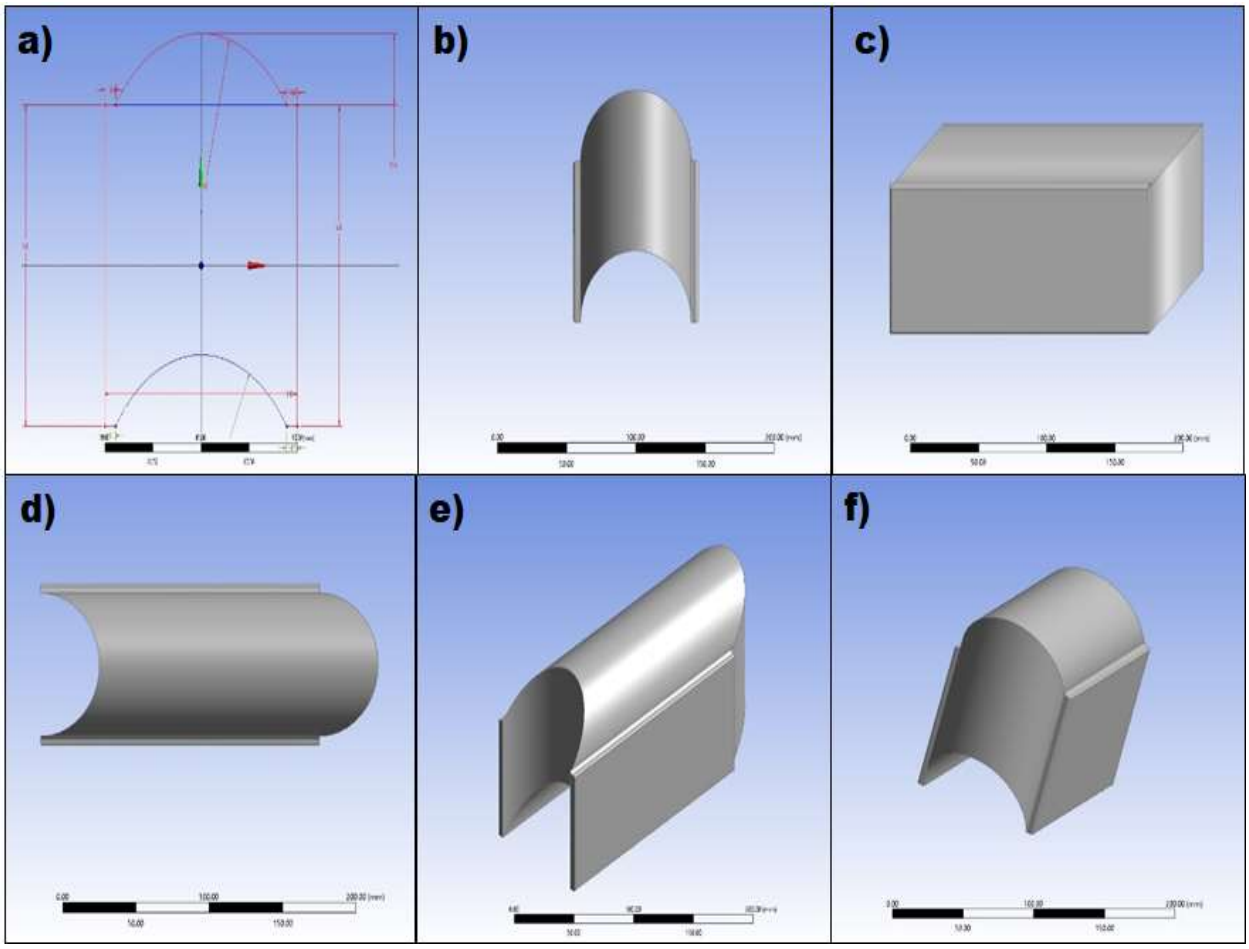


Figure Geometry Schematic: a) wire frame 2-d model, b) front view, c) side view, d) top view, e) back isometric view, f) front isometric view.

Simulation of the brick for compressive loading conditions:

The Proposed Geometry of rectangular block of dimension 90x90x190 mm^3 spanned respectively over X, Y and Z axis. Three arc radiuses 40 mm, 50 mm, and 60 mm were considered for the simulation purposes. **The** tetrahedral meshing was done with the element size of 0.001 mm. 100 MPa pressure was applied on top of the bricks after fixing all the boundaries, except top one.

Stress Intensity Analysis: Stress intensity represents the magnitude of the stress because of the combination of all the generated stresses at a particular point within a structure. Stress intensity analysis provides insights into the stress distribution and levels within the structure. All three geometries having arc radiuses 40 mm, 50 mm and 60 mm were analysed under static structural mode with above described boundary conditions.

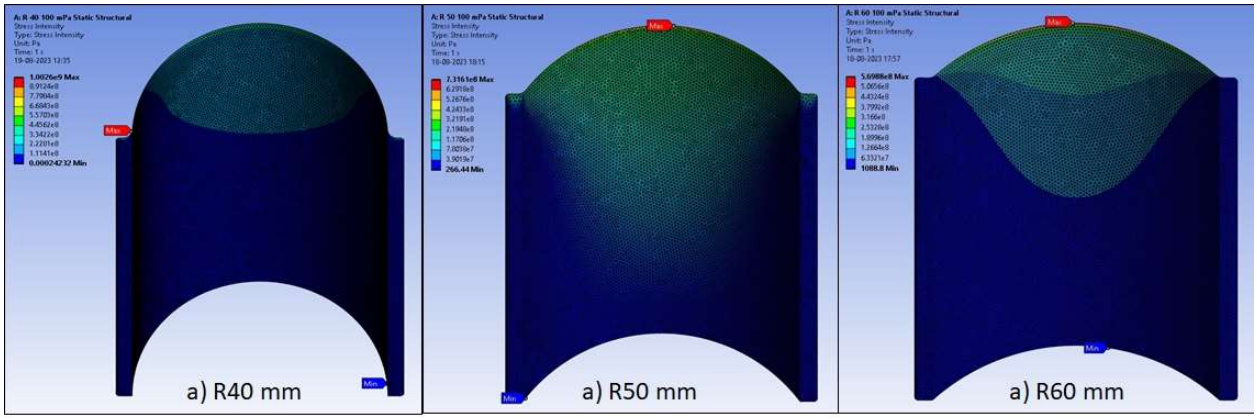


Figure 2: Stress intensity Profile R40mm (a), R50mm and R60mm samples.

It is evident form the stress intensity analysis that the maximum stress intensity is falling down with the increasing the radius of the arc. It shows stress concentration in the member is decreasing and distribution of the stress is increasing. From the stress intensity analysis it is clear that the geometry R 60 mm is performing better than other two geometries (Figure 2), and it will increase with increment of the ARC radius. However Geometry R 50 mm has almost similar average stress intensity to Geometry R 60 mm. For the purpose of joint less brick higher arc radius is desirable and Geometry R 50 mm provides better arc thickness of 20 mm while the geometry with R 60 mm provides 15 mm arc thickness.

It can be clearly inferred from the analysis of the normal stress profiles that the geometry R40 has more stress concentrations and then R 50 and R 60. The geometry R 50 and R 60 have better normal stress component distribution. Among all R 60 is performing better than other two geometry with minimum stress. So, R60 was found to be an optimum curvature for making joint free bricks.

A special four piece die has been designed and its wall thickness was optimised through FEM simulation. The optimum die design is shown in Figure below.

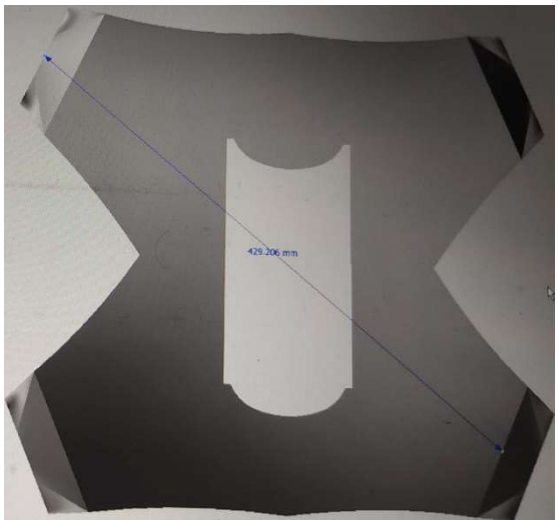
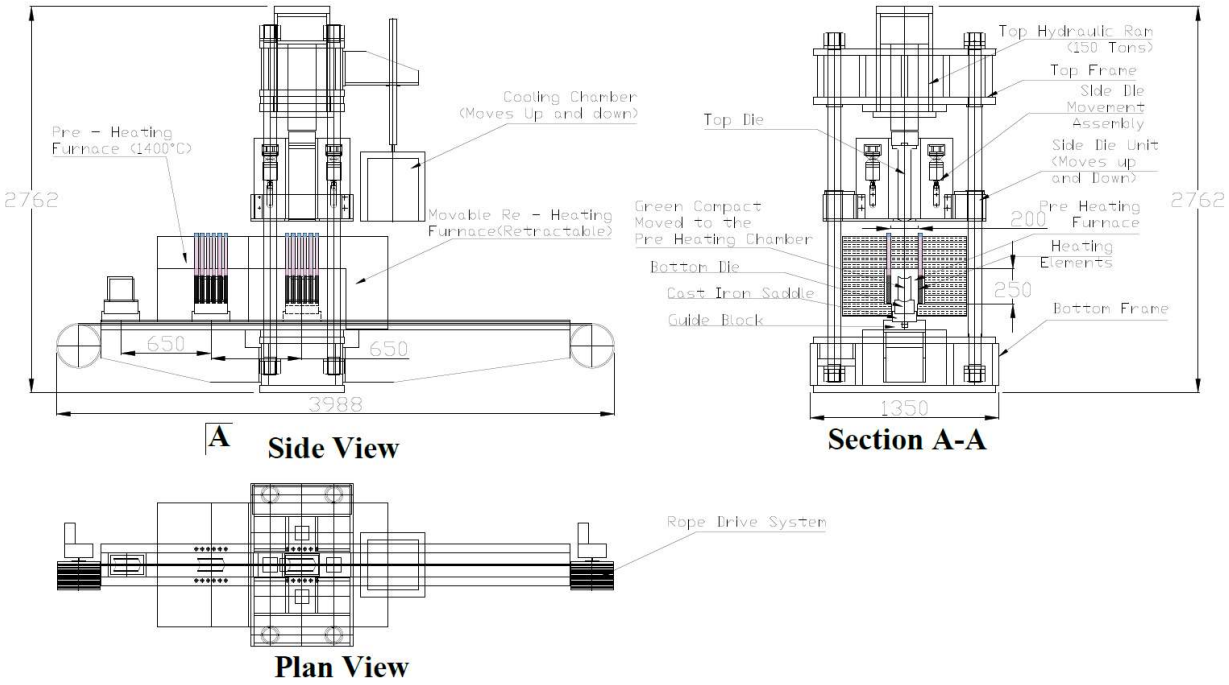


Figure Depicts the die designed to fabricate joint free shield under normal ambient.

- On the basis of the simulated dimension brick and die, CSIR-AMPRI is working on the design and development of a hot press for the fabrication of gamma and neutron shielding blocks. The proposed design of the hot press is shown below



Designing of hot press for the fabrication of gamma and neutron shielding blocks.

Semi Pilot Demonstration for Conversion of Fly ash and Pond ash into Synthetic Aggregates - An Alternative to River Sand

Objectives

1) Geopolymeric conversion of fly ash/pond ash into synthetic aggregates by optimizing suitable conditions and components.

2) Gradation of geopolymeric sand as per desired aggregate size (Fine and Coarse).

3) Evaluation of geopolymeric aggregate properties as per IS standards.

4) Suitability of geopolymeric aggregates in mortar, concrete (fresh and hardened) along with the durability properties.

5) Optimization of full/part replacement of river sand with geopolymeric sand obtained from pond/fly ash.

6) The study will further include detailed mix design for M20/M30 concrete from the synthetic sand.

7) Techno feasibility studies

8) Setting up of semi-pilot manufacturing unit for process demonstration
Work is under progress.

Electrochemical additive manufacturing process for sculptures, statues and decorative arts applications

- Developed electrochemical 3D printer at laboratory scale
- Developed electrochemical 3D technology for decorative art work
- Developed electrochemical 3D printed SERS substrates
- Developed ECAM printer can directly fabricate metal structures with sub-micron to sub-millimetre dimension at sub-micron resolution.
- Obtained results will provide knowledge and understanding to perform layer-by-layer manufacturing of metal parts by electrochemical deposition and enable producing metal parts by additive manufacturing without thermal damage.

  This ECAM printer has a transformative effect on additive manufacturing printing of a wide variety of conductive materials, result in extensive benefits to biomedical, healthcare, electronic, and metal working industries, and extend frontiers of additive manufacturing

Development of Advanced Composite Pressure vessels for Hydrogen Storage"

We are working to make type-IV hydrogen storage vessels, which are made of carbon fibre composites. These types of cylinders are very light weight (own only 30 % of the weight of a typical steel cylinder of similar dimensions) and hence offers better transportation range, handling, payload, and efficiency. In view of that we have done the mechanical tests, such as three-point bending test, tensile test and interlaminar shear test, of our printed cylinders to characterize the mechanical properties of the printed PLA, ABS, CFRABS (Carbon fibre), CFRABS (glass fibre) parts.

Three-point bending test

Three-point bending tests were conducted according to ISO 14125:1998 (fiber-reinforced plastic composites – determination of flexural properties) standard that the specimen is held by two supports and loaded in the middle with a force until the test specimen fractures. The operation specification of the bending standard and the dimensions of the bending specimens in which the carbon fibers orientation is consistent with the longest edge.

Figure: 3-point bending test

Results of 3-point bending test are shown above. First vessel with 1-liter volume was cut into rectangular piece size of width 35 mm and length 165 mm. Second vessel with 0.5 liters volume was cut in section with the diameter of 85 mm and length of 125 mm. Third vessel with 0.5 liters volume with cutting bottom and top (neck of vessel) is removed then loaded in machine. Figure 2 shows different types of cut shapes.

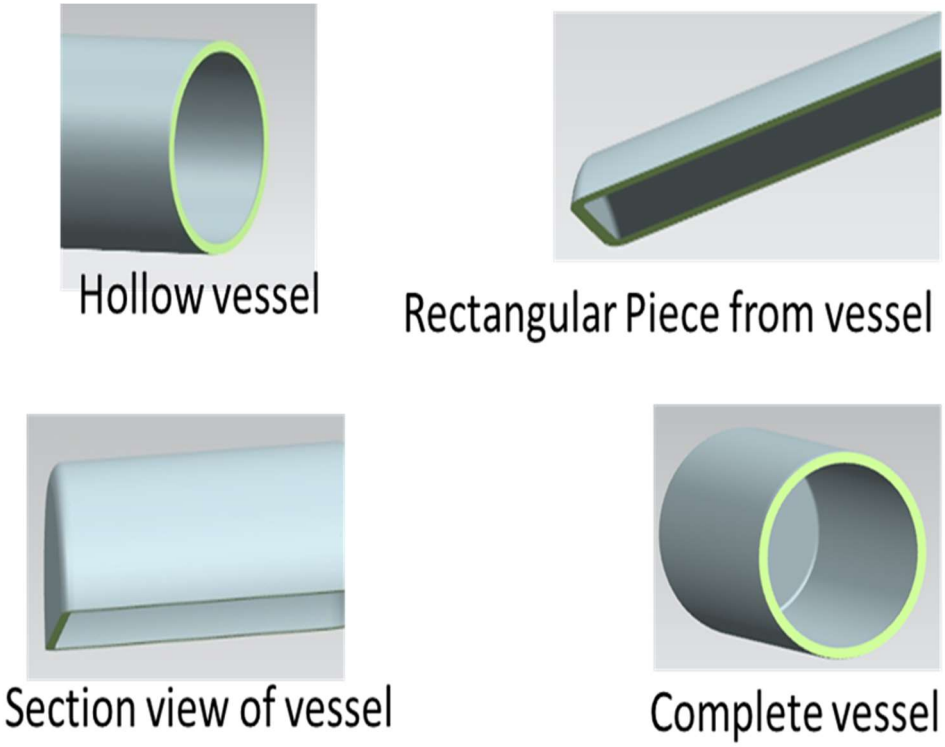


Figure: Different types of shapes cutting pieces from vessel

Results of 3-point bending test are shown in figure 3. The result of vessel shown in figure 3 a) is Hollow vessel. Figure 3 b) is showing result of the rectangular piece from 1-liter volume vessel. Figure 3 c) is showing the result of Section of the vessel. Figure 4 d) is showing the result of complete vessel without neck and with base. Figure 4 e) is showing the comparison of Section, hollow and rectangular samples. On observing the figure 4 e) and figure 4 f), it can be concluded that strain % is more in

complete vessel when compared to hollow, section, rectangular pieces and stress (MPa) is more in hollow, section, rectangular pieces comparing with the complete vessel.

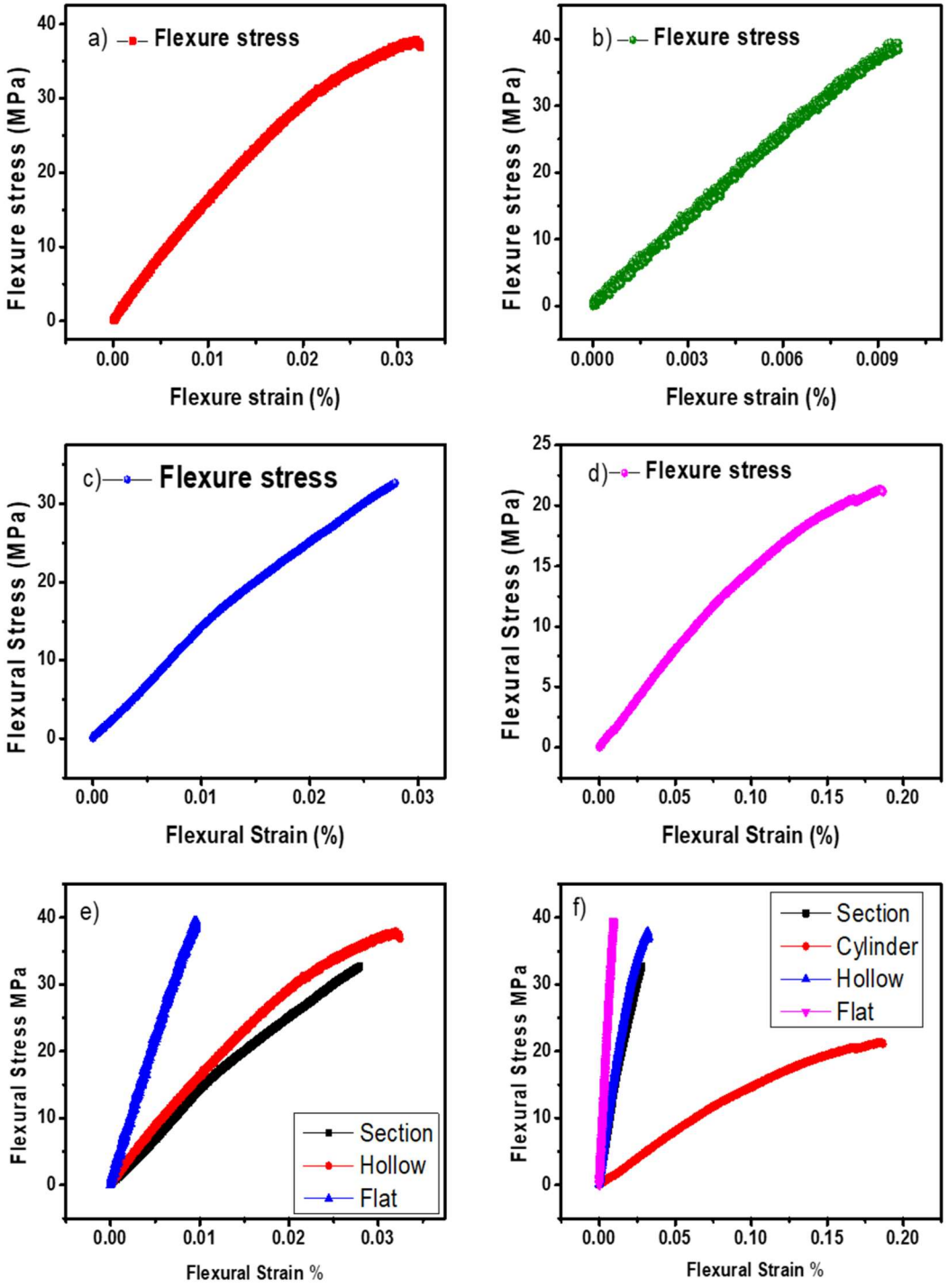


Figure: a) Hollow vessel b) One curve rectangular piece cut from vessel, c) Half section of vessel d) Complete vessel, e) Comparison of Section, hollow and flat samples, f) Comparison of Section, hollow, flat and complete vessel samples

Alloys Composites and Cellular Materials

Fabrication of carbon nanotube-metal oxides based nanoarchitecture as a flexible anode for lithium-ion batteries

- Flexible anode thickness in the range of 0.2 to 0.5 mm and resection up to 100 x100 mm has been synthesized.
- Structural and morphological analysis of MWCNTs flexible paper has been analyzed.
- The flexible MWCNTs paper has high electrical conductivity (24.5 S/cm) to be used as the anode in lithium–ion batteries without the need for copper as a current collector.
- The electrochemical performance of flexible MWCNTs paper has been performed by fabricating a 2032 types coin cell.
- For MWCNTs paper, the first discharge capacity is calculated as 325 mAh/g and after 100 cycles, the discharge capacity of MWCNTs paper has reduced to 300 mAh/g.
- Different metal oxide nanoparticles (e.g. Fe_3O_4, Co_3O_4, NiO, ZnO) have been synthesized and incorporated into the flexible paper.
- MWCNTs paper decorated with Fe_3O_4 nanoparticles has been developed and tested for electrochemical performance
- The specific capacity of MWCNTs paper decorated with Fe_3O_4 nanoparticles has been improved to 382 mAh/g.
- Porous carbon foam decorated with Co_3O_4 nanoparticles has been developed and tested for electrochemical performance.
- To evaluate the effect of carbon-Co3O4 decorated foams for practical application, an asymmetrical supercapacitor is assembled by using carbon-Co3O4 decorated foams as a positive electrode and CF as the negative electrode in 1 KOH electrolyte with polypropylene membrane as the separator.
- The specific capacitance of CF-10Co3O4//CF demonstrates an excellent specific capacitance of 164 F g^{-1} at a current density of 0.5 A g^{-1}.
- The CF-10Co3O4//CF can deliver a high energy density of 44 Wh kg-1 at a power density of 350 W kg-1.

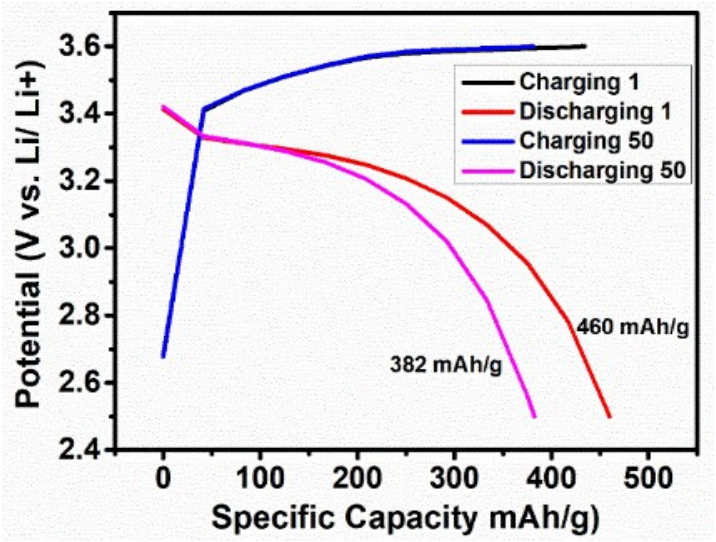


Fig. 1. Charge/discharge cycling studies of flexible MWCNTs decorated with Fe_3O_4 nanoparticles paper at a current density of 100 mA/g for 50 cycles.

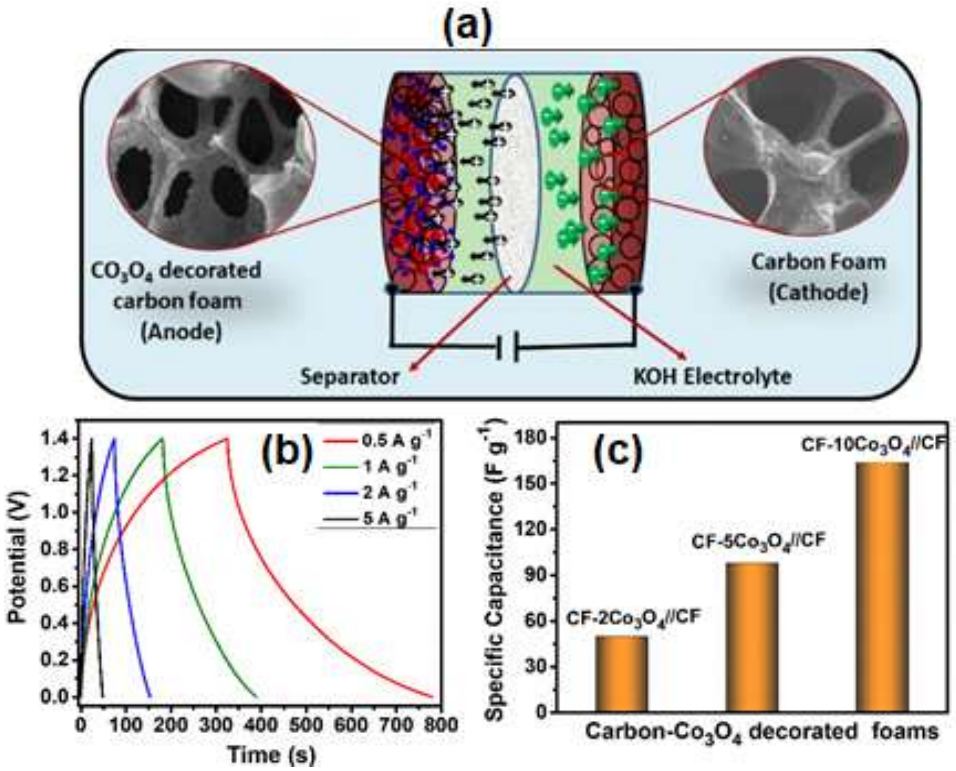


Fig. 2. (a) A Schematic illustration of asymmetric supercapacitor with carbon-Co3O4 decorated foams positive electrode and CF negative electrode, (b) galvanostatic charge/discharge profile of CF-10Co3O4//CF and (c) specific capacitances of carbon-Co3O4 decorated foam samples at current density of 0.5 A g^{-1} respectively.

Center for Advanced Radiation Shielding and Geopolymeric Materials

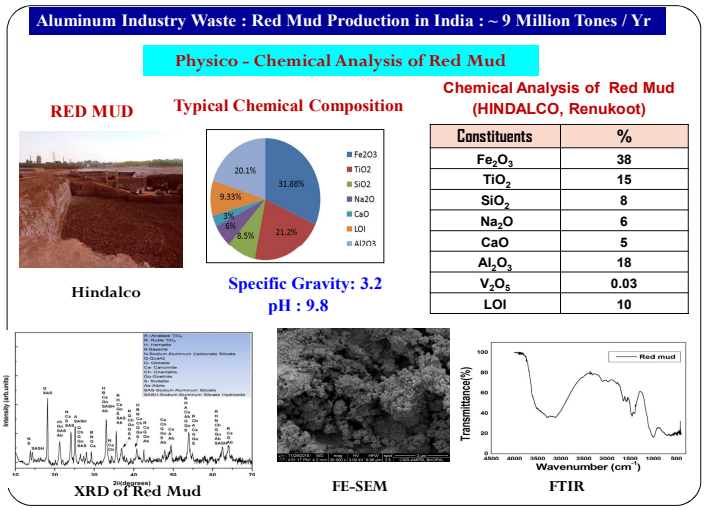
Development of Fly Ash based Advanced Geopolymeric Radiation Shielding Concrete utilizing Industrial By-products

Significant achievements

- Raw Materials Identification and Lab Scale Experiments,
- Bulk Sampling of red Mud &fly ash from Aluminum Industry &Thermal Power Plant
- Physico-chemical characterization of Red Mud &Fly Ashes
- Optimization of the ceramic processing parameters such as additives, temperature, soaking time etc, for development of shielding aggregates.

Work in Progress:

- Optimization of Composition for Development of
  a) High density aggregates by ceramic processing by "Chemically Formulated and Mineralogically Designing red mud, for obtaining multi-component- multi phases containing" shielding aggregates.
  b) Optimization of the ceramic processing parameters such as additives, temperature, soaking time etc. with respect to the required characteristics of shielding aggregates.
  c) Crushing, Sizing and Grading of development of coarse aggregates to obtain the medium and fine grade aggregates for use in concrete design mix.
  d) Development of Fly Ash based Geopolymeric Concrete Matrix is under progress



Blending of Bulk Red Mud with Additives

Bulk Processing and Palletizing of Red Mud with Additives

Ceramic Processing of Red Mud & Additives for Development of Synthetic Aggregate

Up-scaling of Fly Ash based Advanced Geopolymeric Roller Compacted Concrete for all weather road application

1. **Objectives:**
   - Development of Mix Design for Fly Ash based Advanced Geopolymeric Concrete.
   - Optimization of process parameters for Roller Compacted Geopolymer Concrete
   - Up-Scaling of the Process for Roller Compacted Geopolymer Concrete

- Demonstration of Roller Compacted Advanced Geopolymeric concrete road stretch in the premises of selected Institute.
  [Approximate Dimensions: [30m (L) X 3.75m (W) X 0.15m (T)]

Development of Roller Compacted Geopolymeric Concrete at Lab Level

Prototype Roller Trails On Slab And Patching Work On Cement Concrete And Bitumen Pavements

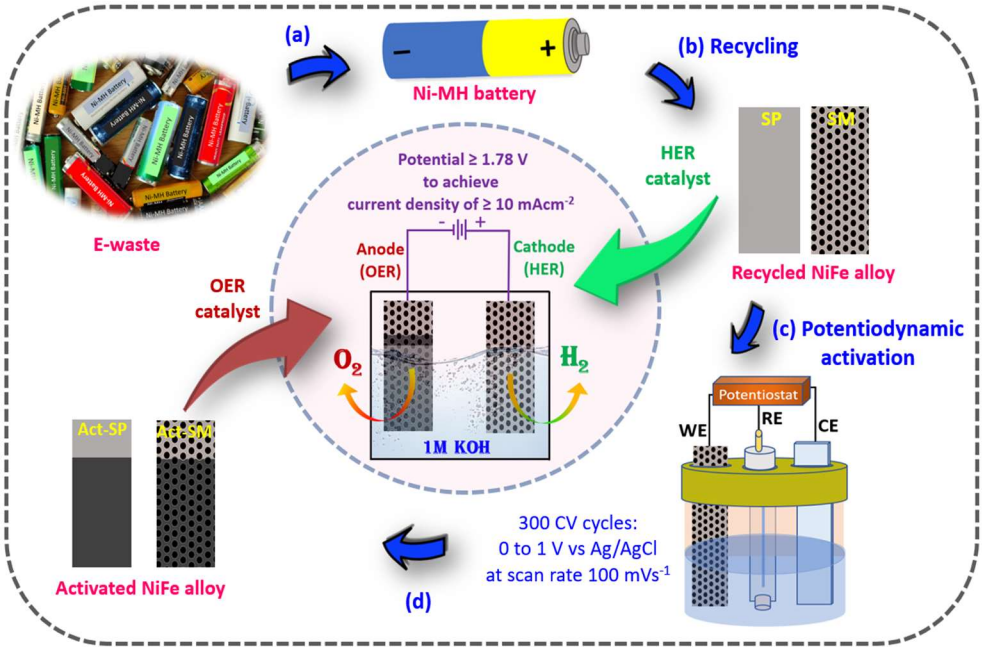
Patching on Cement Concrete Surface

Patching on Flexible Pavement (Bitumen Surface)

Experimental Trial of Roller Compacted Geopolymer Concrete at CSIR-AMPRI

E-waste from spent nickel metal hydride battery: promising materials for hydrogen generation by alkaline electrolysis of water and water treatment application

- The detailed characterization of the various components of the NiMH battery has been done.
- Initial results show that the waste electrode material as well as powder material from the batteries are promising material for overall water splitting as well as for water treatment.



Scheme 1. Schematic demonstrate the recycling and fabrication of electrocatalyst from dead Ni-MH batteries (e-waste).

Synthesis, Characterization and Applications of Lead-free Heavy Metal Oxide based Glass systems

Objectives:

- ✓ Synthesis of compositions based on B_2O_3-TeO_2 based glass by adding heavy metal oxides (Bi_2O_3 / Ba_2O_3 / WO_3).
- ✓ To determine the structural and optical properties of tellurite based heavy metal oxide glass systems.
- ✓ To study the experimental and theoretical radiation shielding characteristics for X-ray medical diagnostics applications.
- ✓ To study the experimental and theoretical radiation shielding characteristics for gamma-ray applications.

Significant achievements:

- ✓ BaO doped B_2O_3-TeO_2-based radiation shielding glasses were synthesized by melt quenching method.
- ✓ The physical, structural, transmission electron microscopy and X-ray attenuation properties of the boro-tellurite based glass system were investigated.
- ✓ From the x-ray attenuation characterization, it was observed that the radiation shielding capacity increases with increasing the heavy metal oxide concentration and can attenuate almost all the x-ray photons.

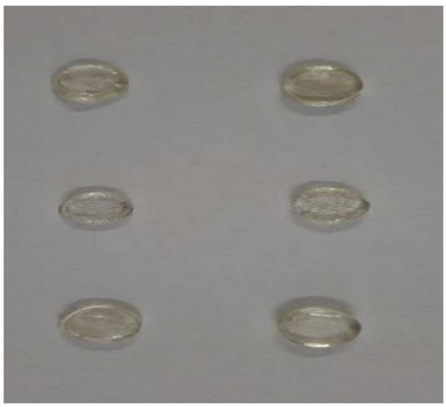


Fig.1: Photographs of processed glass samples

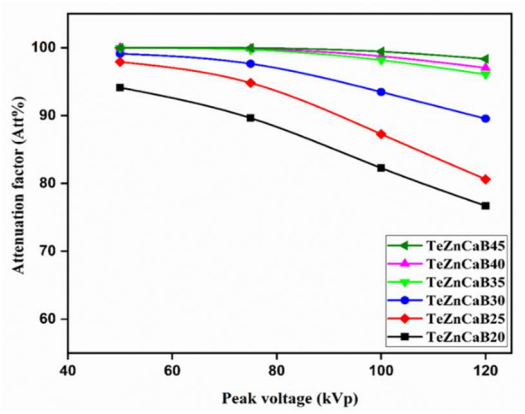


Fig. 2: Attenuation capacity with heavy metal oxides

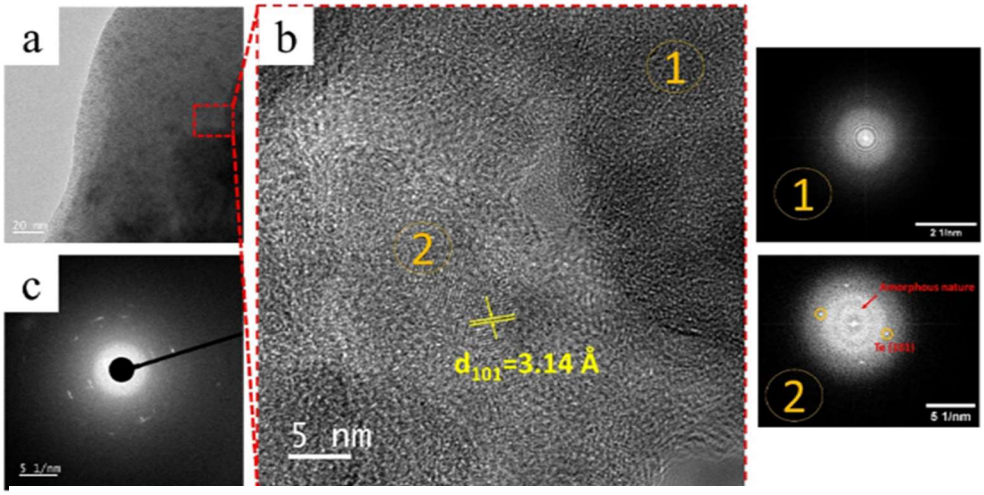


Fig. 3: TEM micrographs and SADP Patterns of the processed HMO glass sample.

Training and Internship on Artificial Intelligence in Hydrological & Environmental Applications

Objectives:

- ✓ To provide opportunities to promising PG students to get exposure and hands-on research experience.

- ✓ To groom students (primarily from Universities, Colleges, Private Academic Institutions and newly established Institutes) in their scientific career pursuits by developing dedicated research skills in selected areas / discipline / fields of Science and Engineering through research internships.
- ✓ To facilitate the young talent to choose a career path in Science and Technology.

Significant achievements:

05 Nos of PG level students from different organisation and fields trained during the Internship Programme under Vritika

- ✓ Many Experts talk
- ✓ Student Interaction and Discussion
- ✓ Hands-On conducted
- ✓ Career discussion in S&T

Participants and Speakers with certification and momentos

Director CSIR-AMPRI offering memento to Dr. Deepak Tomar, HOD , CSE, MANIT.

Welcome of speaker Dr. Pooja Jain, Assistant Professor, IIIT Nagpur by Dr. Avanish Kumar Srivastava, Director, CSIR-AMPRI

Avanish Kumar Srivastava, Director, CSIR_AMPRI interacting with students and professors.

Intelligent Materials and Advanced Processes

Design and Development of an instrument for real time assessment of ferromagnetic phase fraction in ferrous alloys

- Data acquisition system developed and initial data processed and analyzed (Figure 1)
- Initial design of coil is carried analytically as well asusing finite element simulation and it is fabricated for testing of samples (Figure 2)
- Ferrous alloys samples containing ferromagnetic phase fraction fabricated by MANIT Bhopal and tested at experimental setup developed at CSIR-AMPRI.

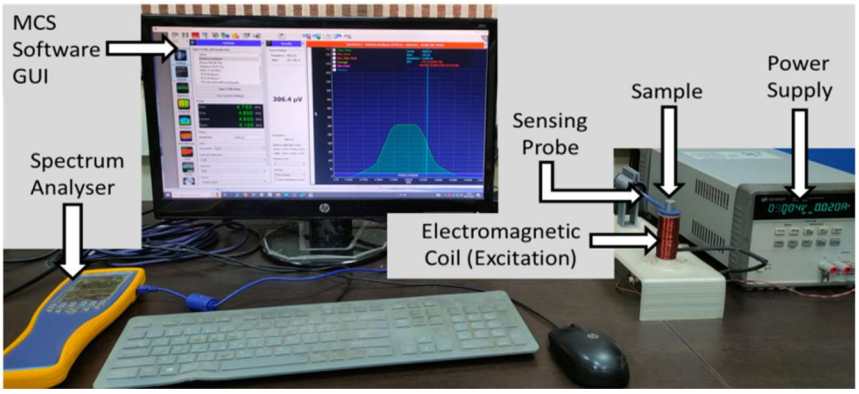
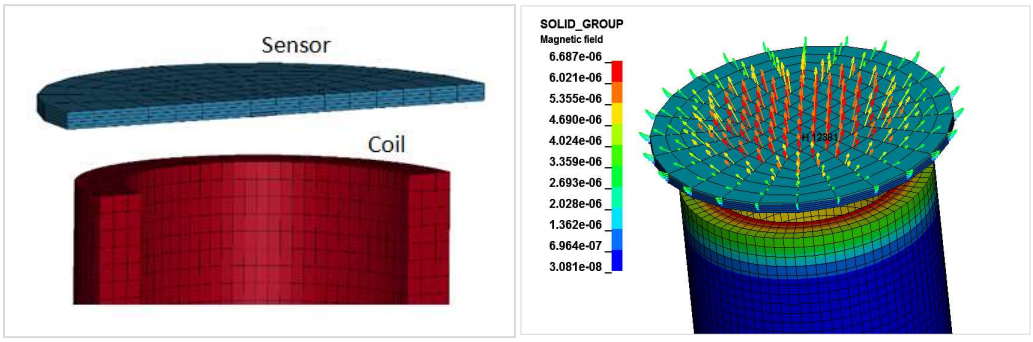
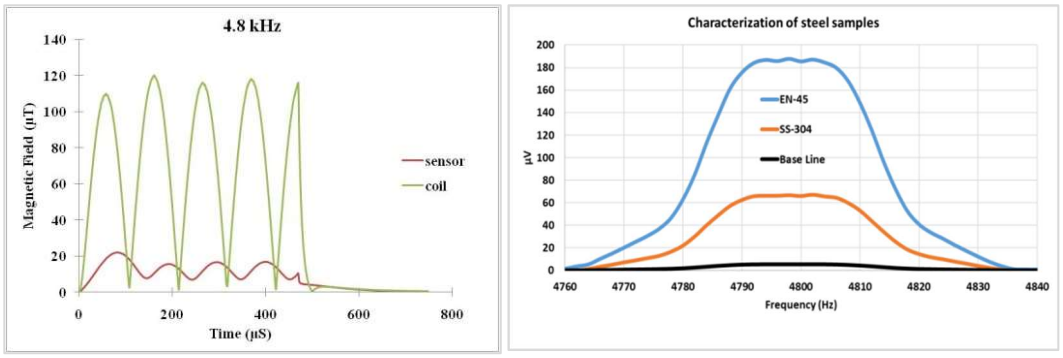


Figure 1: Intial set up for data acquisition



(a) (b)

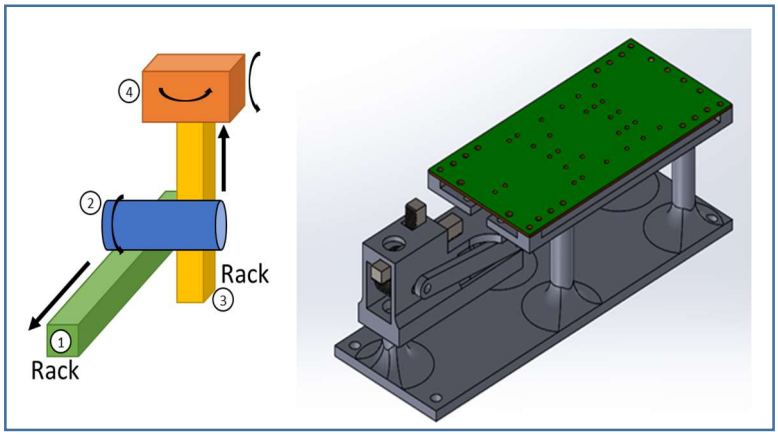


(c) (d)

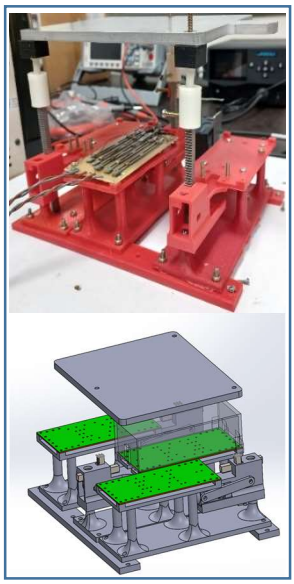
Figure 2: (a) FE model of coil-sensor alongwith (b) magnetic field contour as well as (c) plot of magnetic field for coil excitation at AC 4.8 kHz. (d) variation of sensor voltage at various frequency for EN-45, SS304 and without sample (base line) excited using coil-sensor type arrangement in experimentation.

Integration of thermo-responsive Smart Material Linear Displacement Actuator for position control of 3D printer Extruder using AI-based self-sensing technique"

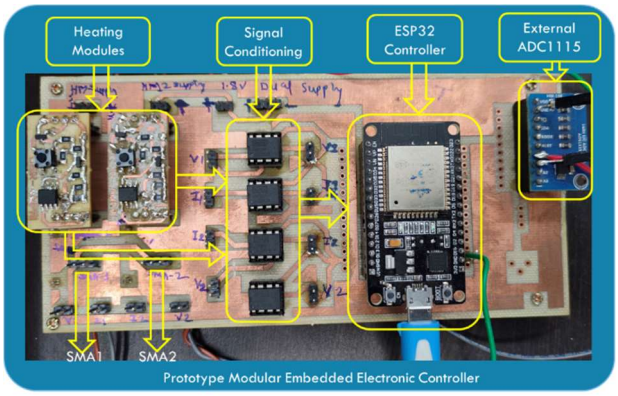
- Reduction in size of the AI model, resulting in lesser computational space and lower latency and associated testing.
- Implementation of the AI model onto the microcontroller-based system and online testing.
- Scanning system integrated with the developed printer bed with custom scan sequence, integration carried out jointly at CSIR-CEERI, Pilani.



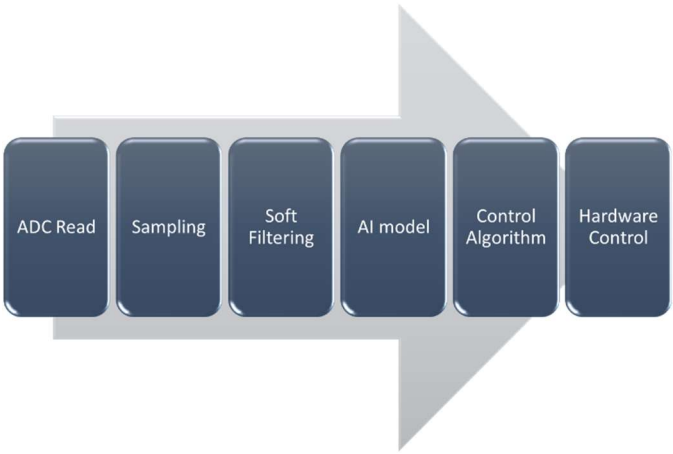
Design for actuator mechanical assembly



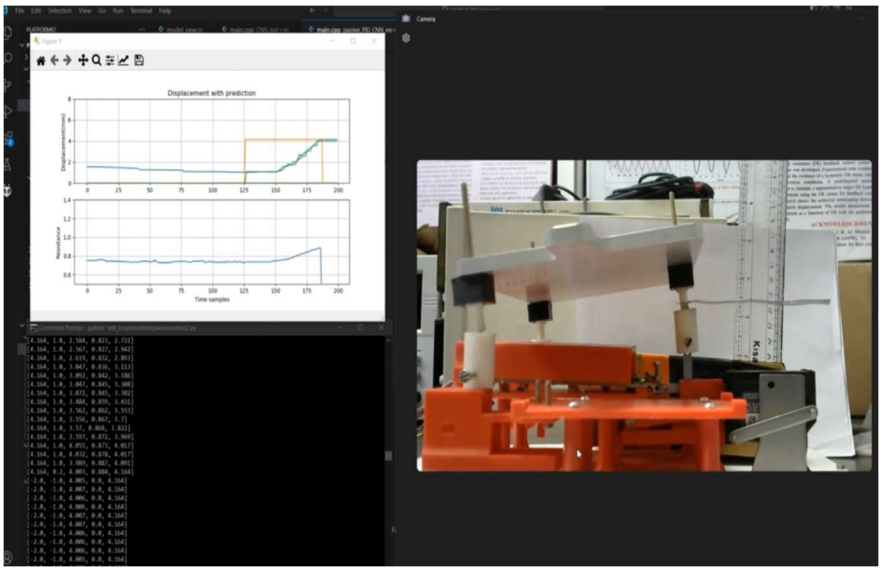
Mechanical assembly with actuator and bed



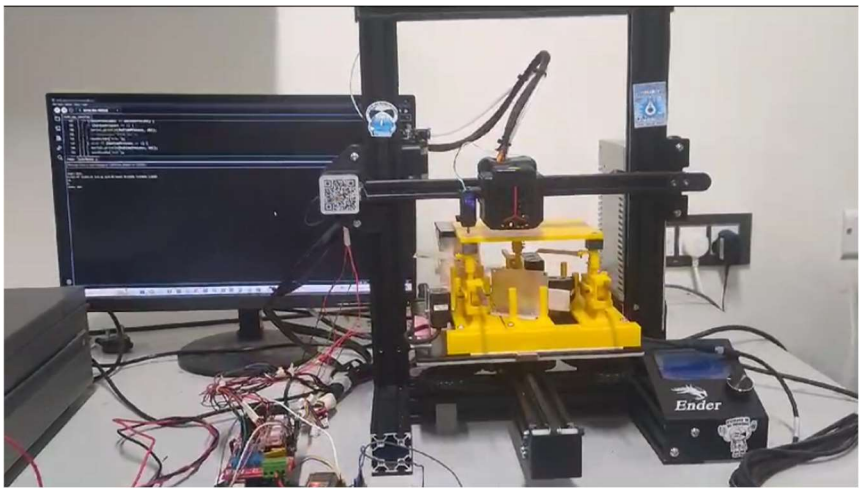
Prototype embedded electronic controller



Software Control flow



Microcontroller based online implementation of AI based control algorithm



Sensor Scanning testing and bed integration at CSIR-CEERI, Pilani

Hybrid Building Materials and Manufacturing

Development of Flexible Piezoelectric Two-dimensional Nanostructures Based Hybrid Nanogenerators for Harvesting Mechanical Energy

Highly crystalline molybdenum disulfide (MoS_2) nanosheets were grown by a simple and cost-effective hydrothermal route. An anomalous structural phase transition in MoS_2 nanosheets was observed in dielectric investigation.

X-ray diffraction confirmed the formation of a hexagonal crystal phase in few-layer MoS_2 nanosheets (Figure 1a). High-resolution transmission electron microscopy and atomic force microscopy results also confirmed the formation of few-layer MoS_2 nanosheets. Raman investigation reveals the formation of few-layer MoS_2 nanosheets with the coexistence of dual semiconducting (2H) and metallic (1T) phases (Figure 1b). TEM image of the as-grown MoS_2 nanosheets. The result of low-magnification HR-TEM exhibits formation of a sheet-like structure of size in the range of 50−100 nm. AFM topography image of the MoS_2 sample, confirming the dimension ranging from 20 to 140 nm with nanosheet-like morphology. The height profile of the sample is also measured using the AFM data to estimate the number of layers. The AFM height profile image shows the variation of height in the range of 3−8 nm, thus confirming the formation of four- to five-layered samples of MoS_2 (Figure 2a-d).

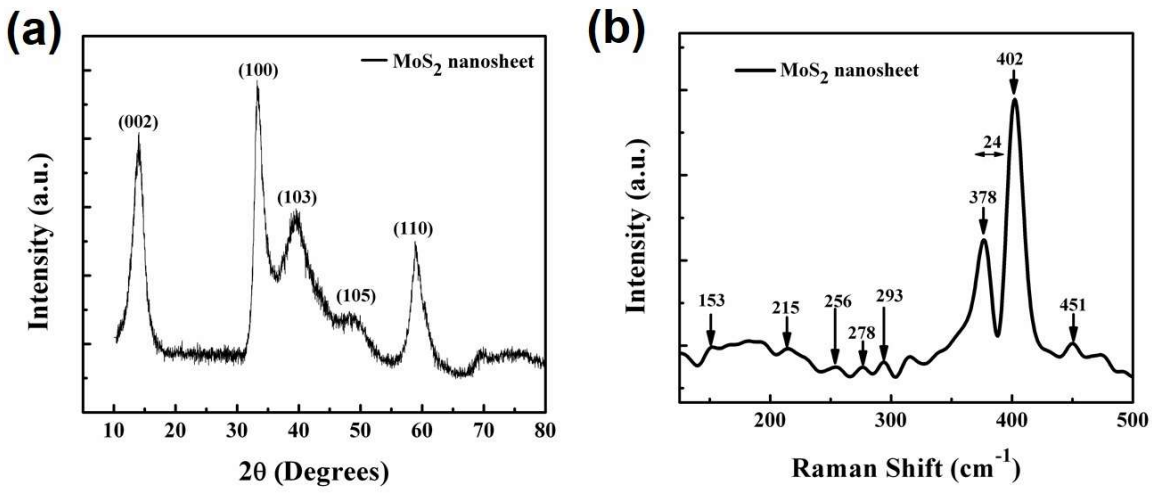


Figure 1. (a) X-ray diffraction patternand (b) Raman Spectrum of few layered MoS_2 nanosheet.

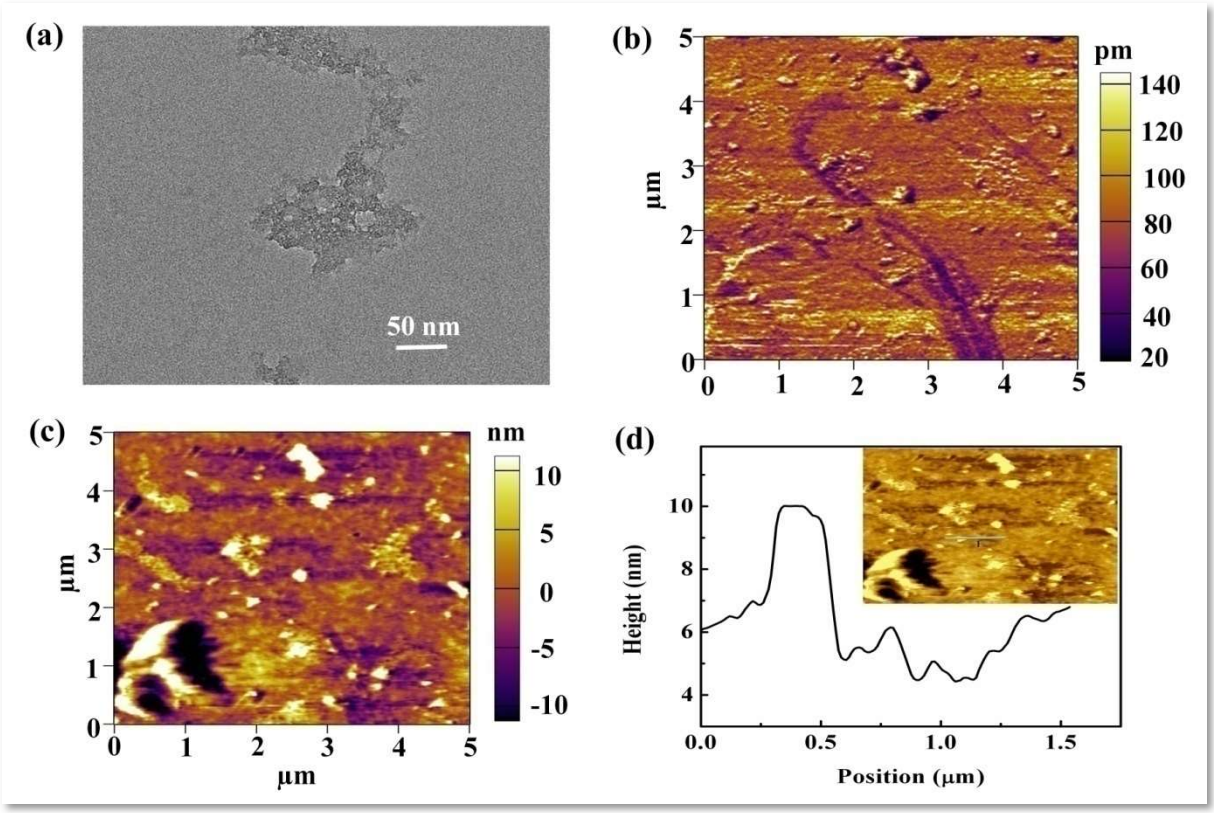


Figure 2. (a) HRTEM image of synthesised MoS_2 nanosheet. (b,c) AFM image exhibiting topography and height image of MoS_2 nanosheet. (d) Height profile data extracted along the shown line

In dielectric studies, a very high dielectric constant (ε′) of 2612 and an unusual dissipation factor of 250 were observed at 1 kHz frequency at room temperature compared to bulk MoS_2 (ε′ ~ 19). The unusual high dielectric constant and high dissipation factor from MoS_2 nanosheets may be due to the nanoscale-driven large polarization density and coexistence of the metallic phase in MoS_2, respectively (Figure 3a-d). An anomalous phase transition at 62 and 102 °C was also observed in the temperature-dependent dielectric analysis. Such phase transition in MoS_2 nanosheets may be associated with the crystal structure (2H-1T′) and the presence of sulfur vacancy in MoS_2 (Figure 4). AC conductivity and activation energy of few-layer MoS_2 nanosheets were calculated in various temperature and frequency ranges. Charge conduction behavior is analyzed in terms of metallic and semiconducting behavior of MoS_2 nanosheets.

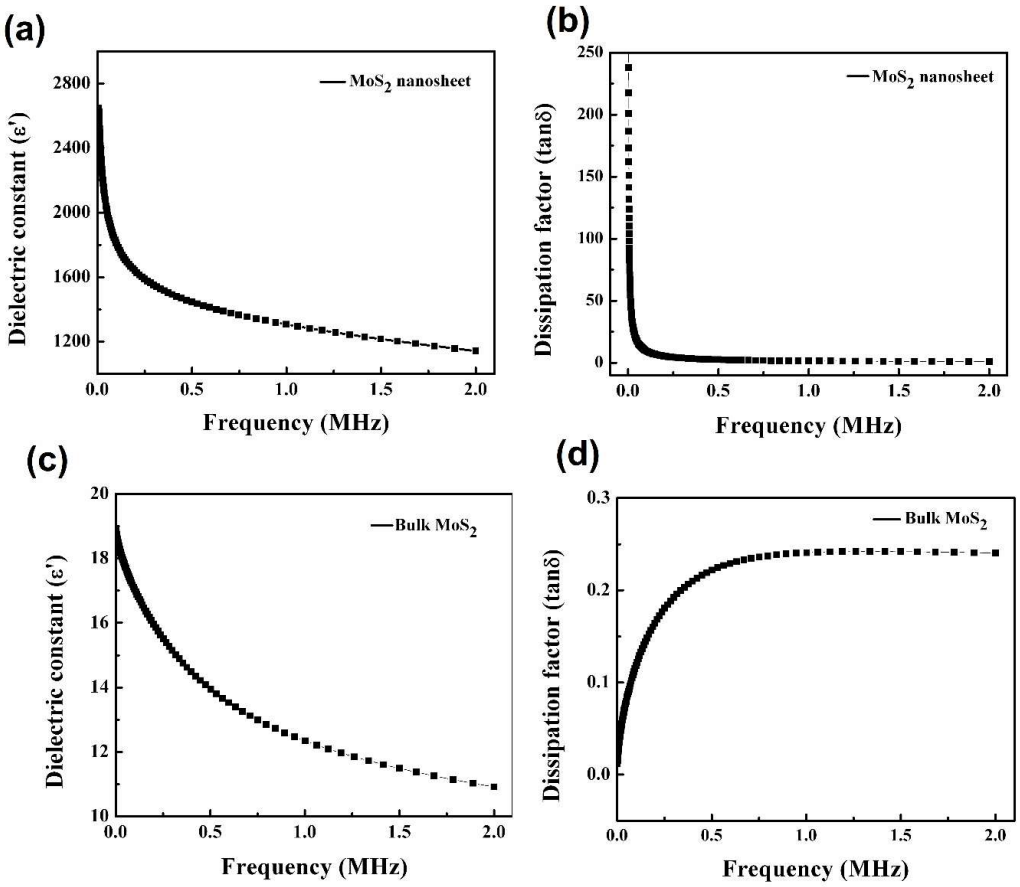


Figure 3. (a) Dielectric constant and (b) dielectric loss of MoS_2 nanosheets, respectively. (c) Dielectric constant and (d) dielectric loss of bulk MoS_2

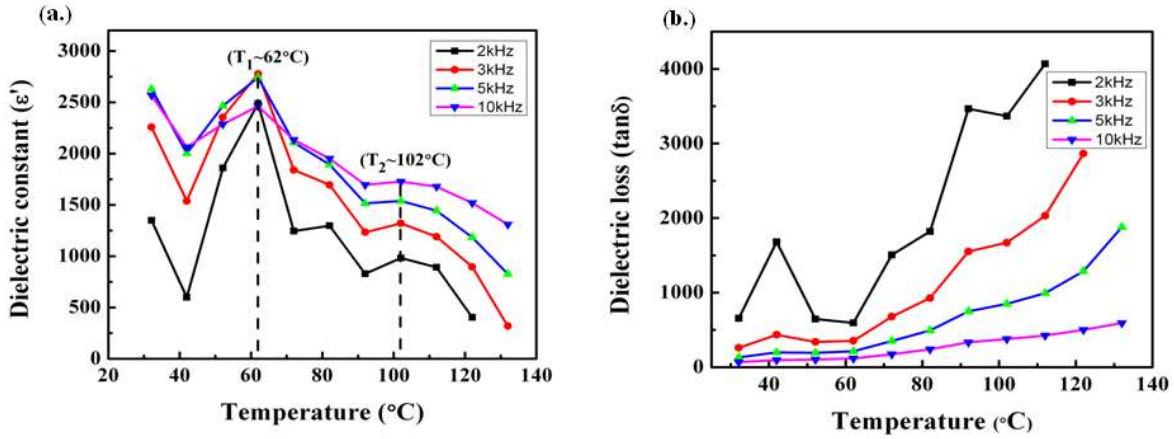


Figure 4. Temperature dependent (a) dielectric constant (b) dissipation factor of MoS_2 nanosheets

We have fabricated the high performance flexible piezoelectric nanogenerator based on S-free defect of 2D few layered molybdenum disulphide (MoS_2) nanosheets (Figure 5). The nanogenerator is

fabricated using few layered MoS_2 nanosheets synthesised*via* hydrothermal method and polydimethylsiloxane (PDMS) polymer on flexible conducting substrate. High resolution transmission electron microscopy (HRTEM) and Raman spectroscopy, confirmed the number of 3-5 stacked number of layers in MoS_2 sheets. The defect, electronic and chemical state of as grown MoS_2 nanosheets was investigated using the X-ray photoelectron spectroscopy (XPS). The MoS_2-CNT based nanogenerator device exhibits excellent high output voltage of 22 V and very high output current density of 9.00μA/cm^2 under small vertical compressive force of 1.5 kgf. The outstanding performance of the S-defect free MoS_2 nanosheets was correlated with the excellent piezoelectric properties of the sample. The piezoelectric charge coefficient of the 2D MoS_2 nanosheet was investigated using piezoelectric force microscopy and very high piezoelectric charge coefficient (d_{33}) of 120 pm/V was obtained. The piezoelectric charge coefficient was very high compared to previously reported monolayer or few layer MoS_2 nanosheets. The energy conversion efficiency of the MoS_2 nanogenerator device was about 30 %. Moreover, MoS_2 nanosheet also shows high dielectric constant of about 2649 at low frequency. The results suggest that absence of the S-defect can reduce free-charge carrier and screening effect, as a result high output was obtained. The defect, electronic and chemical state of MoS_2 nanosheets was also investigated using the X-ray photoelectron spectroscopy (XPS).

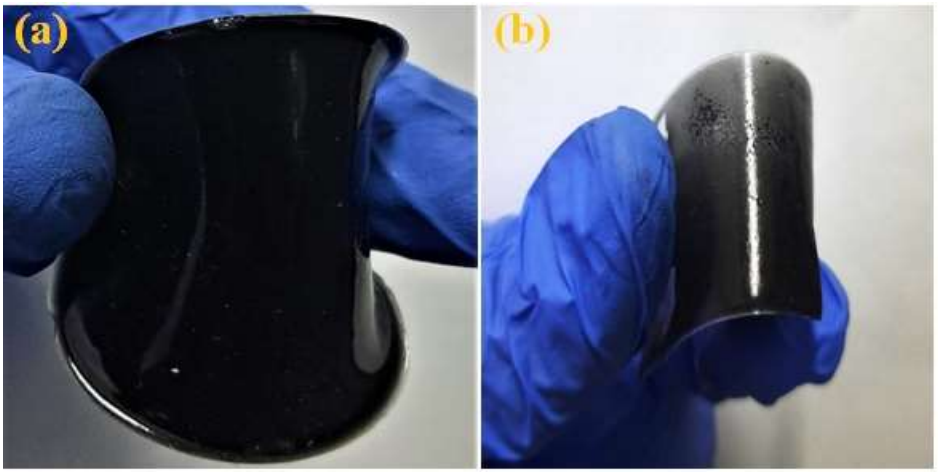


Figure 5. Device images of MoS2-CNT based flexible piezoelectric nanogenerator.

We have successfully developed the high-performance flexible and stable Cu-Ni nanoalloy decorated carbon nanotube (CNT) reinforced poly(vinylidene fluoride) (PVDF) based piezoelectric nanogenerator is presented for the first time with very high current and power density. X-Ray diffraction (XRD) was recorded to investigate the crystalline property of the Cu-Ni nanoalloys CNT-

PVDF nanocomposite film. Figure 6 depicts the XRD pattern of pristine PVDF and Cu-Ni nanoalloys CNT-PVDF nanocomposite..The formation of crystalline β-phase is confirmed using FT-IR and Raman spectra analysis. HR-TEM study reveals the formation of Cu-Ni nanoalloys with well-defined interconnected structure with CNT. The FESEM images of the pristine PVDF, Cu-Ni decorated CNTs structures, and Cu-Ni decorated CNT-PVDF nanocomposite hybrid film are shown in Figure 7. .The Cu-Ni nanoalloy decorated CNT-PVDF nanogenerator device exhibits a high output voltage of 12 V and high current density of 0.3 **μ**A cm^{-2} compared to pristine PVDF nanogenerator (4 V and 10 nA cm^{-2}). Very high power density of 204 **μ**W cm^{-3} is obtained from the nanocomposite nanogenerator. Piezoelectric force microscopy study reveals very high piezoelectric charge coefficient (d_{33}) of about 160 pm V^{-1} from Cu-Ni decorated CNT-PVDF. Very stable output performance with almost no degradation till 1500 cycles is observed from the Cu-Ni nanoalloy CNT-PVDF nanogenerator. Such high stability is due to its dramatic improved high tensile strength of 60 MPa. Very high dielectric constant of 500 is observed from Cu-Ni decorated CNT-PVDF as compared to pristine PVDF (**ε**' ≈ 20). The dramatic increase in output performance even under without electrical poling is discussed in light of self-dipole alignment, in-situ poling, high d_{33}, interfacial polarization, and enhanced dielectric properties (Figure 8).

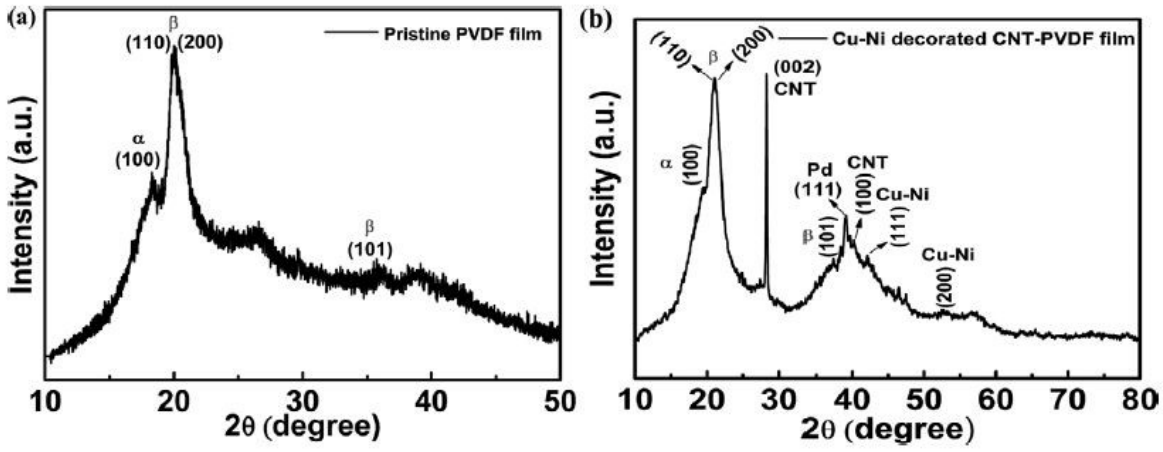


Figure 6. **X-ray diffraction (XRD) spectra of a) Pristine PVDF film showing β phase. b) Cu-Ni decorated CNT-PVDF composite film.**

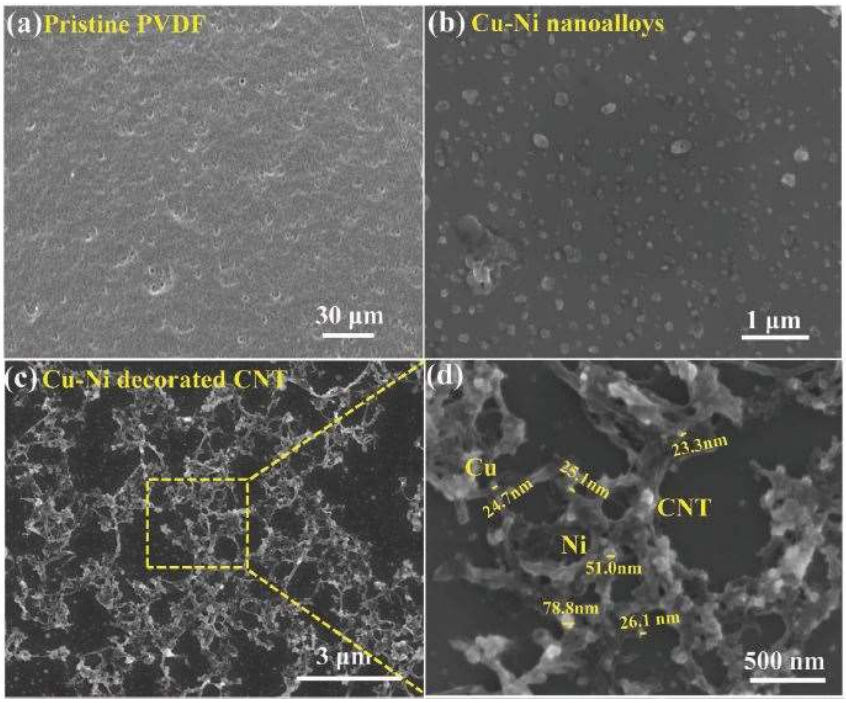


Figure 7. (a) FE-SEM image of pristine PVDF. (b) FE-SEM image of Cu-Ni nanoalloys showing the distribution in PVDF matrix. (c) Low magnified FE-SEM image of Cu-Ni decorated CNT. (d) High magnified FE-SEM image Cu-Ni decorated CNT showing Cu-Ni NPs.

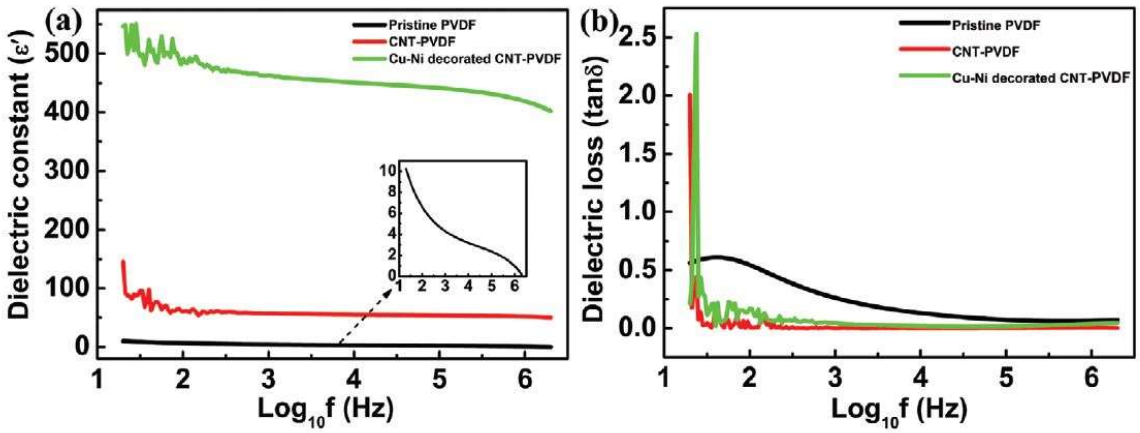


Figure 8. (a) Dependence of dielectric constant of pristine PVDF NG, CNT doped PVDF NG, and Cu-Ni decorated CNT-PVDF NG with frequency at RT. (b) Variation of dielectric loss of pristine PVDF, CNT doped PVDF, and Cu-Ni decorated CNT-PVDF NG with frequency at RT.

Manufacturing red mud waste based X-Ray Radiation shielding doors/panels in pilot scale for hospital sectors

- ✓ Pristine X-Ray Radiation shielding panels using inorganic red mud wastes particulates arising from aluminium industry in epoxy polymer at various pressure and temperature condition are fabricated.
- ✓ The developed glossy finish red mud based product is investigated with water absorption, mechanical strength, thermal and electrical properties
- ✓ The red mud which are collected from the Hindalco was ball milled using high energy planetary ball milling system in order to reduce the size to micro/nanoscale.
- ✓ X-Ray radiation shielding lead free panels with size of 3 mm, 5 mm and 15 and 21 mm is fabricated under optimized condition.
- ✓ Development of the X-Ray radiation shielding lead free panels with various filler concentration of red mud and epoxy.
- ✓ High density of 2.10 gm/cc from red mud based sheet is successfully achieved.
- ✓ Low Water absorption and high mechanical strength from X-Ray radiation sheet in range of is achieved. (WA ~ 0.20- 0.26 %)
- ✓ Low Thermal conductivity (0.5974-0.70 W/mK) of the developed panel were obtained, which is good for thermal insulation and low scattering of the X-Ray beam from sheets.
- ✓ High Flexural strength of the pristine red mud of 65 MPa was achieved.
- ✓ Dielectric breakdown test of the red mud based panel is measured as per ASTM standard and an average high value of 15 KV/mm is obtained
- ✓ Dielectric constant and dissipation factor of the red mud based X-Ray radiation shielding panels are investigated and found to be 22 at low frequency side and low dielectric loss about 2 is obtained which suggest the low electric charge storage capacity of the panels which is usally required for electrical insulation of the X-Ray shielding materials.
- ✓ The interfacial bonding of the red mud with epoxy particulates and their functional group analysis of the prepared sheet are investigated using the SEM and FT-IR analysis.
- ✓ A technology process to developed the high strength and water resistant red mud and natural fibre based X-Ray radiation shielding panels is developed and product with large size of 7 feet x 3 feet are fabricated at low temperature condition.
- ✓ X-Ray attenuation factor such as Half Value layer under X-Ray Photon -60kVp was measured and HVL of 0.16 cm is achieved.

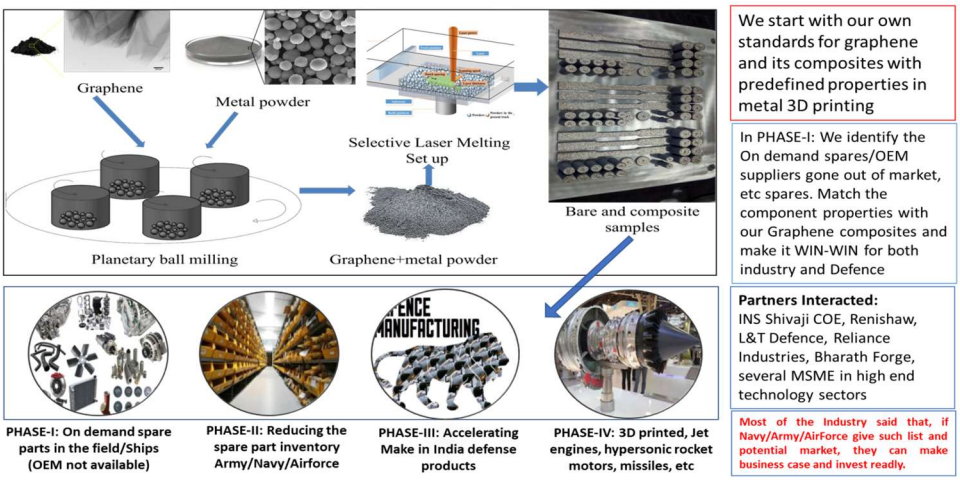
- ✓ High Z materials of barium chloride is used as additional filler with the red mud in the epoxy polymer in ratio of the 10:60:30 and high performance X-Ray radiation sheiling panels with different thickness is developed.
- ✓ We have measured the water absorption and X-Ray radiation shielding properties of the Barium reinforced red mud based X -Ray radiation shielding properties.
- ✓ X-Ray radiation shielding properties of the Ba-doped red mud based panel is improved
- ✓ The half value layer of the sheet is measured with various thickness of the sample for optimisation and X- Ray energy with low value of 44 μG is obtained with the 21 mm thick sample
- ✓ The developed product with red mud based sample is sent to BARC, Mumbai for X-Ray attenuation measurement and X-Ray absorption with various energy of 60 KV and 100 KV are measured with various thickness of the sample.
- ✓ Pilot scale/large scale fabrication of the red mud based X-Ray radiation of size 35 mm and 7 x 3 feet with natural fibre is developed for Real time demonstration of the full scale doors/panel at X-Ray rooms in KGMU and product is sent to KGMU for validation.

Green Engineered Materials and Additive Manufacturing

Centre of Excellence in Graphene and its applications

Graphene has greater potential for transcending India in several fields like, in agriculture, graphene-based sensors for moisture and other chemical powered by radio frequency waves could send big data of farming and managed very efficiently to increase the crop production. Low cost graphene-based sea water desalination could provide water to billions and increase the per capita water production. It is the need of the hour, our developed graphene foam grown over Ni foams is the potential candidate. Graphene based materials will be lighter, stronger, ultra-high permanence which could reduce the need for burning fossil fuels for automobiles or power generation and hence reduce the CO2 emission to atmosphere and also reduce the global warming and improving the air quality. Last but not least graphene has demonstrated highly efficient in genome sequencing, could one day revolutionize the personalize medicine to billions in India. In order to harness the true potential of the graphene and related materials.

Establishing" Translational Centre for Graphene Materials and Devices". To bring the first in kind 3D printing of graphene composites from TRL 3 to TRL 6. Graphene has potential to transcend India by solving several key problems in the area of Energy, Pollution, Agriculture, Health & Water by developing tailored technologies for the country. In CSIR, we have demonstrated for the first time in India using 3D printing to make graphene reinforced composites with remarkable strength, thermal conductivity and wear reduction. We will carry out cutting edge R&D on developing indigenized applications of graphene like high performance alloys & composites, 3D printing of graphene related materials, piezoelectric nano generators, 3D printed energy storage, bio-sensors etc. We also create network of graphene and 2D materials researchers, industries. Unique centre for Additive Manufacturing of Graphene and 2D materials in India and internationally pioneering facilities and activities as follows (i) Establishing RTP_CVD graphene growth and graphene coatings on metal and polymer powders for 3D printing. (ii) Standards and procedures for graphene and 2D materials, composites for 3D printing. (iii) Additive Manufacturing of graphene composites and components for defence, space, general engineering sector (iv) Electro Chemical 3D printing of nano and microscale devices using graphene and derivatives (v) 3D printing of graphene and 2D materials composites and demonstration of components (vi) Construction of New dedicated building for the unique centre with internationally pioneering facilities.



Metal Additive Manufacturing of graphene composites for various applications development

Artistic view of the proposed centre new building

Graphene reinforced metal matrix composites through powder bed additive manufacturing for aerospace and defense applications.

The fabrication of graphene reinforced metal matrix composites (MMCs) has been a challenging task using conventional manufacturing techniques. However, laser powder bed additive manufacturing has made it possibly create MMCs with uniform dispersion of graphene into the matrix. In additive manufacturing there is a limitation in selection of printable alloy systems. Several metal alloys such as stainless steel 316L, aluminium alloy (AlSi10Mg), and titanium alloy (Ti6AlV4) etc. have a high printability. Hence, these materials are potential candidates for preparing graphene reinforced metal matrix nanocomposite. These materials are trivial for fields like aerospace, instrumentation & strategic sectors.

Graphene, 2D allotrope of carbon exhibit excellent mechanical, thermal and electrical properties. Graphene based nanocomposites are well known for their multifunctional characteristics. The technology is not yet well explored. It is potentially useful in sectors like aerospace, marines and allied defence sectors. Based on the research conducted at our lab, we have prepared a material data sheet

for graphene reinforced stainless steel 316L and AlSi10Mg alloy. These material datasheets serve as a database for fabrication of graphene reinforced composites printed at certain process parameters.

Development of high-performance ultrathin overcoats for hard disk media and tape head devices for futuristic high storage capacity magnetic memory systems

Objectives

- ✓ To develop < 2 nm thick novel metal or metal nitride/carbon-based bilayer overcoats with excellent protective characteristics for hard disk media to increase the areal density of hard disk drives from 1 Tb/in^2 to 4 Tb/in^2.
- ✓ To develop < 10 nm thick novel metal or metal nitride/carbon-based bilayer and multilayer overcoats with excellent protective characteristics for tape heads to enhance the areal density of tape drives beyond 100-120 Gb/in^2.

Achievements

- ✓ We have developed sub-2 nm overcoats on hard disk media which outperformed 2.7 nm thick commercial overcoat.
- ✓ We have developed ultrathin hybrid coating that reduce the friction and wear magnetic material for tape head application.

Water Resource Management & Rural Technology Division

Objectives of as per the project document:

- Erection of makeshift hospital
- Review of erected structure and installation of necessary appliances, as applicable
- Handing over of makeshift hospital to M. P. government (Directorate of Health Services)

Significant achievements

- The construction of makeshift hospital at Sarangi Village, Tehsil Petlawad, District Jhabua, Madhya Pradesh has been completed.
- False ceiling has also been provided with respect to discussion with Dist. Health officials.
- CSIR-AMPRI Bhopal has handed over the completed 06+02 bedded (total 08 bed) hospital to District Officials, Jhabua for smooth operations.

Makeshift hospital dedicated to society for societal benefit

Completed makeshift hospital

Ramp with railing for stretcher, patients; emergency exit door in the general ward

Team CSIR-AMPRI, Bhopal led by Director, CSIR-AMPRI and Principal, RGPV-UIT, Jhabua at Makeshift Hospital, Sarangi, Jhabua

Installation of SODAR system for Maharashtra Pollution Control Board (MPCB)

Objectives of as per the project document:

- ✓ Installation of SODAR system facilities
- ✓ Data collection, monitoring and maintenance for three years.

Significant achievement

- ✓ As per the promised objectives, we have successfully installed SODAR system at Maharashtra Pollution Control Board (MPCB) station and it is working properly from last three years. MPCB is using atmospheric boundary layer height data measured by SODAR system for air quality management of Mumbai region.

CSIR Integrated Skill Initiative

CSIR Integrated Skill Initiative (Phase II)

Objectives:

- Upgradation of knowledge on latest technologies.
- Creating a pool of skilled human resource for industries.
- Developing employment oriented skill programmes.
- Aligning the skill programmes with CSIR Integrated Skill Initiative, National Skill Development Council (NSDC) and Sector Skill Councils (SSC) to meet the national objectives.

Significant achievement:

During the FY-2023-24 (August to March) CSIR-AMPRI, Bhopal has successfully trained **549 numbers** of trainees in various skill-training programs Further, an ECF of **Rs. 7,42,810/-** has been generated during the FY-2023-24. (August to March).

Number of Trainees trained - 549

Number of Programmes conducted - 16

ECF generated - 7.42 lakhs

Participants of 2 weeks Training on 'LSPR Substrate for investigation of micro plastic' from 1 to 14 Aug 2023

Training Program for Sant Hirdaram Girls College, Bairagarh

Training Program at Dr. A. P. J. Abdul Kalam UIT Jhabua

Training Program for Eklavya Model Residential School

CSIR-Jigyasa

CSIR-Jigyasa 2.0: Virtual Lab Integration

Duration: 27/07/2022 to 31/03/2026

Objectives:

- To connect students and scientists and create scientific temper at school
- To eliminate the physical concept of laboratory from web-based study and learning
- To remotely access to laboratories in various topics
- To motivate students for conducting experiments as per their own interest
- To learn basic and advanced concepts of experiments through remote access
- To easily build up their knowledge and improve fundamental concepts with practical work

Achievements:

- 145 programs were conducted by CSIR-AMPRI, Bhopal as part of the CSIR-Jigyasa initiative
- 06 Nos National Level Science Teachers Workshop organized
- A total of 13 videos have been created and uploaded on the IIT Bombay server for the benefit of students worldwide.

Participants	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	Total
Students (Urban and Ruler)	856	2019	6648	46766	19048	10450	6747	92534
Teachers	69	772	939	5000	4280	1250	1366	13676
Tribal Area School Students	0	640	1870	10210	4432	3070	1684	21906
Programmes	16	20	20	12	17	35	25	145
Total	941	3451	9477	61988	27777	14805	9822	128261

Important Technological Contributions

Bamboo Composites for Modern Housing Structures

CSIR-AMPRI transferred Know-How Technology on "Bamboo Composites for Modern Housing Structures " to i) M/s Asili Bamboo Products, Meerut, 18th Jan 2024 and ii) M/s Ecological Fibre Composites Pvt. Ltd. Jabalpur, M.P., 14th May 2023.

About the Event: One of the unique and extraordinary mega science festivals - India International Science Festival (IISF 2023) was organized during 17-20th January 2024 in Faridabad, Haryana. During the second day of this science festival, i.e., 18th Jan 2024, the Know-How Technology on "Bamboo Composites" was transferred to a well-known materials manufacturing company, M/s Asili Bamboo Products, Meerut, in the presence of Dr. Avanish Kumar Srivastava, Director, CSIR-AMPRI, Bhopal and Mr. Akshay Joshi, Director, M/s Asili Bamboo Products, Meerut. On this occasion other dignitaries were also present, namely Mr. Md. Ali Shah, Sadhana, Dr. C. Anandharamakrishnan, Director, CSIR-NIIST Trivandrum, Prof. Manoranjan Parida, Director, CSIR-CRRI New Delhi, Dr. B. Chandrasekaran, Former Director, CSIR-CLRI, Prof. Sudhir Singh Bhadauria, Director, UIT, RGPV Bhopal, Shri. Mayank Mathur, RC Member from CSIR-Headquarter, Dr.J.P.Shukla, Chief Scientist, Mr. Somnath Mazumder, COA, Dr. J.P. Chaurasia, Head PPD, Dr. Sandeep Singhai, Head Business Development, Dr. Sarika Verma, PI and Principal Scientist, Dr. Neeta V M Khalkho, Senior Principal Scientist and Dr. Satanand Mishra, Principal Scientist from CSIR-AMPRI, Bhopal. The industrial product, bamboo composites, has been developed using environmentally friendly technique using natural and versatile resource bamboo. Bamboo has been declared as grass and it proliferates rapidly with no stringent rules and regulations imposed for its growing, cultivation, propagation and cutting. Within 3-4 years, the bamboo gets matured to be utilised for developing into bamboo composite, unlike teak wood, which requires 30-40 years to grow. Bamboo is an excellent absorber of carbon dioxide and releases a large amount of oxygen (approximately 35%) back into the atmosphere, and thus, can cure global warming. The bamboo composite product resembles teak wood with better durability & dimensional stability, high strength, density, mechanical strength, fire resistance, moisture resistance, and natural & aesthetic appearance.

The technology of manufacturing bamboo composites, developed by CSIR-AMPRI Bhopal, has sequential steps like cutting of bamboo poles to desired sizes, splitting to strips, removal of knots, chemical treatment for protection against microbial/natural degradation, its conversion to fibrous form without damaging the natural strength of bamboo fibers, coating of adequate pre-polymer, which is followed by compaction under appropriate heat and pressure to obtain a composite sample of the

desired shape. The final shape may be a moulded article, plain sheet, thick boards, beams, etc. These shapes can be further machined for the final finished product.

After the successful trials on an industrial level, panel boards, beams, pillars, partitions, doors, window frames, roof, floorings etc., were developed, and a "Demonstration Structure (AMPRI's Bamboo Composite Committee Room "Baithak"),," made up of bamboo composites has been erected in the campus of CSIR-AMPRI Bhopal in January 2022. It has a hexagonal base erected with a Peak height of 13' 8", a Max span of 24'8", and a Floor area of 253 sq. ft. It includes walls, roofs, floors, beams, poles, doors, and window frames of bamboo composites. Using AMPRI's bamboo composite technology recently, a similar structure has been erected at CSIR-NEIST, Jorhat, Assam. CSIR-AMPRI's knowhow based 'Bamboo Composites Tiles' manufactured by the industry partner have been successfully installed for demonstration at CSIR, New Delhi on flooring, Seminar Room (Room No. 101) in March 2024. Due to its unique characteristics, the developed bamboo composite can be also used in various other sectors, especially in Aerospace. Therefore, bamboo can create future products similar to wood with a ten times faster harvest cycle, and with the growth in farming and cultivation of bamboo, the generation of employment, especially in rural areas will be improved. The technology have the potential to attract and encourage micro, small and medium enterprises, start-ups, etc., and thus, supports in achieving sustainable goals by contributing to Atma Nirbhar Bharat, Swasth Bharat Abhiyaan, Swachh Bharat Abhiyaan and many more. The technology "Bamboo Composites for Modern Housing Structures" developed by CSIR-AMPRI, Bhopal was also transferred to M/s Ecological Fibre Composites Pvt. Ltd. Jabalpur, M.P. in the presence of the Honourable Governor of Madhaya Pradesh,Shri Mangubhai Patel, chief guest on the occasion of Inaugural Function of One Week One Lab Programme of CSIR-AMPRI on 14th May,2023.

Know-How Technology Transfer of "Bamboo Composites" to M/s Asili Bamboo Products and M/s Ecological Fibre Composites Pvt. Ltd.

Bamboo composites tiles flooring, Room No 101, Seminar Room, CSIR-HQ, Delhi.

Commercial Launch of the CSIR - AMPRI's Technology based Evergreen Hybrid Composites of Parali (Agrowastes) and Industrial Wastes.

Every year, the burning of agro residues, specially Parali burning in open land, created severe air and smog pollution in NCR, where Delhi has been cited as one of the most polluted cities in the world and air pollution level has reached manifold than that of the World Health Organization (WHO) safe limits. Solution to Parali burning problem is need of society and we came up with a complete solution. Various ways have been used to tackle agro waste, however, to date, eco-friendly solution to tackle the agro residue especially paddy straw is still not available. In line with the spirit of waste-to-wealth on mission mode, scientists at CSIR- Advanced Materials and Processes Research Institute, Bhopal, under leadership of Dr. Avanish Kumar Srivastava, Director-CSIR-AMPRI, Bhopal has came up with a green technology to manage the paddy straw (Parali) agro waste. They have introduced a new class of materials Parali-based particle board as a wood substitute for building applications so that consumption of timber in building and house construction can be minimized and Parali can be consumed in an eco-friendly manner. This technology also offers a potential solution for the effective utilization of other several industrial wastes such as paddy straw, wheat straw, marble waste, and fly ash. The developed ecofriendly Parali board (evergreen hybrid wood), is cheaper and stronger than the conventional particle Board and Counterpart. The developed technology can solve the long-standing problem of Parali burning by farmers in Haryana, Panjab, and NCR. The innovative composite evergreen hybrid parali particle board have a variety of application such as doors, false ceilings, flooring, architectural wall panels, partition, and furniture.

It has other potential applications for infrastructure in the construction sector including locomotive (train) and other transport systems. The evergreen hybrid ply and composite wood are stronger and environmental-friendly. The developed parali board is resistant to weather, corrosion, water, moisture and is a termite and fungus-free product. The developed Parali product is an alternate material for wood/timber, plastic, and synthetic wood such as MDF Board. The developed Parali board technology can solve the typical north-India stubble burning problem and air pollution problem in NCR which are not only harms people's health but also create a negative impact on the country's economy.

To solve the burning issue of the Parali and to facilitate the large-scale production of evergreen Parali hybrid wood, Team CSIR-AMPRI Bhopal has transferred technology “Evergreen Hybrid Composite of Parali (Agro waste) and Industrial Waste” to one of the well known industry M/s Amit Densified (Doors) Private Limited, Sonipat, Haryana under brand of M/s Bhutan Tuff, New Delhi on 21st August 2023 at CSIR - AMPRI, Bhopal.

Now, Bhutan Tuff has started the production of the Parali-based board and the board will be available for the society for utilsation.

Commercial Launch of the CSIR AMPRI Technology of paddy Board

Eco-friendly Red Mud-based X-ray Radiation Shielding Panels

CSIR-AMPRI, Bhopal technology/know-how on Eco-friendly Red mud based X-ray Radiation Shielding Panels transferred to M/s Nature's Global Service, New Delhi, 27th December 2023. About the Event: CSIR-AMPRI, Bhopal has Transfered know-how to M/s NATURE'S GLOBAL SERVICE (Brand: X-Shield), New Delhi of Eco-friendly Red mud based X-ray Radiation Shielding Panels. This technology will provide an alternate of the currently utilised lead materials and has wider spectrum multifunctional applications in Hospital and Nuclear Sector.

Mr. Tanuj Bhateja, Director, NATURE'S GLOBAL SERVICE, New Delhi, Prof. Avanish Kumar Srivastava, Director, CSIR-AMPRI, Prof. Atul Narayan Vaidya, Director, CSIR-NEERI, Nagpur, Dr. Amogh Kumar Gupta, Chairman, BG, School of Planning and Architecture, Vijayawada & President, VIBHA, Madhya Bharat Prant, Bhopal, Prof. Anil Kothari, DG, MPCOST, Bhopal & Scientific Adviser, Govt. of MP, Prof. Sudhir Singh Bhadauria, Director, University Institute of Technology, RGPV, Bhopal & Secretary General, Vigyan Bharti, New Delhi were also present on this occasion.

भास्कर खास • देश में पहली बार एम्पी ने तैयार किया लेड का विकल्प, 9 मिलियन टन रेड मड निकलती है हर साल देश में

एक्सरे, सीटी स्कैन और रेडियोथेरेपी सेंटर में लेड की जगह रेड मड रोकेगी रेडिएशन; यह एल्युमिनियम फैक्ट्री का वेस्ट मटेरियल... जांच दरें 20% तक कम हो सकेंगी

आधी कीमत पर तैयार

रेड मड खुली छोड़ दी जाए तो घातक, इसे ट्रीट किया जाता है

एंबुलेंसों ने किया प्रयोग

Technology/know-how transfer on Eco-friendly red mud-based X-ray radiation shielding panels to M/s Nature's Global Service, New Delhi

Installation of CSIR-AMPRI developed water filters in the Dhar district of MP

Installation of CSIR-AMPRI developed water filters in the Dhar district of MP About the Contribution: CSIR- AMPRI has installed its defluoridation filters in various villages of Dhar district of Madhya Pradesh. The filters are installed in Himmatgarh, Shikarpura, Musapura and so on villages. These villages have maximum population of scheduled tribals where ground water is severely affected by presence of fluoride in concentration higher than the permissible limits. The filters are in use and villagers are drinking filtered water.

Important Events

One Week One Lab (OWOL) Programme Organised By CSIR-AMPRI, Bhopal

CSIR-AMPRI, Bhopal organized One Week One Lab Programme from 14th -18th May 2023. National Technology Day & Curtain Raiser of OWOL programme were organised on 12th May 2023, Shri Deependra Singh, Chairman and Managing Director, Indian Rare Earths Ltd. was the chief guest at the function.

Inaugural Function and Thematic Discussion on "Advanced and Futuristic Materials", Industry Meet and Expo for Technology, Demonstration and Dissemination, R& D and Academia Meet and Young Researchers' Conclave, Jigyasa & Awareness Programme, and Open Day, Skill Development and Tribal Welfare Program were organised during OWOL programme. Programme concluded with Valedictory Function on 18th May 2023.

Shri Mangubhai Patel, Honourable Governor of Madhaya Pradesh was the chief guest on the occasion of inaugural function. Shri Girish Gautam Ji, Honourable Speaker, Legislative Assembly, Madhya Pradesh was the chief guest at the occasion of Jigyasa & Awareness Programme. Shri Vishnu Datt Sharma Ji Hon'ble Member of Parliament, was the Chief Guest and Shri Jitendra Litoriya Ji, (Cabinet Minister Rank), Chairman, M P Khadhi & Village Industries Board, Bhopal was the Distinguished Guest at Skill Development and Tribal Welfare Program

Prof. Sunil Kumar Gupta, Vice Chancellor, Rajeev Gandhi Prodyogiki Vishwavidhyalaya (RGPV), Bhopal was the chief guest and Prof. Anil Kothari, Director General, Madhya Pradesh Council of Science and Technology (MPCST), Bhopal was guest of honour at Valedictory Function.

Dignitaries viz. Prof. Siva Umapathy, Director, IISER, Bhopal , Dr. Lalhmingmawia Pachuau, Additional Director of Horticulture, Department of Horticulture, Govt of Mizoram ,Prof. Saroj Barik, Former Director, CSIR-NBRI and Professor, North Eastern Hill University, Meghalaya, Dr. Hemant kumar Aiyer, Lead Scientist, Aditya Birla S & T Centre, Dr. Amit Raje, Chairman & M.D., and Chief Technical Officer, Aartech Solonics Ltd., India, Shri Parikipandla Narahari, IAS, Secretary, MSME & Industries Commissioner, Government of Madhya Pradesh , Shri Ashok Kumar Chauhan, IFS, Additional Secretary, Department of Forests, Govt. of Madhya Pradesh ,Shri Sudipta Saha, President - Operations, Prism Johnson Ltd., , Shri Samarendu Chatterjee, Senior Vice President, Bharat Oman Refineries Ltd , Mr. L. Lalhmingmawia Pachuau, Additional Director of Horticulture, Department of Horticulture, Govt of Mizoram, Mr. Mahendra Bhatpahari, Shub Green Pvt. Ltd. Bhilai, Mr.Bhujang Shet, representative from Permali Wallace Pvt. Ltd, Bhopal, Dr. R.M. Mohanty, Senior Principal Scientist, CSIR New Delhi, Shri Ramesh Kumar Gupta, IFS Principal Chief Conservator of Forest,

Department of Forests, Govt. of MP , Shri. D. D. Gajbhiye, Joint Director, Indian Enterprise Development Services, Ministry of MSME, Indore, Dr. Purnima Swarup Khare, Director, School of Nanotechnology, RGPV, Bhopal Er.Sanjeev Agrawal, Chancellor, Sage University, Bhopal & CMD SAGE Group, Professor Vipin Vyas, Department of Bioscience, Barkatullah University, Shri Raghvendra Shrivastava (IFS), Hon. Member, SEAC, Shri Rohit Singh (IAS) Director, MSME, Prof. Sanjay K. Tiwari, Vice Chancellor, MP Bhoj (Open) University, Bhopal , Prof. Akhilesh Kumar Pandey Vice Chancellor, Vikram University and Deputy Commissioners from KVS and NVS of M.P. and Chhattisgarh graced various occasions of the event.

Various events organized in One Week One Lab programme of CSIR-AMPRI like Jigyasa, skill development and tribal welfare, industry meet and expo, open day will help in creating awareness among common people about ongoing activities of CSIR-AMPRI and scientific developments in country, creating scientific temperament among students, encourage them to pursue science as career and establishing connectivity with industries. This will result in transfer of more technologies to industries and formulation of new project proposals. Ultimately, this will be beneficial for the society at large.

Release of Brochure of One Week One Lab Programme

Inauguration of Expo by Honourable Governor

Welcome of Shri Girish Gautam Ji, Honourable Speaker, Legislative Assembly, MP by Director CSIR-AMPRI and CSIR-NML

Presentation of memento to the guest by Director CSIR-AMPRI and CSIR-NML

CSIR – AMPRI celebrated National Science Day

CSIR- AMPRI, Bhopal celebrated National Science Day on 5th March 2024. Captain Dr. Om Prakash Sharma, Quality Assurance Officer (Warship Equipment), Indian Navy, Ministry of Defense was the Chief Guest at the function.

At the outset, Dr. Avanish Kumar Srivastava, Director, CSIR-AMPRI, Bhopal welcomed guest and gave welcome address. He highlighted the importance of celebration of National Science Day and talked about activities of CSIR-AMPRI, with emphasis on technologies transferred in the recent past.

Captain Dr. Om Prakash Sharma addressed the gathering. He appreciated the work done by CSIR-AMPRI. He emphasized on the indigenization to enter into Amrit Kaal, need of novel advanced materials to solve society problems and collaboration between Indian Navy and CSIR-AMPRI in areas of mutual interest in near future. Video film on DGQA was also played by him at the occasion.

Dr. N. Sathish, Principal Scientist, CSIR-AMPRI gave talk on Make in India Raman Spectrometer developed by CSIR-AMPRI, Bhopal. Other researchers also gave presentation about their research work covering piezoelectric nanogenerators and MXene based materials. Video Film made by CSIR -AMPRI on Raman Spectroscopy was played at the occasion.

CSIR-AMPRI technologies-based Memento was presented to the Chief Guest by Director, AMPRI.

Dr. Sarika Verma, Principal Scientist moderated the programme and Dr. Mohd. Akram Khan, proposed vote of thanks at the end of programme.

Presentation of Memento to the Chief Guest

Captain Dr.Om Prakash Sharma addressing the gathering

CSIR-AMPRI, Bhopal, IISF 2023 Public Outreach Program

A one-day public outreach program was organized for the promotion of the 9th India International Science Festival (IISF) 2023 at CSIR- Advanced Materials and Processes Research Institute, Bhopal under the chairmanship of Prof. Avanish Kumar Srivastava, Director, CSIR-AMPRI. In this context, CSIR-AMPRI Bhopal organized a one-day program on 27th December 2023 to reach out to students,

faculties, and public to present a detailed view of IISF 2023. CSIR-AMPRI Bhopal had privilege of hosting distinguished guests Dr. Amogh Kumar Gupta, Chairman, Board of Governors, School of Planning and Architecture, Vijayawada and President, Vibha, Madhyabharat Prant, Bhopal, Dr. Anil Kothari, Director General, Madhya Pradesh Council of Science and Technology, Bhopal, Dr. Atul Narayan Vaidya, Director, CSIR-NEERI, Nagpur and Dr. Sudhir Singh Bhadauria, Director, UIT-RGPV, Bhopal and Secretary General, Vigyan Bharti, New Delhi during the program. Prof. Avanish Kumar Srivastava, Director, CSIR-AMPRI chaired the outreach programme, which was packed with technical presentations of invited guests, Capsule film of AMPRI showcasing AMPRI research activities, IISF 2023 film etc.

In the presence of an august audience and under the leadership of the Director, CSIR-AMPRI, Bhopal, a technology/know-how on Eco-friendly red mud-based X-ray radiation shielding panels transferred to M/s Nature's Global Service, New Delhi

In the program, 'Applied Innovative Research' journal and 'Anusandhan Sandesh' Hindi journal published by CSIR-AMPRI were released by the distinguished guests present on the stage.

In the last phase of the program, Dr. Jai Prakash Shukla, Chief Scientist, AMPRI presented the vote of thanks.

Technology/know-how transfer to M/s Nature's Global Service, New Delhi.

Release of Anusandhan Sandesh Hindi journal

CSIR-AMPRI Organized One Day Hands on Training cum Workshop on the topic "A Fusion of Technology and Art: Opening New Horizons for Artisans"

CSIR- Advanced Materials and Processes Research Institute (AMPRI) hosted a one-day hands-on training cum workshop titled "A Fusion of Technology and Art: Opening New Horizons for Artisans," funded by DST under the SYST scheme on 19th February 2024. The event aimed to explore the convergence of technology and art, providing participants with a platform to learn, collaborate, and experiment. Mrs. Durgabai Vyam, Padma Shri Awardee for Art in 2022, was the Guest of Honor, joined by eminent speakers Architect S.M. Husain from Shelter Company, Bhopal, and Mr. Faisal Mateen, Artist & CEO of I Design Dreams, Bhopal. The event also

witnessed the presence of artists from Hemanya Art Foundation (NGO), Bhopal, and Shain Art Welfare Society (NGO), Bhopal.

At the outset, Dr. Avanish Kumar Srivastava, Director, CSIR – AMPRI, Bhopal welcomed the guests and highlighted the importance of workshop. Mrs. Durgabai Vyam, spoke about extraction of colors from flowers and about painting on canvas and sheet. Dr. Mohd Akram Khan, Chief Scientist and Head, Industrial Waste Utilization Nano and Bio Materials Division, CSIR-AMPRI, Bhopal spoke about areas of activities and technologies of CSIR-AMPRI, Bhopal. Dr. Surender Kumar, Senior Scientist, CSIR-AMPRI, Bhopal talked about Electrochemical 3D printing by citing examples of paintings of Bhimbetka Bhopal. Architect S.M. Husain spoke about Art and Creativity and gave examples of use of cement, lime bricks in construction and highlighted that lot of inventions are yet to be done. Mr. Faisal Mateen, Artist highlighted work done by him for various brands.

Mr. Shivam Namdeo, Artist, Hemanya Art foundation (NGO), Bhopal, Mr. Rakesh Kumar Roy, Founder Trustee, Hemanya, Art foundation, (NGO) Bhopal, Mr. Badar Aalam, President of Shain Art Welfare Society (NGO), Bhopal and Mr. Balkrishan Namdev, Secretary of Shain Art Welfare Society (NGO), Bhopal were the special invitees in the workshop and graced the occasion by their presence.

Welcome of Mrs. Durgabai Vyam (left) and Presentation of memento (right)

Dignitaries on Dias

Inauguration of poster session

Awards and Achievements

- CSIR-AMPRI, Bhopal is the winner of CII 3R awards 2023 for excellence in innovation, solutions or technology by research labs/ academic institutes for sustainable waste management. CSIR-AMPRI has bagged this award for the technology "Red Mud into Lead Free Radiation Shielding Materials".

- Dr. Avanish Kumar Srivastava, Director CSIR-AMPRI has been elected as Fellow of Indian National Academy of Engineering w.e.f. 01/11/2023.

- Name of Dr. Avanish Kumar Srivastava, Director CSIR-AMPRI, Bhopal , Dr.D.P. Mondol, Chief Scientist,CSIR-AMPRI , Dr.Shiv Singh,Scientist, CSIR-AMPRI and Dr.Dipen Kumar Rajak, Scientist, CSIR-AMPRI appeared in Top 2% Most Influential Scientists (Single Year) in 2023 Stanford University List: Analysis of Indian Researchers.

- Venkat Chilla delivered an invited talk on "A detailed powder metallurgy-based methodology for large scale production of aluminum foam-filled steel tubes for enhanced crashworthiness" 25-28 February 2024, International conference on powder metallurgy and particulate materials, Pune.

- Dr. Archana Singh, Principal Scientist, CSIR -AMPRI, Bhopal has been awarded Certificate of achievement for her outstanding contribution in the field of STEM and for being a role model for girl students of M.P. under the WeSTEM programme of Government of M.P. and UN Women, 12th February 2024.

- Dr. V Sorna Gowri delivered a talk on "Multifunctional Finishing of Textiles Based on Polymer Nanocomposites" in IFESB special lectures series from Internationally Recognized Scholars-6th lecture at Institute for Fibre Engineering, Shinshu University, Japan on 26th Feb, 2024

- Dr Archana Singh, Principal Scientist, CSIR-AMPRI, Bhopal has been awarded Merck Young Scientist Runner-Up Award 2023 in field of sustainability. The prestigious award is given by the Merck to Indian researchers selected across the country who have proven themselves by their innovative and novel research ideas in the field of sustainability to the jury panel.

- CSIR-AMPRI, Bhopal has participated in 10th Bhopal Vigyan Mela 2023 organised by M.P. Council of Science & Technology, Bhopal and Vigyan Bharti during 15th to 18th September 2023 and awarded third Vigyan Pavilion prize in the category of research institute showcased during Bhopal Vigyan Mela.

- Foundation stone for Graphene Centre" was laid by Dr. Avanish Kumar Srivastava, Director, CSIR-AMPRI, Bhopal on 25th September 2023 at CSIR-AMPRI, Bhopal.

AcSIR-AMPRI (2023-2024)

CSIR_Advanced Materials and Processes Research Institute (AMPRI), Bhopal, under the aegis of AcSIR (Academy of Scientific & Innovative Research (AcSIR – AMPRI) offers an Opportunity to Students for Higher Education in Interdisciplinary Research Areas & to Work with World Class R & D Experts, in the following courses;

- Ph.D. in Engineering (Material Science & Technology)
- Ph.D. in Chemical Science
- Ph.D. in Physical Science
- Integrated Dual Degree Program (IDDP)

  M.Tech. + Ph.D. in Engineering (Material Science & Technology)

AcSIR-AMPRI, Bhopal is running PhD courses in Engineering Science since 2014. There are two semesters each year, starting from January and August and students are admitted in both the semester. The selection procedure is stringent, AcSIR invites applications and candidates are selected based on their credentials, for the written examination/ interview by the individual CSIR Institutions.

In 2023-2024 sessions, total 9 students got registered in AcSIR-AMPRI; Ph.D in Engineering: 2, Ph.D. in Chemical Science:4, Ph.D. in Physical Science : 2 and Ph.D under IDDP: 1 . 7 students took admission in August 2023, 02 students took admission in January 2024 .

Six students were awarded Ph.D. this year and three students submitted thesis. For the progress evaluation of students 16 DAC meeting were conducted.

Presently the number of faculties in AcSIR-AMPRI Bhopal is 47 (Engineering 28, Chemical Sciences 12 and Physical Sciences 7). The courses offered at AcSIR-AMPRI, Bhopal are 28 in Material science and Engineering, 29 in Chemical Sciences and 12 in Physical Sciences.

Pass out students of AcSIR Mr. Bishnu Nand Yadav has joined Chonnam University, South koria as Post Doctoral Fellow, Mr. Karan Singh Verma is appointed Asst. Professor, in Oriental College of Engineering, Bhopal, Mr. Dhiraj has joined IIT, Delhi as Post Doctoral Fellow, Mr. Amit Abhash joined Sagar Engineering College, Bhopal as Asst. Professor, Mr. Satendra Kumar joined USC Spain as Post-Doctoral Fellow.

Staff list as on 31 March 2024

Scientific Staff

S.N.	Name	Designation
1	Dr. Avanish Kr. Srivastava	Director
2	Dr. A.K. Singh	Chief Scientist
3	Dr. D.P. Mondal	Chief Scientist
4	Dr. P. Asokan	Chief Scientist
5	Dr. Manish Mudgal	Chief Scientist
6	Dr. Md. Akram Khan	Chief Scientist
7	Dr. J.P. Shukla	Chief Scientist
8	Dr. Deepti Mishra	Chief Scientist
9	Dr. H.N. Bhargaw	Chief Scientist
10	Dr. S. Murali	Chief Scientist
11	Dr. Sanjeev Saxena	Chief Scientist
12	Dr. J.P. Chaurasia	Sr. Principal Scientist
13	Dr. Raju Khan	Sr. Principal Scientist
14	Sh. Prabhat Kumar Baghel	Sr. Principal Scientist
15	Dr. Vandana	Sr. Principal Scientist
16	Dr. Neeta V. M. Khalkho	Sr. Principal Scientist
17	Dr. R.K. Bharilya	Principal Scientist
18	Dr. Gaurav Kr.Gupta	Principal Scientist
19	Dr. Sathish N.	Principal Scientist
20	Dr. S.K. Panthi	Principal Scientist
21	Sh. Meraj Ahmed	Principal Scientist
22	Dr. Sarika Verma	Principal Scientist
23	Dr. Archana Singh	Principal Scientist
24	Dr. Neeraj Dwivedi	Principal Scientist
25	Dr. Rajesh Patidar	Principal Scientist
26	Dr. Satanand Misra	Principal Scientist

27	Dr. Alka Mishra	Principal Scientist
28	Dr. Kirti Soni	Principal Scientist
29	Dr. Sandeep Singhai	Sr. Principal Scientist
30	Sh. Abhishek Pandey	Sr. Scientist
31	Dr. Venkat A.N.	Sr.Scientist
32	Dr. Chetna Dhand	Sr. Scientist
33	Dr. Pradip Kumar	Sr. Scientist
34	Dr. Samarth Singh	Sr. Scientist
35	Sh. Sriram Sathaiah	Sr. Scientist
36	Dr. Tilak Chandra Joshi	Sr. Scientist
37	Dr. Mohammad Ashiq	Sr. Scientist
38	Dr. Surender Kumar	Sr. Scientist
39	Dr. Mohit Sharma	Sr. Scientist
40	Sh. Nikhil Rajendra Gorhe	Sr. Scientist
41	Dr. Manoj Kumar Gupta	Sr. Scientist
42	Dr. Shabi T.S.	Sr. Scientist
43	Dr. Supriya Saha	Sr. Scientist
44	Ms. Medha Mili	Scientist
45	Sh. Narendra Singh	Sr. Scientist
46	Sh. Shiv Singh Patel	Scientist
47	Dr. Shiv Singh	Scientist
48	Dr. Dipen Kumar Rajak	Scientist
49	Dr. M. Chandra Shekhar Naik	Scientist
50	Sh. Himanshu Sharma	Scientist
51	Dr. Ram Kumar	Scientist
52	Dr. Tamal Chatterjee	Scientist
53	Sh. Atul Kumar Chatter	Scientist
54	Dr. K. Karthikeyan	Scientist

Technical Staff

S.No	Name	Designation
1	Sh. Ajay Kulshreshth	PrincipalTO/Tech.Gr.III(7)
2	Sh. T.S.V.C. Rao	PrincipalTO/Tech.Gr.III(7)
3	Sh. M.K. Ban	PrincipalTO/Tech.Gr.III(7)
4	Dr. Ajay Naik	PrincipalTO/Tech.Gr.III(7)
5	Dr. R.K. Soni	PrincipalTO/Tech.Gr.III(7)
6	Dr. Edward Peters	PrincipalTO/Tech.Gr.III(7)
7	Dr.(Mrs.)Sorna Gowri	PrincipalTO/Tech.Gr.III(7)
8	Dr.(Mrs.)Prabha Padmakaran	PrincipalTO/Tech.Gr.III(7)
9	Smt. Sangeeta Gamad	Sr. TO(2)/ Tech.Gr.III(5)
10	Sh. O.P. Chourasia	Sr. TO(2)/ Tech.Gr.III(5)
11	Sh. Anwar Ahmed Bakhsh	Principal TO/Tech.Gr.III(7)
12	Sh. Deepak Kr. Kashyap	Sr. Tech.Officer/Gr.III(4)
13	Sh. Balwant Barkhania	Sr. Tech.Officer/Gr.III(4)
14	Dr. Mohd. Shafeeq M	Sr. Tech.Officer/Gr.III(4)
15	Sh. Anup Kr. Khare	Sr. Tech.Officer/Gr.III(4)
16	Sh. K.K. Naktode	Tech.Officer/Gr.III(4)
17	Sh. Prasanth N.	Tech.Officer/Gr.III(4)
18	Sh. Arvind Kr. Asati	Sr. Tech (2)/ Gr.II(4)
19	Sh. S.K. Suryavanshi	Sr. Tech (2)/ Gr.II(4)
20	Smt. Swagatika Pal	Sr. Tech (2)/ Gr.II(4)
21	Sh. L.N. Sahu	Tech.Gr.I(4)
22	Sh. Santosh.K. Batham	Tech.Gr.I(4)
23	Sh. S.K. Raikwar	Tech.Gr.I(4)
24	Sh. Anil Gond	Tech.Gr.I(4)
25	Sh. Ramesh koluram	Tech. Gr. II
26	Dr. Satyam Saini	ARMO

Administrative Staff

S.No	Name	Designation
1	Sh. Somnath Mazumder	Controller of Administration
2	Sh. Shailendra Pratap Singh	Finance & Accts Officer
3	Sh. Sanjay Vinodia	Finance & Accts Officer
4	Sh. Ashok Kumar Yadav	Stores & Purchase Officer
5	Smt. Mini Surendran	Prinicpal Private Secretary
6	Sh. Vijay Shrivastav	Section Officer(Gen)
7	Sh. N. Viswanathan	Prinicpal Private Secretary
8	Smt. Asha Vinodia	Section Officer(G)
9	Sh. Vijay Kumar Nathiley	Asstt. Section Officer(S&P)
10	Dr. Manisha Dubey	Senior Hindi Officer
11	Sh. Neelesh Jaiswal	Section Officer(Gen)
12	Sh. Vivek Khare	Section Officer(Gen)
13	Sh. Shailendra Singh Tomar	Section Officer(S&P)
14	Sh. Gundu Adinarayan	Security Officer
15	Sourabh Sethia	Sr. Stenographer
16	Sh Sanjay Kumar	Section Officer(Gen)
17	Sh. Anand Vinodarao Pandit	Asstt. Section Officer(G)
18	Sh . Praveen yadavrao Jagtap	Asstt. Section Officer(G)
19	Sh. Praveen Kumar	Senior Secretariat Assistant (F&A)
20	Sh. Rahul Singh Chouhan	Senior Secretariat Assistant(S&P)
21	Smt. Seema Singh Rauthan	Senior Secretariat Assistant(G.)
22	Smt. Asha Golait	Peon

AMPRI in Press and Media

विज्ञान ज्योति की छात्राओं के लिए ऑनलाइन कार्यशाला आयोजित हुई

डीआर संवाददाता ⏭ शमशाबाद

पीएमश्री जवाहर नवोदय विद्यालय शमशाबाद में विज्ञान ज्योति फेस 5 के अंतर्गत विद्यालय की विज्ञान ज्योति में पंजीकृत छात्राओं ने दोपहर तीन बजे से पांच बजे तक सीएसआई आक एम्प्री भोपाल की सीनियर वैज्ञानिक डॉ अर्चना सिंह से ष्केमिस्ट्री ऑफ ड्रिकिंग वाटरष् विषय पर वर्चुअल मोड से इंट्रेक्शन किया। क्षेत्रीय कार्यालय भोपाल, जबलपुर, रायुपर संभाग के छात्र–छात्राओं ने तथा नवोदय विद्यालय समिति क्षेत्रीय कार्यालय भोपाल के छात्र–छात्राओं ने ऑनलाइन भाग लिया। विज्ञान ज्योति प्रभारी पीसी गौतम ने कहा कि यह कार्यक्रम छात्राओ के लिए बहुत की रूचिकर और ज्ञानवर्धक रहा तथा विद्यार्थियों के अंदर वैज्ञानिक सोच और नवाचार के लिए ऐसे कार्यक्रम अत्यंत आवश्यक है। इस मौके पर विद्यालय की मंजूनाथ मिश्रा, पीजीटी रसायन छात्राओं के साथ उपस्थित रही। विद्यालय के प्रभारी प्राचार्य एके राजे ने बताया कि विज्ञान ज्योति की विद्यार्थियों में विज्ञान के प्रति रुझान विकसित करने के लिए समय–समय पर विद्यालय में कार्यशालाएं आयोजि होती रहती है।

भास्कर खास • देश में पहली बार एम्प्री ने तैयार किया लेड का विकल्प, 9 मिलियन टन रेड मड निकलती है हर साल देश में

एक्सरे, सीटी स्कैन और रेडियोथेरेपी सेंटर में लेड की जगह रेड मड रोकेगी रेडिएशन; यह एल्युमिनियम फैक्ट्री का वेस्ट मटेरियल... जांच दरें 20% तक कम हो सकेंगी

एम्प्री में मनाया नेशनल साइंस डे

सिटी रिपोर्टर | सीएसआईआर- एम्प्री में मंगलवार को राष्ट्रीय विज्ञान दिवस मनाया गया। इंडियन नेवी में वॉरशिप एक्विपमेंट के क्वालिटी एश्योरेंस ऑफिसर कैप्टन डॉ. ओम प्रकाश शर्मा समारोह में मुख्य अतिथि के रूप में शामिल हुए। कार्यक्रम की शुरुआत एम्प्री के निदेशक डॉ. अवनीश कुमार श्रीवास्तव ने सभी वैज्ञानिकों का स्वागत करके किया। इसके बाद कैप्टन डॉ. ओम प्रकाश शर्मा ने कहा- एम्प्री में बहुत सारे ऐसे रिसर्च चल रहे हैं, जो डायरेक्टर भारतीय नौसेना में इस्तेमाल किए जा सकते हैं।

तकनीक : पराली से बोर्ड बनेंगे

नई दिल्ली, प्र. सं.। राजधानी में पराली के प्रदूषण को पूरी तरह से खत्म किया जा सकता है। इसके लिए भोपाल स्थित सीएसआईआर एम्प्री द्वारा विकसित तकनीक के इस्तेमाल को बढ़ाना होगा। इस तकनीक से पराली का इस्तेमाल कर हाइब्रिड प्लाई बोर्ड बनाए जाते हैं।

यह जानकारी दिल्ली स्थित केन्द्रीय सड़क अनुसंधान संस्थान में आयोजित कार्यक्रम में सीएसआईआर एम्प्री के निदेशक डॉ. अवनीश श्रीवास्तव ने दी। उन्होंने बताया कि भोपाल में पराली के प्रदूषण को खत्म करने के लिए उन्होंने

■ भोपाल के सीएसआईआर एम्प्री ने बोर्ड निर्माण की तकनीक विकसित की

यह तकनीक इजाद की है। पंजाब और हरियाणा में अगर पराली से इस तरह के बोर्ड बनाने का कारोबार बड़े स्तर पर शुरू किया जाए तो पराली जलाने की आवश्यकता ही नहीं पड़ेगी। किसान अपनी पराली को बेच सकेंगे। पराली से बनाए बोर्ड सामान्य बोर्ड के मुकाबले सस्ते होते हैं।

स्वदेश

जनजातीय गौरव दिवस के उपलक्ष्य में आयोजन

जनजातीय छात्रों ने किया सीएसआईआर एम्प्री का भ्रमण

स्वदेश संवाददाता, भोपाल

जनजातीय गौरव दिवस के उपलक्ष्य में प्रगत पदार्थ तथा प्रक्रम अनुसन्धान संस्थान (एम्प्री) में एकलव्य मॉडल आवासीय गुरुकुल विद्यालय के छात्र भ्रमण पर पहुंचे। इस दौरान भोपाल के अनुसूचित जनजाति के विद्यार्थियों ने भाग लिया। विद्यार्थियों ने विभिन्न प्रयोगशालों में जाकर विज्ञान और प्रौद्योगिकी के क्षेत्र में हो रहे कार्यों को देखा और वैज्ञानिक दृष्टिकोण समझने की कोशिश की। स्कूल के प्राचार्य डॉ. यशपाल सिंह ने सी.एस.आई.आर.-एम्प्री के कार्यों और जनजाति वर्ग के विद्यार्थियों के विकास हेतु आयोजित इस कार्यक्रम की सराहना करते हुए निदेशक एम्प्री एवं वैज्ञानिकों को धन्यवाद प्रस्तुत किया। प्रयोगशाला भ्रमण कार्यक्रम में एम्प्री के निदेशक प्रो. अवनीश कुमार श्रीवास्तव और डॉ. जय प्रकाश शुक्ल, मुख्य वैज्ञानिक भी सम्मिलित हुए और विद्यार्थियों का प्रोत्साहन किया। कार्यक्रम में 111 विद्यार्थियों एवं 4 शिक्षकों ने भाग लिया।

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मध्य स्वदेश
स्वदेश ग्वालियर समूह का भोपाल संस्करण

भोपाल - मध्य स्वदेश
25 Nov 2023

जनजातीय कल्याण पर केंद्रित रही एम्प्री की कार्यशाला

मध्य स्वदेश संवाददाता ■ भोपाल

एकलव्य मॉडल आवासीय विद्यालय के विद्यार्थियों को मिला प्रोत्साहन

प्रगत पदार्थ तथा प्रक्रम अनुसंधान संस्थान एम्प्री में विज्ञान और जनजातीय कल्याण कार्यशाला आयोजित की गई। जनजातीय गौरव दिवस के तारतम्य में हुई इस संगोष्ठी में एकलव्य मॉडल आवासीय विद्यालय गुरुकुलम के विद्यार्थियों को संस्थान के वरिष्ठ वैज्ञानिकों का मार्गदर्शन मिला। इसके अलावा आरजीपीवी और यूटीआई के संयुक्त तत्वाधान में झाबुआ के विद्यार्थियों को ऑनलाइन शोध कार्यों से अवगत कराया गया।

शुक्रवार इस आयोजन के दौरान एम्प्री के निदेशक प्रो अवनीश कुमार श्रीवास्तव ने जनजातीय समाज के विद्यार्थियों को विज्ञान के महत्व से अवगत कराते हुए प्रोत्साहित किया। यहां मुख्य अतिथि के रूप में अपने विचार रखते हुए एम्प्री के मुख्य वैज्ञानिक डॉ. जय प्रकाश शुक्ल ने सीएसआईआर से अवगत कराया। साथ ही इसके द्वारा चलाई जा रही कौशल विकास एवं जिज्ञासा जैसे कार्यक्रमों की जानकारी प्रदान की। जबकि यहां विज्ञानएवं प्रौद्योगिकी संस्थान के डॉ प्रवीण दिघरे एवं डॉ विकास शेंडे ने विद्यार्थियों को विज्ञान एवं कला जगत के नवीन कार्यों से अवगत कराया। कार्यक्रम के अंत में आयोजित विज्ञान प्रतियोगिता मे सफल विद्यार्थियों को पुरुस्कृत कर प्रोत्साहित भी किया गया। इस अवसर पर एम्प्री ने एकलव्य मॉडल आवासीय (गुरुकुलम) विद्यालय भोपाल के प्राचार्य डॉ यशपाल सिंह भी मौजूद थे।