Dr. Mansukh Mandaviya
Minister of Chemicals & Fertilizers
and Health & Family Welfare
Government of India

I am happy to learn that the Department of Chemicals and Petrochemicals, in association with Central Institute of Petrochemicals Engineering & Technology (CIPET), is organizing the Presentation of 11th National Petrochemicals Awards on 27th September 2022 in New Delhi.

The Petrochemicals sector is fueling the growth and development of the global and Indian economies. The chemicals and petrochemicals industry plays paramount role in sapping other ailed industries in the country. It has a significant potential to help India reach its goal of $5 trillion by 2025. Our government under the leadership of Hon'ble Prime Minister Narendra Modi is fully committed to transforming the country into a Global Chemicals and Petrochemicals manufacturing hub.

Research & Development plays a critical role in the innovation process which sustains growth and enables industry to become competitive so as to meet the global challenges. The awards seek to encourage the petrochemical and downstream plastic industries to strive for innovation, excellence and improvement of services delivery so that they can position their products well in the global market.

I congratulate the award winners on their success and look forward to higher level of participation in the future editions of the National Petrochemicals Awards.

15th September, 2022

Dr. Mansukh Mandaviya

Shri Bhagwanth Khuba
Minister of State for Chemicals & Fertilizers
and New & Renewable Energy
Government of India

Department of Chemicals and Petrochemicals under Ministry of Chemicals & Fertilizers has instituted the National Petrochemicals Awards for rewarding outstanding professionals in the field of Petrochemicals to open new avenues for further Research and Development.

The Scheme is being successfully implemented through Central Institute of Petrochemicals Engineering & Technology (CIPET), since its launch in 2010-11. Over the years, the awards have achieved a very high stature among professionals and researchers from the industry and R&D Institutions.

To improve competitiveness in manufacturing, research and development has a very important role to play, which enables organizations to achieve faster growth and to generate more wealth over a period of time.

The Eleventh National Petrochemicals Awards will also certainly bring out the most outstanding usage of technology to achieve excellence in performance through innovation in the various fields of Petrochemicals.

My hearty congratulations to all the awardees. I wish them all the best in their pursuit of excellence and hope that their innovation, enthusiasm and dedication will inspire others to embark on the path of innovation.

21st September, 2022

(Bhagwanth Khuba)

सत्यमेव जयते

Shri Arun Baroka, I.A.S.
Secretary (C&PC)
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers
Government of India

I am glad to note that my Department, in association with Central Institute of Petrochemicals Engineering & Technology (CIPET), is organizing the presentation of 11th National Petrochemicals Awards on Tuesday, 27th September, 2022 in New Delhi. Innovation and research is a key parameter to be recognized in any country and the Department of Chemicals and Petrochemicals is committed to these activities by recognizing innovations in the area of petrochemicals.

These awards are envisaged to recognize the outstanding contribution in the field of R & D leading to conservation of energy, efficient management of plastic waste, increase in product life cycle, development of innovative green products and other emerging areas. As petrochemicals are finding applications in all the key sectors of the Indian economy, viz. aerospace, automobile, agriculture, packaging, information technology, medical, electrical & electronics etc, even small innovations can make a lot of positive difference and benefit all segments of the enterprises, including MSMEs.

I thank Expert Committee members and commend Central Institute of Petrochemicals Engineering & Technology (CIPET) for its support in successfully conducting the National Awards function for the eleventh year in a row.

I convey my heartiest congratulations to all the awardees for their great contribution in the development of the petrochemicals sector and wish great future ahead.

19th September, 2022

(Arun Baroka)

Ms. Arti Ahuja I.A.S.
Secretary (C&PC)
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers
Government of India

India has a great potential for production and consumption of chemicals and petrochemicals, including raw materials for polymers and intermediates. We need state-of-art technologies for manufacturing in an efficient, competitive and cost effective manner. Such innovative technological developments will help in achieving the vision of Make of India, and would also contribute significantly towards economic growth and development of the country.

Department of Chemicals and Petrochemicals (DCPC) has taken up promotion of investment in the country through Plastic Parks, Petroleum, Chemicals and Petrochemicals Investment Region (PCPIR) clusters and also supporting research ventures in petrochemical sector through its Centre of Excellence (CoE) scheme. This would facilitate the Scientists and Researchers to set-up exclusive R&D facilities in specific areas, formulate technologies and transfer to the industries while promoting start-ups.

Also, the Department of Chemicals & Petrochemicals has instituted the National Petrochemicals Awards for recognizing outstanding contribution in the field of R&D leading to innovation in petrochemicals, polymeric materials and products, Green polymeric materials & product and polymers for agriculture, water conservation, medical & pharmaceutical applications.

I thank the Members of Expert Committee for evaluating the proposals and appreciate Central Institute of Petrochemicals Engineering & Technology (CIPET) for its support in conducting successfully the National Awards function for the eleventh year in a row. I congratulate the award winners for their great contribution in development of petrochemicals sector and believe that they will carry forward these initiatives in newer areas.

(Arti Ahuja)

15th September 2022

सत्यमेव जयते

AWARDEES - WINNERS


Shri Shivam Tiwari


Dr. Pralay Maiti


Dr. Santanu Das

IIT (BHU), VARANASI

Shri Shivam Tiwari is currently pursuing his Ph.D at School of Materials Science and Technology, IIT (BHU) Varanasi. He has received his M.Tech. from IIT (BHU) in 2017 and was awarded the Gold Medal for securing first position in Materials Science and Technology. He has completed his M.Sc. and B.Sc. from Ramakrishna Mission Vidyamandira, University of Calcutta. His research interest is in polymers for energy and adhesive applications.

Dr. Pralay Maiti is Professor and Ex-Coordinator of the School of Materials Science and Technology. Dr. Maiti has received his M.Sc. from IIT Kharagpur in 1991 and Ph.D. in Polymer in 1996 from The Indian Association for the Cultivation of Science (Jadavpur University). He was COE Researcher and Lecturer at Venture Business Laboratory, Hiroshima University, Japan (1997-1999) and was post-doctoral fellow at Toyota Technological Institute, Japan (1999-2001). He was Visiting Scientist at Cornell University, USA from 2002 to 2004. He was Quick Hire Fellow at Central Leather Research Institute, Chennai before joining the School of Materials Science and Technology as Reader in December 2004. His current research interests include Biomaterials and Energy materials.

Dr. Santanu Das is currently appointed at Department of Ceramic Engineering, IIT (BHU) as Assistant Professor. Dr. Das also worked as a Research Scientist at the University of North Texas, the USA from April 2014 to March 2016 and worked as a postdoctoral associate from September 2012 to March 2014. He did his Ph.D. from Florida International University (FIU) (2008-2012). Dr. Das's research interests lie in synthesis of thin-films, two-dimensional (2D) graphene and transition metal dichalcogenides (TMDs) materials and applications.

सत्यमेव जयते

INNOVATION IN POLYMERIC MATERIALS

LOW COST, DURABLE AND RENEWABLE POLYMER BASED HIGHLY EFFICIENT ADHESIVE FOR METAL-CERAMIC JOINTS.

Shri Shivam Tiwari, Dr. Santanu Das and Dr. Pralay Maiti
Indian Institute of Technology (Banaras Hindu University), Varanasi

Adhesives are an efficient material which restricts the failure of materials or joints during the vigorous motion when a proper bonding is developed between the material and the substrates. Ceramic based substrates are one of the important materials used in different fields where they are assembled with other substrates which require good interfacial bonding for prolonged use. The commercially available adhesives are not so efficient for the metal – ceramic joints or ceramic – ceramic joints and thus the innovation focuses on the development of adhesives which are applicable to these joints.

The present innovation demonstrates a unique technique to develop polymer-based adhesive prepared from the natural oil based precursor in the presence of a common and inexpensive catalyst. The novelty of the invention is the room temperature, machinery-less processing method implied to prepare the adhesive without any involvement of external conditions. The method highlights the development of highly efficient adhesive which is cost-effective and has simple and easy processing technique. The developed product creates a stronger bonding between the metal-ceramic or ceramic-ceramic joints of the substrates which is durable and has the ability to withstand vigorous motion.

Hence an eco-friendly, cost effective, solvent-less, chemically stable, moisture or water resistant, tunable, structurally versatile and durable adhesive is formulated which provides better mechanical and thermal stability and has the ability to withstand vigorous motion without affecting the joints of the metal-ceramic or ceramic-ceramic substrates.

WINNER


Dr. Debdatta Ratna


Shri Vijay Shankar Mishra


Shri Rama Kant Kushwaha

NMRL, DRDO
AMBERNATH

Dr. Debdatta Ratna has been working as a scientist at the Naval Materials Research Laboratory (NMRL), Ambernath, Maharashtra for the last 28 years and presently heads the Polymer Science and Technology Directorate (PSTD). He did his Doctorate from IIT Kharagpur and postdoctorate in Australia and Germany under BOYSCAST and Humboldt Fellowship, respectively. He is a Project Director of two ongoing DRDO projects and developed several products for Indian Navy. He has published more than 100 technical papers and authored four books. He has received laboratory level and national awards for product development and technology innovation.

Shri Vijay Shankar Mishra is a team member of PSTD (NMRL)and has been working for last 22 years in the field of polymer composites. He is graduated from the Instititution of Engineers (India), Kolkata in Mechanical Engineering, did his M. Tech from DIAT, Pune and presently pursuing his PhD.

Shri Rama Kant Kushwaha is also a team member of PSTD (NMRL) and has been working for last 22 years in the field of thermoset coating and composites. He did his M.Sc in physics from university of Mumbai.

INNOVATION IN POLYMERIC PRODUCTS

DEVELOPMENT OF 6" BALL VALVE USING DOUGH MOLDING COMPOUND BASED ON CHOPPED FIBER-REINFORCED POLYMER COMPOSITE FOR CONTROL OF SEAWATER FLOW IN PIPELINES OF NAVAL PLATFORMS.

Dr. Debdatta Ratna, Shri Vijay Shankar Mishra and Shri Rama Kant Kushwaha
Naval Materials Research Laboratory (NMRL), Ambernath

The innovation deals with development of 6" ball valve based on chopped fiber-reinforced polymer composite for control of fluid flow in pipelines of Naval platforms. The FRP valves are corrosion-free and about 3 times lighter and much easier to operate compared to metallic valves. Replacement of metallic valves with the developed FRP composite valves will not only reduce the weight penalty of naval platforms and offer soldier comfort but also going to save the huge expenditure incurred by Indian Navy for regular replacement/maintenance due to corrosion in marine environment. Such valves will certainly find applications in other industries as well. Hence the innovation is a necessary & important step towards "Make in India" Mission under Atmanirbhar Bharat Abhiyaan.

WINNER

Dr. Roy Joseph

Ms. Gopika V Gopan

Dr. Jayadevan E.R

SCTIMST, TRIVANDRUM

Dr. Roy Joseph is a Senior Scientist specializing in the development of polymeric medical devices.

Dr. Gopika V. Gopan is doing her PhD under the supervision of Dr. Roy Joseph.

Dr. Jayadevan is working as an additional professor in the imaging sciences and interventional radiology department. His areas of interest are patient care, teaching in endovascular neuro intervention, and the development of medical devices.

POLYMERS IN MEDICAL AND PHARMACEUTICAL APPLICATIONS

METAL FREE RADIOPAQUE POLYMERIC MATERIAL FOR THE EMBOLIZATION OF ARTERIOVENOUS MALFORMATION OF BRAIN

Dr. Roy Joseph, Ms. Gopika V Gopan and Dr. Jayadevan E.R
Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum

Arteriovenous malformation (AVM) of the brain is an abnormal tangle of blood vessels connecting arteries and veins, which disrupts blood flow and oxygen circulation to normal tissues. Rupture of brain AVM causes haemorrhage, stroke and damage to brain tissues. AVMs are managed by blocking the blood flow (embolization) to these abnormal vessels by injecting sealants through a microcatheter which solidify on contact with blood. This treatment option is less invasive than surgery and can be used to treat deep or inoperable AVMs.

In this innovation, a novel embolic agent was developed by iodinating a polymer and dissolving it in a solvent. During the embolization process, the blood that comes in contact with the embolic agent precipitates the polymer thereby blocking the blood vessels. The solvent diffuses into the blood and escapes through the lungs. The advantage of this innovation is that the system is injectable, radiopaque, biocompatible and free of metal powder.

WINNER

Dr. Madhukar Onkarnath Garg

Reliance Industries Limited,
Navi Mumbai

Dr. Madhukar Garg is an acknowledged expert in Petroleum refining and Petrochemicals and has been instrumental in developing and commercializing large number of technologies in the Indian refineries. A graduate from Nagpur University and a post graduate from IIT Kanpur, he did his Ph.D. with Prof H R C Pratt at University of Melbourne in Solvent Extraction. He served Engineers India Limited in the Research and Development Centre for 18 years until 1994 and then Technip KTI for four years before joining CSIR-Indian Institute of Petroleum in 1998. He has been the Director of the Indian Institute of Petroleum for 13 years from 2003 to 2016 and officiated as the Director General of CSIR during the year 2015. His areas of specialization include solvent extraction, process integration, advanced control, simulation, and modeling, besides the ability to conceive research ideas and take them to commercialization.

Dr. Garg's extraordinary industrial research track record includes 26 Solvent Extraction based technologies developed and commercialized, 16 breakthrough technologies in Refining and Petrochemicals, 15 successful implementations of Pinch Analysis and 8 Path Breaking developments in Simulation and Modelling. He has 44 Indian and 23 International patents to his credit and is author of 97 peer reviewed papers and 198 papers in proceedings of prestigious conferences. He has won several awards. Some of most prestigious are: MOPNG Innovation Award (2016), TDB Technology Day Award (2017 and 2019), ICC Life time Achievement Award (2013), Vasvik Award (2017), besides several CSIR Technology as well as Innovation awards from 1998 to 2016. He is the elected Fellow of the Indian National Academy of Engineers.

He is currently President, Refining and Petrochemicals R & D of Reliance Industries Limited.

INNOVATION IN PETROCHEMICALS AND NEWER POLYMER APPLICATIONS

RECOVERY OF HIGH PURITY MERCHANT GRADE BENZENE - A PRIMARY BUILDING BLOCK FOR PETROCHEMICAL INDUSTRY AND SIMULTANEOUS PRODUCTION OF BENZENE-LEAN GASOLINE FROM UNPROCESSED CRACKED GASOLINE FRACTION

Dr. Madhukar Onkarnath Garg
Reliance Industries Limited, Navi Mumbai

Gasoline from FCC units is a major contributor of Benzene in gasoline pool. Benzene is a known carcinogen and is regulated to less than 1 % in gasoline pool as per BS VI. It is thus imperative to remove benzene from this stream to meet the desired benzene limit in gasoline. To address the challenge of unavailability of a proven commercial process, CSIR - Indian Institute of Petroleum and Reliance Industries Limited jointly developed**, a first to the World Technology** for processing C6 heart-cut of FCC gasoline, based on the principles of extractive distillation, without the requirement of any pre-processing step to saturate di-olefins and reduce reactive impurities (chlorides, peroxides etc.). This technology serves a dual role of not only producing U.S grade gasoline but also recovering high purity benzene.

The unique and novel aspects of technology are: it is based on most thermally and chemically stable and tunable solvent system discovered to handle reactive impurities in FCC Gasoline, along with an innovative and proprietary process configuration which minimizes solvent loss, utility requirements, and maximizes purity and yield of products. The process does not require any prior hydrogenation step to saturate di-olefins making it simple, energy efficient, and low-cost operation.

The Synergistic Teamwork resulted in successful Development, Design, Engineering, Construction, Commissioning and Operation of "**First Commercial Unit in the World**" technology in the Reliance Industries Petrochemical Complex at Jamnagar, India. The unit with design capacity 0.7 MMTPA (17.4 KBPSD) was successfully commissioned in May 2016.

The above Benzene Recovery Unit has become extremely critical to JMD operations for meeting the benzene specifications in the gasoline pool. The unit is consistently operating at a throughput of 150% of design and has been a huge commercial success with a pay back of less than 6 months. The technology is completely indigenous, and the technological innovation offers multifold benefits in terms of India's competitiveness, employment & society and environment. It has been granted patents in several countries including Russia, China, Japan, European Union, India, and U.S. This technology will occupy the central place in the global efforts to convert Crude to Chemicals.

WINNER

Shri Sujit Sharma

RUBBER TECHNOLOGY CENTRE
INDIAN INSTITUTE OF TECHNOLOGY
KHARAGPUR

Shri Sujit Sharma is a research scholar at the prestigious institution, Indian Institute of Technology, Kharagpur. He completed his Bachelor of Technology degree in Chemical Engineering from the National Institute of Technology, Durgapur in 2015. He acquired a Master of Technology degree in Rubber Technology from the Indian Institute of Technology, Kharagpur in 2018. He did his B.Tech project from Indian Oil Corporation Ltd. (Haldia Refinery) and M-Tech project under IIT Kharagpur and ALP Nishikawa, Lalru, Punjab. He has been working on "Design and Simulation of the extrusion die for rubber product used in automotive industries" as a doctoral fellow at the Rubber Technology Centre in Indian Institute of Technology, Kharagpur under the supervision of Prof. Santanu Chattopadhyay (Head of Rubber Technology Centre) and Prof. Arghya Deb (Civil Engineering Department) since July 2018. He has published 8 journal papers in peer-reviewed international journals.

RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY (FOR RESEARCH STUDENTS OF ACADEMIC INSTITUTE /RESEARCH LAB)

DESIGN AND SIMULATION OF CO-EXTRUSION DIE FOR COMPLEX - SHAPED RUBBER PROFILES USING A COMPUTATIONAL METHOD

Shri Sujit Sharma
Rubber Technology Centre, Indian Institute of Technology, Kharagpur

Co-extrusion is one of the most effective processes for manufacturing long polymeric profiles with two textures with different constituent rubber compound's inherent properties. Die swell is a critical phenomenon in extrusion for viscoelastic fluids at die exit. The dimension and shape of the extrudate changes at die exit owing to die swell leading towards complexity in designing the die for rubber products. A deep understanding of fluid flow behavior will help optimize the die design. This innovation investigates the die swell characteristics using computational fluid dynamics. Herein, the EPDM rubber-based compound's thermal and rheological parameters have been identified to predict the extrudate's overall deformation profiles during the extrusion molding process. Carreau-Yasuda and Arrhenius approximate law exhibited an excellent fit for a wide range of shear rates with the experimental data. Finally, the extrudate's overall deformation has been simulated using finite element software at real processing conditions along with the boundary conditions. Furthermore, numerical results generated from the simulation have been cross-verified with the experimental results for a complex-shaped rubber profile, and a good agreement with efficiency of > 98.5 % was obtained.

The significance of this innovation is that the developed simulation can be implemented in rubber/plastic profile manufacturing industries to improve precision, quality, and productivity as it replaces the traditional “trial and error” method of die design. The simulation technique may find potential to predict the flow pattern and extrudate shape for other rubber compounds, TPE's and TPV's rather than only EPDM based rubber compounds.

WINNER

Say "YES" to Plastics
&
"NO" to Littering

AWARDEES RUNNERS - UP

Dr. Debmalya Roy

DMSRDE, DRDO
KANPUR

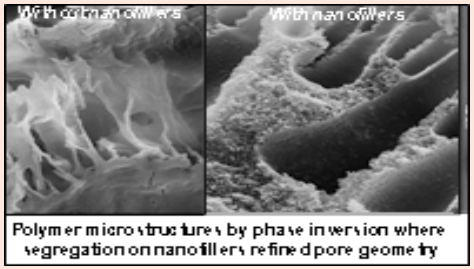
Dr. Debmalya Roy is currently heading the Directorate of Nanomaterials, DMSRDE, Kanpur. He leads a group of scientists and technical staff to develop indigenous material solutions for strategic applications at extreme operational conditions. Dr. Roy established the state-of-the-art facilities for large scale synthesis, production and characterization of nanomaterials at DMSRDE. He worked on several projects of national importance and published more than seventy peer reviewed research papers/book chapters and sixteen Indian and one US patent. Dr. Roy is educated in Chemistry from Visva Bharati University, Santiniketan and a Ph. D. from University of Delhi. He was awarded the commendation certificates and medals for the National Science & Technology Day Orations, Laboratory Scientist of The Year Award, Technology Group Awards and DAAD Research Fellowship of German Academic Exchange Service.

INNOVATION IN POLYMERIC MATERIALS

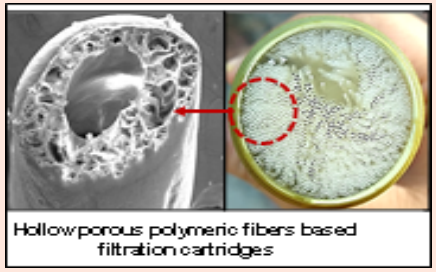
HOLLOW POROUS POLYMERIC NANOCOMPOSITE FIBRES FOR MOBILE WATER FILTRATION CARTRIDGES

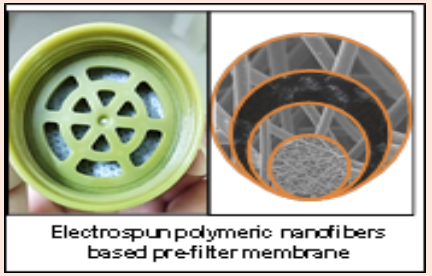
Dr. Debmalya Roy
Defence Materials and Stores & Research and Development Establishment (DMSRDE), DRDO, Kanpur

One of the major challenges for mobile water filtration technology is the rate of filtration due to insufficient gravitational pressure. A robust mitigation strategy in compact area has been formulated using nanotechnology to generate multifunctionalities in polymeric membrane which don't use any chemical or electrical power for purification. Hollow porous polymeric fibers have been fabricated to facilitate the adsorption of analytes on chemically modified synthetic membrane for rapid immobilization and decontamination of contaminates. The polymer phase segregations in presence of functional nanofillers were used to generate controlled pore geometries of polymeric fibers by optimizing the process parameters. The pocket water filtration cartridge which could fit into plastic water/cold drinks bottle of standard nozzle size has been developed using hollow porous fibers-based membrane and electrospunnanofibers based changeable prefilters for prolonged uninterrupted supply of potable water as shown below:



Polymer microstructures by phase inversion where segregation on nanofillers refined pore geometry


Hollow porous polymeric fibers based filtration cartridges


Electrospun polymeric nanofibers based pre-filter membrane

The unique features of the mobile water filtration cartridges enable mass-scale supply of drinkable water during flood/cyclone/natural calamities. Our developed cartridges could achieve higher flux rate with little pressure on water bottles by hand or sucking from the tip of cartridges. The provision of easily changeable prefilters increases the life and efficiency of filtration during the operation where the contamination level is high. This 'make-in India' polymer nanofibers-based product has already successfully completed field trials at two major government organizations, CRPF and NDRF of Ministry of Home Affairs. The technology to fabricate the nanocomposite-based pocket filtration cartridges has been transferred to Indian industries and the licencing agreement has been handed over to industry by Hon'bleRakshaMantri during the event of “Landmark policy decision to indigenise 101 more weapons and platforms to speed up 'Aatmanirbharta' in Defence”

JOINT RUNNER-UP


Dr. TK Mahato


Dr R. Baloji Naik


Shri N G Malvankar


Shri S S Pawar

NMRL, DRDO
AMBERNATH

Dr. TK Mahato is Scientist-F at Naval Materials Research Laboratory, (Defence Research and Development Organization-DRDO), Ambernath, Maharashtra. He is an M. Sc, M. Tech & PhD from IIT Kharagpur and Post Doctorate from Germany. He is specialized in Polymer and Synthetic Bio-Organic Chemistry with more than 25 years' experience in marine paints. He has been awarded with DRDO Technology Oration, BOYSCAST Fellow and Technology group awards. He has 25 publications and eight patents to his credit.

Dr. R. Baloji Naik is a Scientist-D at Naval Materials Research laboratory for the last 14 years and involved in the development of various organic coatings for Indian Navy. He did M. Sc Chemistry from Osmania University, Hyderabad and PhD from Mumbai University, Mumbai. He has seven Indian patents, sixteen technical trial reports, published more than fifteen research papers to his credit. He has awarded with Distinction in Corrosion science and Technology NACE international Gateway India section, prestigious DRDO Young Scientist Award and Lab level technology group award. He has also bestowed with National Science Day Oration 2021 from DRDO.

Shri N G Malvankar is a Technical Officer 'C' at Naval Materials Research Laboratory, Ambernath. He is specialized in Marine Paint Formulation, Resin Synthesis with more than 30 years experience in marine paints.

Shri S S Pawar is a Technical Officer 'C' at Naval Materials Research Laboratory, Ambernath. He did M. Sc and is pursuing PhD from DIAT Pune. He is specialized in Marine Paint Formulation, Resin Synthesis with more than 25 years' experience in marine paints.

INNOVATION IN POLYMERIC MATERIALS

DEVELOPMENT OF SELF-CLEANING POLYDIMETHYL SILOXANE, EPOXY STRATIFIED COATING FOR NAVAL APPLICATION

Dr. TK Mahato, Dr R. Baloji Naik, Shri N G Malvankar and Shri S S Pawar
Naval Materials Research Laboratory (NMRL), DRDO Ambernath, Thane

Protecting the environment without compromising the development is the need of the day. This can be done by making the materials and process technology greener and greener. Living nature is the inspiration for many innovations and continues to serve as an invaluable resource to solve technical challenges. Lotus leaves promotes self cleaning property inspite of it grow in muddy water due to a waxy hierarchical hydrophobic surface structure. Based on this principle we have developed a novel self cleaning coating. Conventional coatings are applied in multicoated systems where primer, anticorrosive and top coat are applied separately. This multicoated system requires complex formulation consisting of resin, pigments, fillers, additives and solvents for each coat, time consuming for application and curing procedures of each coat. The present innovation describes polydimethyl siloxane-epoxy self cleaningcoating compositions which impart anticorrosive &self cleaningproperties in a single coat application. This coating is formulated based on self-stratification concept of thermodynamically incompatible polymers. During curing the low surface energy silicone coating enriches at the air interface while the epoxy coating with a higher surface energy preferentially migrates towards the substrate. The low surface energy hydrophobic top surface ensures self cleaningproperty, while the underneath epoxy coating layer provides anticorrosive properties and excellent adhesion to metallic substrates.Developed coating will provide following advantages:

- In single coat application, dual desired coating layer can be obtained
- Use of tie coat can be avoided
- Economic advantages in respect of application cost and time.
- Eco-friendly coating composition

JOINT RUNNERS-UP


Shri Avinash R. Pai Prof. Sabu Thomas

മഹാത്മാഗാന്ധി സർവ്വകലാശാല, കേരളം
Mahatma Gandhi University, Kerala
महात्मा गांधी विश्वविद्यालय, केरल

Shri Avinash R. Pai is a Visvesvaraya Ph.D fellow at the International & Inter University Center for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kerala, India under the supervision of Prof. Sabu Thomas, Hon. Vice Chancellor, MG University. He has received his Bachelor's degree (B.Tech) in Polymer Engineering from Mahatma Gandhi University with Third Rank and holds a Master's degree (M.Tech) in Polymer Engineering from Institute of Chemical Technology, Mumbai. As a part of his doctoral research, he received a fellowship to work at Lancaster University, United Kingdom as Newton Bhabha Fellow with full funding from the British Council, UK. His research interests include development of sustainable polymer nanocomposites for Electromagnetic Interference (EMI) shielding applications.

Prof. Sabu Thomas is a well known researcher in the field of Nanoscience, Polymer Science and Engineering, Polymer Nanocomposites, Elastomers, Polymer Blends, Interpenetrating Polymer Networks, Polymer Membranes, Green Composites and Nanocomposites, Nanomedicine and Green Nanotechnology. In collaboration with India's premier tyre company, Apollo Tyres, Professor Thomas's group invented new high performance barrier rubber nanocomposite membranes for inner tubes and inner liners for tyres. He has published over 1200 research articles in international refereed journals and has also edited and written 160 books with an H-index of 122 and total citation of more than 71,845. He has received a large number of international and national awards and recognitions. Professor Thomas has received more than 30 national and international awards.

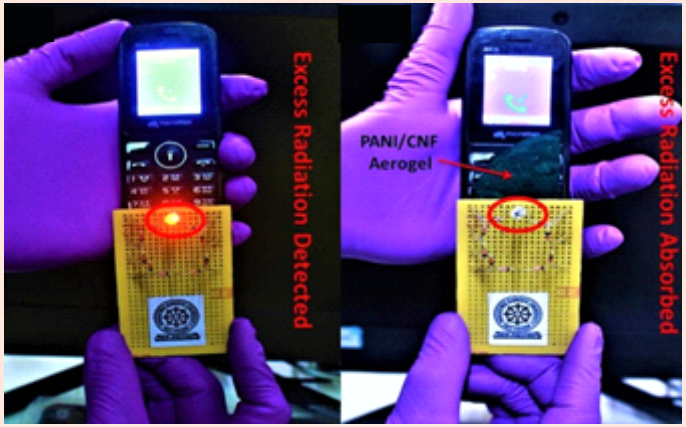
सत्यमेव जयते

INNOVATION IN GREEN POLYMERIC MATERIALS & PRODUCTS

ULTRA-FAST HEAT DISSIPATING NANOCELLULOSE AEROGELS TO ABSORB EXCESS ELECTROMAGNETIC RADIATIONS EMANATING FROM ELECTRONIC DEVICES

Shri Avinash R. Pai and Prof. Sabu Thomas
Mahatma Gandhi University, Kottayam, Kerala

Electromagnetic (EM) pollution is ubiquitous and has soared to a great extent in the past few decades. The use of plant sourced cellulose nanofibers to fabricate sustainable and high performance electromagnetic shielding materials is foreseen as a green solution by the electronics industry to address this unseen pollutant. Currently, conductive polymeric foams used as EMI shields pose serious environmental concerns and a sustainable solution to this problem is the need of the hour. The present invention deals with the development of a facile and environmentally benign strategy to synthesize ultra-light and highly conductive aerogels derived from cellulose nanofibers (CNF) decorated with polyaniline (PANI) via a simple *in-situ* polymerization and subsequent freeze drying process devoid of any volatile organic solvents. The obtained conductive aerogels exhibited density as low as 0.01925 g/cc with a maximum EMI shielding value −32 dB (>99.9% attenuation) in X band region (8.2-12.4 GHz). These porous shields demonstrated strong microwave absorption behavior (95 %) with minimal reflection (5 %) coupled with high specific EMI SE value ~1667 $dB.cm^3.g^{-1}$ which make these aerogels a potential candidate for use in telecommunication, military and defense applications. A real-time shielding performance of these porous shields is demonstrated using a RF detector and mobile phone, wherein the excess microwave radiation leaked from the mobile phone can been seen absorbed by these aerogels.



RUNNERS-UP

Shri M.A Haseeb

WeLLworth MFT PIPE

Shri M. A Haseeb a Mechanical Engineer, MBA, Grandson of Janab A Thangal Kunju musaliar (TKM) is known for his technological inventions in the industry. He is in the industry since the last 5 decades.

POLYMERS IN AGRICULTURE AND WATER CONSERVATION

PATENTED - MIRROR FINISHED TECHNOLOGY (MFT)

Shri M.A Haseeb
WellWorth Polymers, Ernakulam

Significance: Transporting of healthy water to "AamJanta" at low cost.

Benefits:

1) C-value achieved 170: Back in the 70's high capacity pumps were used to pump water through GI pipes, surface was rough and C-value of 130. In 80's GI pipes were replaced by PVC pipes, high capacity pumps were replaced by low capacity pumps, C-value of 150 for the same discharge of water. In 2009 Mirror Finished Technology was invented to create mirror like surface inside the PVC pipes and have achieved a C-value of 170 certified by FCRI.

2) Frictionless Flow: The mirror like finish increases the flow of water, resulting in less head loss and more discharge of water.

3) Energy Savings up to 25%: Since the flow of water is more due to less friction the loadon the water pumps reduces and saves energy cost up to 25%.

4) Less adherence of dirt: Chances of adherence of dirt or algae particles are very minimal due to the smooth finish of the inner walls.

5) Less porosity: Normal PVC pipes have a porosity of more than 200 microns, whereas MFT pipes have almost zero porosity because of the inner hardened layer. Less chance of bacteria's the water supply.

RUNNER-UP

Dr.Vivek Sharma

BABA FARID GROUP OF INSTITUTIONS
Bathinda, Punjab (India)

Dr. Vivek Sharma is working as HOD Chemistry & Assistant Professor at Baba Farid College, Bathinda, Punjab. Dr. Sharma has got his M.Sc. & Ph.D. degree in Chemistry. He has experience as guest faculty in Jiwaji University, Gwalior (M.P.) from 2007 to 2011. He has 6 years research experience with 01 Research Project, 10 Publications, 01 Patent and 02 Book Chapters. He attended/participated 16 conferences.

सत्यमेव जयते

INNOVATION IN PETROCHEMICALS AND NEWER POLYMER APPLICATIONS

ECO-FRIENDLY, GREEN METHOD TO OBTAIN PURE PET FROM WASTE PET

Dr.Vivek Sharma
Baba Farid College, Bathinda

This method is focused to develop novel technology for replacing hazardous or toxic methods of recycling of waste PET by eco-friendly green method to prepare pure PET (Polyethylene terephthalate) by polymerization of pure MHT (Monohydroxyethyl terephthalate) monomer obtained from depolymerisation of waste PET using hydrotalcite as catalyst and polyols as solvent; which can be easily recyclable. It would be expected long term sustainable benefits for environmental safety. Most of the reported methods of recycling of waste PET gave poor yields, long reaction time, harsh reaction conditions, expensive, toxic to various extents and non-recyclable catalyst. Replacement of conventional systems by using green method to obtained pure PET from waste PET-Bottles which is environment friendly, cheap, easily recyclable solvent and catalyst.

The main advantage of the present invention is that in the depolymerization and polymerization reaction only a single set of catalyst and solvent is used which makes a process economical, industrial viable and easy to scale up. The foremost advantage of the present invention is that by employing the present invented process of depolymerization and polymerization using definite set of catalyst, solvent and reaction conditions highly pure monomer (MHT) is obtained which is the key factor for synthesis of high molecular weight virgin PET because once the polymer is formed it is very difficult to purify PET and thus present invention provides a novel process to recycle waste PET to pure PET and thus provides option to use such a recycled pure PET to high food grade PET applications.

RUNNER-UP

Shri Jeevi G

CIPET सि पे ट
probe • perform • practice • Plastics

Shri Jeevi is a Research scholar in the Department of Plastics Technology, Central Institute of Petrochemicals Engineering and Technology, Chennai. He is holding a Master of Engineering (ME) degree in CAD/CAM Engineering from CIPET, Chennai and secured **First Class with Distinction**. He has more than **5 years of academic and industrial research experience** with **4 publications and few book chapters**. His research areas are Fiber Reinforced Polymer Composites, Hybrid Composites, Joints in Thermoset Composites, New Product Design and Development, Product Testing and Validation, Rapid Prototype Technology.

सत्यमेव जयते

RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY (FOR RESEARCH STUDENTS OF ACADEMIC INSTITUTE /RESEARCH LAB)

DEVELOPMENT OF NOVEL HYBRIDIZED JOINTS USING HYBRID COMPOSITE STRUCTURE

Shri Jeevi G
CIPET-Institute of Petrochemicals Technology (IPT), Chennai

Polymer composites play major role in structural and non-structural applications considering their outstanding properties. The distinctive characteristics of hybrid composites have lead the material to be utilized in diverse structural engineering applications in such areas of aerospace, automobile, marine, medical instruments, windmill blades, building and construction etc. Over the last few decades, as a result of growing awareness of the interconnected global environmental factors of industrial ecology, eco-efficiency and sustainability, the researchers have shown interest in developing natural fiber based materials, and products. The most common challenges and construction difficulties faced in composite engineering are the joining of composite materials.Mechanical joining of polymer composites are challenging long term environmental exposure and leads to degradation of materials properties. To overcome these challenges, newly developed novel hybrid composite structure and hybrid joints was employed to enhance the material properties and produced synergetic effect on joint strength. The hybridization of basalt and silane treated glass fiber reinforcement in vinylester composites have beneficial and synergistic properties which is further enhanced by different stacking sequence of reinforcements. The developed hybrid structure resulted as high strength and stiffness combined with high impact resistance. The lightweight hybrid composite can be considered for replacement of expensive carbon fiber reinforced polymer. The novel joining techniques considerably reduce the fiber delamination and crack propagation near the holes of composite structure assembly. The novel hybrid bonded-bolted joint improved the joint performance and enhance shear deformation, higher load carrying capacity and high energy absorption. Aerospace and construction industry can consider this hybrid composite with HBB joints as a potential material to avoid premature failures of joint system in the structural components.

RUNNER-UP

LIFE TIME RECOGNITION

Shri Rajnikant Devidas Shroff

Shri Rajnikant Devidas Shroff, also known as Rajju Shroff is an Indian businessperson and billionaire, who is the founder and chairman of UPL Limited. In 2020, he was ranked as the #93 richest person in India, with a net worth of $1.5 billion, according to Forbes. The Government of India conferred him India's third highest civilian award the Padma Bhushan in 2021. Shroff is the only industrialist to receive Padma Bhushan in 2021. He was born in a family of entrepreneurs in a small village in Kutch, Gujarat, passionate about chemistry and chemicals right from the beginning. He is chemistry graduate from the Bombay University. He established a novel process of manufacturing mercury salts in a plant at U.K. and was paid royalty for it by the British Company; a big achievement for any Indian way back in 1957. Soon after, he mastered red phosphorous and quickly moved on to the production of other chemicals like Aluminium Phosphide (fumigant) and Zinc Phosphide (rodenticide) for agriculture. Mr. Rajnikant Shroff, the CMD of UPL, pioneered Red Phosphorus manufacturing in 1969, giving an impetus to the indigenous chemical industry. In 1980s, UPL started launching an avalanche of crop protection products and is one of the leading total crop solutions providers in the world now. He is considered as the India's 'Crop Protection King'. He has been listed in the Forbes India's Tycoons of Tomorrow 2018. In September 2018, Shroff received the Orden Mexicana del Águila Azteca (Mexican Order of the Aztec Eagle), the highest Mexican order awarded by the Mexican government to foreigners in recognition of outstanding services to Mexico or to humanity.

Awards and recognition

- Padma Bhushan, by the Government of India, 2021
- Ranked #93 in the 2020 list of richest person in India by Forbes
- Forbes India's Tycoons of Tomorrow 2018
- Ernst & Young Entrepreneur of the Year Award, 2013 Orden Mexicana del Águila Azteca by the Federal government of Mexico, 2018
- Lifetime Achievement Award by the Indian Chemical Council, 2010

11th National Petrochemicals Awards

by

Prof. (Dr.) Shishir Sinha
Director General-CIPET &
Chairman- 11th National Awards Committee

Petrochemicals comprise of plastics and most of other chemicals as downstream hydrocarbons derived from crude oil and natural gas. These hydrocarbons are a valuable resource and constitute vital raw-materials in industry. The value added petrochemical products all along the value chain cater to the needs of textiles and clothing, agriculture, packaging, infrastructure, healthcare, furniture, automobiles, information technology, power, electronics, telecommunications etc.

The Government of India announced the National Policy on Petrochemicals in April 2007. The policy envisioned

I. Development of value added, quality petrochemical products at globally competitive prices using eco-friendly processes and technologies.
II. Innovation of newer application and products with focus on sustainable development.

These are to be achieved through promotion of Research and Development and Human Resource Planning and Development. Towards furtherance of this objective, the policy envisaged institutionalization of National Petrochemicals Awards for Technology innovation in various field of Petrochemicals.

Central Institute of Petrochemicals Engineering & Technology (CIPET) - an autonomous body under the Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India was entrusted the responsibility of implementing the award scheme. Accordingly, National Awards scheme was successfully implemented by CIPET since 2010-11. There has been an enthusiastic participation of awardees, stakeholders/petrochemical industries and associations.

The 11th National Petrochemicals Awards has been designed for the following categories:

1. **Innovation in Polymeric Materials:**
   New Polymers, Blends & Alloys, filled materials, fibers, Polymer Composites and Nano-Composites, Smart Materials etc., New Additives, Compounds for newer & special applications in defence & space, Non-conventional application/replacement of conventional materials (e.g. Metal & Ceramics etc.), Materials for Additive Manufacturing Technologies.

2. **Innovation in Polymeric Products:**
   New / creative product design, Non-conventional application / Replacement of conventional materials (eg. Metals, Ceramics etc.), Modification of product design for performance improvements, Application in defence & space, Enhancement in the working environment, life cycle, energy efficiency, recyclability etc.

3. **Innovation of Polymer Processing Machinery, Equipment, Robotics & Automation:**
   Development of innovative/eco-friendly processing techniques, Modification of machinery for higher Efficiency / Productivity / Automation, Energy conservation, product quality improvement, Improvement & design of moulds, dies and auxiliary equipments, Development and Application of Robotics & Automation in different polymer processing techniques. Development in material movement system, Improvement in moulding & post-moulding operations, Development of low cost, energy efficient, polymer testing equipments, Modification of Single Use Plastics (SUP) Machinery for alternative use.

4. **Innovation in Polymer Waste Management:**
   Newer technology in plastic waste utilization into products/energy recovery, Recycling Technology, Plastic waste collection, segregation techniques, Product design for improved recyclability.

5. **Innovation in Green Polymeric Materials & Products:**
   Biopolymers, Biodegradable / compostable Polymers, Time controlled degradation, Green material filled polymers, Biodegradability evaluation techniques.

6. **Innovation in Packaging Techniques including Creative Design:**
Emerging Packing Technologies, Smart Packaging, New compound for replacement of multi-layered packages, Packaging for defence, Creative design for improved recyclability, Packaging for improved shelf life, Consumer convenience, Stability on shelves for easy storage.

7. **Polymers in Agriculture and Water Conservation:**
Water transportation, mulching, canal lining, drip irrigation, sprinkler system, low tunnels, poly house etc., Controlled release system for fertilizer, pesticides, micronutrients, etc., Innovative packaging for agriculture, floriculture and horticultural produce, Controlled permeability films & packaging for improved shelf life, Novel Usage of plastics for food security, Drinking water storage & transportation, Polymer membrane for water purification /Desalination, Devices for waste water, drainage, sewage treatment system.

8. **Polymers in Medical and Pharmaceutical Applications:**
Affordable / cost effective implants, implements and devices, New innovative products for medical application, Polymer based new drugs delivery system, Polymer body implants, Innovation in PPE Products, Innovation in ventilator, sanitizer etc.

9. **Innovation in Petrochemicals and Newer Polymer Applications:**
Sustainable substitutes for chemical intermediates of fossil origin, Innovation in Crackers, Catalyst Complexes for better yield, Biodiesel, Clean products targeting circular economy, Energy Efficient Technologies for Upstream Petrochemical Industries, Materials for Energy Storage & Conversion, Innovation in Coatings for Oil & Gas pipelines.

10. **Research in the field of Polymer Science & Technology:**
(for Research Students of Academic Institute / Research Lab)
Individual / Team of researchers in R & D Institutions & laboratories, Original research work in polymeric material processing etc. leading to prototype development & future industrial applications.

11. **Innovative "Start-up" venture in Polymer field:**
New start-up polymer industry for market needs, export oriented units, units related to waste management and recycling producing innovative product, import substitute in additives etc., "Start-up" with indigenous technologies, Eco-friendly, cost effective product solution to improve life standards.

12. **Best Employer in Petrochemical Sector:**
(for R&D units / Manufacturing Industries with 3 consecutive years in Operation & 20+ employees in role)
Employs qualified person from main stream / core subject, Maintains low / no attrition rate, Treat employees fairly, responsive/respected and pays attention to employees well being, personal growth & develop professionally, Encourage creativity and provide opportunities to try & learn new things, Great work/life balance, benefits, compensation, autonomy, positive attitude and supportive & collaborative working atmosphere, Strong leadership and transparent / direct / effective / timely communication.

13. **Special Award for the Life Time Achievement in Petrochemicals.** The Lifetime Achievement Award in Petrochemicals to recognize members who have contributed significantly and demonstrated outstanding achievements and longevity, within the field of Petrochemicals.

IMPLEMENTATION FRAMEWORK & OPERATIONAL MODALITIES

351 applications were received under the aforementioned 13 categories. The duly constituted selection committee scrutinized the application and recommended the list of Winners and Runners-up to the Prize Award Committee. Based on the recommendations of Prize Award Committee and approval from the Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India, 05 nominations were selected as Winners and 06 nominations were selected as Runners-Up and one for Life Time Recognition Award. The 11th National Petrochemicals Awards Function has been scheduled to be organized on September 27, 2022 at New Delhi to encourage and promote technology innovation in Petrochemical sectors. Dr. Mansukh Mandaviya Hon'ble Minister of Health & Family Welfare and Chemicals & Fertilizers, Government of India shall be presenting the National Petrochemicals Awards to the awardees in the presence of Shri Bhagwanth Khuba, Hon'ble Minister of State for Chemicals & Fertilizers and New & Renewable Energy, Government of India.

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY (CIPET)
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Central Institute of Petrochemicals Engineering & Technology (CIPET) is a premier National Institute devoted to Skill development, Technology support, Academic, Research and Development (STAR) for the Petrochemicals & allied industries in India. CIPET spread across the length & breadth of the country, which includes 08 Institute of Petrochemicals Technology (IPT), 31 Centre for Skilling and Technical Support (CSTS), 4 Sub Centres and 3 School for Advanced Research in Petrochemicals (SARP). All the CIPET centers have state-of-art infrastructural facilities in the areas of Design, CAD/CAM/CAE, Tooling, Plastics Processing, and Testing & Quality Control. CIPET offers a blend of various specialized Academic Programmes in the field of Plastics Engineering & Technology and Petrochemicals Engineering - Doctoral, Post Graduate, Undergraduate, Post Diploma or Diploma; in order to provide techno-skilled human resource to the plastics & allied industries.

CIPET renders Technology Support Services in Design, Tooling, Plastics Processing and Testing & Quality Assurance in India and abroad. CIPET's expertise as a third party inspection for plastic products is recognized by various Central & State Govt. Organizations for pre-dispatch / delivery inspection of plastics & allied products.

With a vision to be recognized as a global R&D hub, CIPET has established three R&D centres, viz., (CIPET:SARP) Advanced Research School for Technology & Product Simulation (ARSTPS) at Chennai, (CIPET:SARP) Laboratory for Advanced Research in Polymeric Materials (LARPM) at Bhubaneswar and (CIPET:SARP) Advanced Polymer Design & Development Research Laboratory (APDDRL) at Bengaluru. These laboratories work towards developing novel indigenous technologies to cater the current requirements in the areas of Polymer Composites, Nanocomposites, Biopolymers, Functional Plastics, Carbon Nanotubes, Polymer membranes, Conducting Polymers, Fuel & Solar cells, E-Waste recycling, Water Purification, Coatings, Adhesives; Innovative product concept development & Commercialization by aid of CAD/CAM/CAE, Product evaluation & Commercialization along with training to Post graduate and Ph.D. students.

The Institute has signed various Memorandum of Understanding (MoU) for collaborative research and developmental activities, faculty & student exchange programmes with leading international Universities / Organizations at USA, Canada, Australia, Germany, France, Korea, Poland, Mexico, China, South Africa, Russia, Brazil & Durban. With strong Alumni base, CIPET has emerged as an apex Plastics Technology Institution, not only in India but also a unique institution of its kind, in South East Asia.

CIPET 's contribution, as a Quality Education and Technical service provider has been very well recognized by the professional bodies by bestowing many awards like Plastindia Foundation, Plasticon Award 2005 and Greentech Environmental Excellence Silver Award 2002; Best Performance Award: 2015-16, Official Language Implementation, Dept. of Chemicals & Petrochemicals, Govt. of India and Best Performance Award (Gold Category): 2018 for Best Skill Training Provider in India from Ministry of Social Justice & Empowerment, Govt. of India. Gold Award has been received for efficient implementation of Skilling Initiatives under Government Training Institute category from National Backward Classes Finance & Development Corporation (NBCFDC), Ministry of Social Justice & Empowerment, Govt. of India in 2019. Excellence Award is also received for outstanding performance in implementation of Skilling Programmes under PM-DAKSH Yojana supported by Ministry of Social Justice & Empowerment, Govt. of India through their corporation i.e. NBCFDC & NSFDC in 2021.

As a part of social responsibility and creating various awareness among public, CIPET has been training entrepreneurs to set up plastic waste recycling ventures through its technology-cum-demonstration centre at Guwahati as a model in association with NGOs and Civic bodies. The model centre exhibits viable end-to-end chain from collection of plastic waste, organized segregation to processing in the plant and production of granules.

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The institute is also involved in disseminating the information about Plastics Waste Management, educating the general public, organizing awareness camps for Corporation officials & NGOs, conducting training programs, participating / organizing National & International Conferences & Seminars on Plastics Waste Management.

As part of Atmanirbhar Bharat initiative, CIPET is supporting industries through development of moulds & dies, manufacturing of plastics products, import substitutes, etc. In line with 'Startup India', CIPET promoted start up ventures to boost entrepreneurship and encouraged start up with job creation.

In line with Skill India Mission, CIPET develops skilled work force for the plastics/ petrochemical and allied industries by conducting Long-term and Short-tem skill development training programmes. The institute has been the best skill provider in the country empowering about 4.67 lakh skilled human resources during 8 years from 2014 to 2022. Similarly, 6.06 lakh of Technology Support Assignments have been successfully completed by CIPET during 2014-2022. The Research & Development activities have witnessed manifold growth by undertaking various Research Projects during 08 years.


Grow With PLASTICS!

11th NATIONAL PETROCHEMICALS AWARDS