Government of India
Ministry of Chemicals & Fertilizers
Department of Chemicals & Petrochemicals

10th NATIONAL AWARDS

for

Technology Innovation

in Petrochemicals & Downstream Plastics Processing Industry (2019-20)

Tuesday, 23 February, 2021

New Delhi

Shri D. V. Sadananda Gowda

Hon'ble Minister for Chemicals & Fertilizers,
Government of India

I am happy to learn that the Department of Chemicals and Petrochemicals under my Ministry is organising "10th National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry" on 23rd February, 2021 in New Delhi.

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

I appreciate the efforts made by the Department of Chemicals & Petrochemicals for successfully implementing this scheme jointly with TEAM CIPET. I also take this opportunity to compliment the Awardees for their valuable innovations.

I believe that the presentation of these awards not only encourage the petrochemical and downstream plastic industries to strive for innovation, excellence and improvement of services delivered but also position their products in the global market.

I again congratulate the Awardees and wish the function a great success.

D. V. Sadananda Gowda

Shri Mansukh Mandaviya

Hon'ble Minister of State for Ports, Shipping and
Waterways (Independent Charge),
Chemicals & Fertilizers, Government of India

The global consumption of polymers have increased manifold in the last 50 years. We all know that plastics and polymers constitute a major role in the economic growth of a country. Today resource-efficient polymers are present in an infinite range of products and applications helping us to save energy, CO_2 emissions, water and even food. This incredibly versatile material plays a vital role in our everyday lives with its manifold applications in household to industrial and commercial sectors.

Continuous research & development and new innovations in the field of polymers & petrochemicals are the need of the hour for sustained growth to enable the Indian industry to remain competitive and meet the global challenges.

I recognize the efforts of the officers of the Department. CIPET and the Expert Panel for their contribution towards conducting the 10 edition of the National Awards in a row.

My heartiest 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 work for constant innovation.

Mansukh Mandaviya

सत्यमेव जयते

10th National Awards for Technology Innovation

Shri Yogendra Tripathi, I.A.S.

Secretary to the Govt. of India Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Shastri Bhawan, Dr. Rajendra Prasad Road,
New Delhi - 110 001

I am happy to note that my Department, in association with Central Institute of Petrochemicals Engineering & Technology (CIPET), is organizing the presentation of "10th National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry" on 23rd February, 2021 in New Delhi.

These awards are in recognition of outstanding contribution to the field of R & D leading to conservation of energy, efficient management of plastic waste, increase in product life cycle, development of innovative new products, quality standards, recycling and other emerging areas. As polymers 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.

I thank the members of the Expert Committee for expeditiously evaluating the proposals, and appreciate CIPET's effort for conducting the National Awards for the tenth year in a row.

I congratulate the innovators for their great contribution to the polymer segment, and believe that they will carry forward these initiatives in new areas.

Yogendra Tripathi

Shri Kashi Nath Jha

Joint Secretary to the Govt. of India, Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers, Shastri Bhawan, Dr. Rajendra Prasad Road,
New Delhi - 110 001

As research and innovation constitute the foundation of any industry, the National Awards for Technology Innovation have been instituted, and their 10th edition would be held on 23rd February 2021 in New Delhi. These awards are envisaged to improve the performance of the existing products and their quality, leading to better acceptance and increase in demand of the products in the competitive market of polymers and plastics as well as benefit all segments of the enterprises, including Cottage Industry and MSMEs.

Since their initiation, the National Awards of the Department have become very popular and achieved peer recognition among professionals, entrepreneurs and researchers from various industries and R&D institutions. I am confident that the 10th National Awards for Technology Innovation will also work towards the most outstanding usage of technology in multi-disciplinary applications of Polymers.

I take this opportunity to felicitate the Members of the Expert Committee, who spared their valuable time to scrutinize and evaluate the received proposals. I appreciate CIPET for taking up the challenge of executing the 10th edition of the National Awards expeditiously. DCPC will continue to support innovation and research in the field of petrochemicals.

I convey my heartiest congratulations to all the awardees.

Kashi Nath Jha

सत्यमेव जयते

10th National Awards for Technology Innovation

Awardees


Dr. Samir H. Chikkali


Shri Ravindra P. Gote


Dr. Dipa Mandal


Dr. Ketal Patel


Shri Krishnaroop Chaudhuri


Dr. C. P. Vinod


Dr. Ashish K. Lele

CSIR - NCL
PUNE

Dr. Samir H. Chikkali has postdoctoral research at the University of Amsterdam, Netherlands and the University of Konstanz, Germany. He joined CSIR-NCL, Pune in 2012. He has guided 6 Ph.D. students, 5 post-docs and 12 project assistants. He has 55 publications in international journals and 15 patents.

Shri Ravindra P. Gote obtained his M.Sc. degree in Chemistry from Pune University, Maharashtra in 2015. He worked in CSIR-NCL Pune. Presently he is pursuing PhD degree in Physical Science and Engineering (PSE) Division at King Abdullah University of Science and Technology, KAUST, Kingdom of Saudi Arabia.

Dr. Dipa Mandal obtained her PhD from IIT, Chennai in 2016. She worked as research associate in CSIR-NCL Pune. Presently working with M/s Dorf Ketal Chemicals India Pvt. Ltd.

Dr. Ketan Patel obtained his PhD from MS university of Baroda, Gujarat. Presently working with CSIR-Central Salt and Marine Chemicals Research Institute, Bhavnagar

Shri Krishnaroop Chaudhuri had B.E. degree while working in CSIR-NCL, Pune. Thereafter, obtained PhD degree. Presently working in Chemical and Materials Engineering Department, University of Kentucky Lexington, USA.

Dr. C. P. Vinod obtained his PhD from JNCASR, Bangalore. Presently working with CSIR-NCL, Pune.

Dr. Ashish K. Lele obtained his PhD in chemical engineering from university of Delaware, Newark, DE, USA. He joined CSIR-NCL Pune. He also worked as research associate at university of Cambridge, U.K. He obtained so many awards. He has 64 papers publication and 2 granted patent. Presently working with Reliance Industries Ltd, Mumbai.

सत्यमेव जयते

INNOVATION IN POLYMERIC MATERIALS

"PREPARATION AND SCALE-UP OF DISENTANGLED ULTRAHIGH MOLECULAR WEIGHT POLYETHYLENE: A MATERIAL 11 TIMES STRONGER THAN STEEL."

Dr. Samir H. Chikkali, Shri Ravindra P. Gote, Dr. Dipa Mandal, Dr. Ketan Patel, Shri Krishnaroop Chaudhuri, Dr. C. P. Vinod and Dr. Ashish K. Lele

In our day-to-day life we come across various materials (generally called plastics or polymers) starting from toothbrush to the humble carry-bag (polyethylene). The same carry-bag, that one may easily tear-off, can be reinforced to an extend that it starts behaving as a bullet proof material. The team headed by Dr. Chikkali at NCL has designed and synthesized a set of homogeneous and heterogeneous catalysts that deliver super strong polyethylene. The super strong polyethylene is called "Disentangled Ultra High Molecular Weight Polyethylene (dUHMWPE)".Inventors catalyst produces dUHMWPE with molecular weights in millions (1-10 million g/mol). This is the first time a heterogeneous catalyst that displays pseudo-single site nature is able to produce dUHMWPE. The thus prepared nascent dUHMWPE is thermally very stable(melting temperature of 141-144 °C) and displays high modulus (strength). dUHMWPE is a speciality material which offers excellent mechanical properties (weight on weight basis: 11 times stronger than steel) along with chemical, moisture, dirt & abrasion resistance. The commercial UHMWPE requires solvent processing which is not environmental friendly, while the dUHMWPE produced by inventor can be processed without solvent. dUHMWPE can be used for bullet proof materials, anti-ballistic applications, in prosthetics and in highly demanding applications.

India imports close to 2000 tons of UHMWPE per year. The technology is closely guarded by two multinational companies and India does not have access to this technology. Therefore, with increasing emphasis on ensuring a secure supply chain to become "Aatamnirbhar" and the desire to be less dependent on imports, domestic development of dUHMWPE is slated to attract significant interest from strategic and commercial sectors.

WINNER

10th National Awards under the Category of "INNOVATION IN POLYMERIC MATERIALS"


Dr. Smita Mohanty


Dr. Akshya Kumar Palai


Shri Sagar Kumar Nayak


Shri Smruti Ranjan Mohanty

Dr. Smita Mohanty is the Director and Head of CIPET:SARP-LARPM with more than 16 years of Research and Teaching experience. She has expertise in the area of E-waste Recycling, Composites/Nanocomposites, Biopolymers from Natural Resources etc. She has published 200 papers in major International Journals and has 06 Indian Patents to her credit. She has guided many PhD students. In the capacity of Investigator, she has successfully completed several research projects and has authored many textbooks/chapters.

Dr. Akshaya K. Palai currently working as a Junior Scientist in CIPET:SARP-LARPM, Bhubaneswar. He worked as a Brain Pool Research Professor at Konkuk University, South Korea for more than 03 years. He has guided more than 10 M.Sc./M. Tech. students, authored 50 peer-reviewed articles and presented many national/international conference papers. His research interest is in the area of organic electronics, energy conversion and storage, synthetic organic chemistry, Smart polymeric materials.

Shri Sagar K. Nayak has submitted his PhD thesis to the BPUT, Odisha under the supervision of Prof. (Dr.) S. K. Nayak, CIPET:SARP-LARPM, Bhubaneswar. His research area of interest is Reinforced Polymer Composite and thermal conductivity model analysis.

Shri Smruti R. Mohanty has enrolled for PhD with BPUT, Odisha under the supervision of Dr. S. Mohanty, CIPET:SARP-LARPM, Bhubaneswar. His research area of interest is polymer synthesis and polymeric coating for automotive applications.

सत्यमेव जयते

INNOVATION IN POLYMERIC PRODUCTS

"INDIGENOUS DEVELOPMENT OF POLYMER-CERAMIC BASED POROUS BED FOR SEPARATION OF MIXED ION-EXCHANGE RESINS"

Dr. Smita Mohanty, Dr. Akshya Kumar Palai, Shri Sagar Kumar Nayak and Shri Smruti Ranjan Mohanty

Thermal energy and nuclear power plants devour a lot of water which resulted in extravagant built-up of the fouling agents in the boiler feed system. The ion-exchange resins are utilized in water treatment plant to entrap positive and negative ions present in the water and subsequently supply ultrapure water with conductivity below 0.06 μS/cm. Over a period the resins get exhausted due to which its regeneration is indispensable as single-use of resin will be commercially non-viable.

The research in the field of innovation in polymeric product entitled "Indigenous development of polymer-ceramic based porous bed for separation of mixed ion-exchange resins" addresses the above issue by developing a low cost polymer-ceramic based porous bed for hydro-classification of exhausted mixed cation and anion exchange resin to restore their capacity by rigorous washing of the resins via water, acid and alkaline solution. The bed was designed to effectively sustain desired air and water pressure. The major advantage of this bed over the conventional bed is its cost effectiveness (about five times cheaper than the beds available in the market), higher compressive strength and better service life. In addition, the provision for renovation of upper layer enables the bed to be sustainable for many regeneration cycles. After iterative trials, the technology has been successfully demonstrated on-site at a thermal power plant and serves the purpose to effectively revive the mixed resins. The designed and fabricated product mentioned above has the potential application in the power generation and water purification industry.

WINNER

10th National Awards under the Category of "INNOVATION IN POLYMERIC PRODUCTS"


Shri Suresh. I


Shri A. Vadivel Murugan


Shri Srinivasa Moorthy


Shri Balram


Shri Veluchamy

M/s SHIBAURA MACHINE INDIA PRIVATE LIMITED, CHENNAI

Shibaura Machine India Private Limited manufactures most advanced injection molding machines for complex plastic injection molding applications. TD Multi series machines are application specific built concept with special rotary table, rotary fluid coupler, and unique drive system with special controller to accomplish this requirement. The machine is built with a unique filling sequence conveniently configurable by the user. This innovation has also the flexibility of producing simple two color parts along with the complex parts with un-conventional filling requirement discussed above.

Shri Suresh. I is having 20 years of experience in R&D of Injection Molding machinery design. He worked in various IMM developments and received the first position in Navodaya Innovation Award in L&T group of companies for S-Tech series development. He has graduated Bachelor of Science in Engineering Technology from BITS-Pilani and PD-PMD from CIPET.

Shri A. Vadivel Murugan is working for the development of next generation controller. He joined L&T, Chennai, then deputed to Demag-Germany where he was part of new controller development team. He has developed software for TD-Multi machines.

Shri Srinivasa Moorthy joined L&T in 1986, then he shifted to Injection Molding machine sales in 2002 as a part of marketing growth plan. Since, he has been involving in various injection molding machinery technical sales. He has been coordinating between R&D and Marketing to develop new solutions.

Shri Balramsingh. S is having more than 10 years of experience in Service and Applications of injection molding industries. He has installed and commissioned more than 350 of injection molding machines in various segments of plastics processing from auto mobile to household parts manufacturing industries.

Shri Veluchamy is having more than13 years of experience in Injection Molding machine testing and validation. During working, he completed B.Tech from SRM University. He Joined in L&T in 2008.

INNOVATION IN POLYMER PROCESSING MACHINERY, EQUIPMENTS, ROBOTICS & AUTOMATION

"MULTI COLOR/MATERIAL INJECTION MOULDING MACHINE FOR ANTI-COUNTERFEIT ARTICLE PRODUCTION"

Shri Suresh. I, Shri A. Vadivel Murugan, Shri Srinivasa Moorthy, Shri Balram and Shri Veluchamy

This innovation is about a unique design and development of Multi Material/colour injection molding machine to produce plastic parts which needs un-conventional molding sequence along with in-mold automation functionality. FMCG products are widely using plastic injection molded caps and closures in their packaging solutions. Apart from the functional requirement, these parts are to inhibit good aesthetic, tamper-evident and anti-counterfeiting features. FMCG business has always been a part of every human life. Due to the nature of these products and its manufacturing friendliness, these products are more vulnerable for counterfeiting. Counterfeit products have a huge socio-economic impact with poor quality, leading to economy loss for the country as these parts are not sold by the original manufacturers. Preventing counterfeiting of the product means protecting the brand value for the business, protecting the quality for the consumer, protecting the economy for the country. Anti-counterfeiting focuses on complex part design which can be manufactured with special tool and un-conventional manufacturing process with high precision and repeatability to ensure the product integrity. Manufacturing of such parts are possible only with technically advanced machines with complex controllers.

WINNER

10th National Awards under the Category of
"INNOVATION IN POLYMER PROCESSING MACHINERY, EQUIPMENTS, ROBOTICS & AUTOMATION"


Dr. Lizymol Philipose Pampadykandathil

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, THIRUVANANTHAPURAM, KERALA

Dr. Lizymol Philipose Pampadykandathil obtained Ph.D in polymer chemistry from Mahatma Gandhi University, Kerala. She is currently working as Scientist F and in charge of the division of dental products. She has more than 30 years of experience in the field of polymers and biomaterials. Lizymol has contributed significantly to the area of polymers by developing novel polymer based biomaterials for dental and orthopedic applications. She has authored one book, 44 journal papers, 5 book chapters, and 25 patents (13 granted) in the area of polymers. She has successfully completed projects in the area of polymeric biomaterials and received many awards.

POLYMERS IN MEDICAL AND PHARMACEUTICAL APPLICATIONS

"DEVELOPMENT OF BIO-ACTIVE, RADIOPAQUE, NON-CYTOTOXIC, BONE CEMENT BASED ON A NOVEL IN-SITU POLYMERIZABLE OLIGOMER FOR ORTHOPEDIC APPLICATIONS"

Dr. Lizymol Philipose Pampadykandathil

A successful arthroplasty and orthopedic procedures depend on the properties of the bone cement, which acts as a grout for the fixation of prosthesis, stabilizer for stabilizing the vertebral fractures during vertebroplasty, kyphoplasty and vertebral stenting procedures, From 1970, Charnley's PMMA bone cement was widely applied in orthopedics. But the main drawbacks are thermal necrosis by exothermic reaction during curing, chemical necrosis, polymerization shrinkage lead to poor bonding between bone and cement, aseptic loosening lack of bioactivity, poor mechanical properties, embolism due to injectable liquid cement in vertebroplasty, toxicity of the residual monomer leading to hypoxia and allergic reactions and short implant life. The draw backs of current methyl methacrylate (MMA)/PMMA bone cement have been addressed using a novel bioactive resin containing mixtures of alkoxides of calcium and silicon with free silanol groups and polymeric methacrylate groups to replace toxic MMA for high load carrying orthopedic applications. The new resin can be mixed with combination of fillers including homo/copolymers of methyl methacrylate, styrene, hydroxyapatite (PMMA, PMMA-co-PS, HAP) and other inorganic fillers. The resin filler combination is capable of being hardened and solidified to form solid substance with good mechanical property, low exotherm, low polymerization shrinkage non cyto-toxic and biocompatible. This development has paved for a new technology for MMA free bioactive, non cytotoxic bone cement. The innovation is successful in completely replacing MMA monomer from the liquid part of the bone cement to get rid of complications due to residual MMA monomer.

WINNER

10th National Awards under the Category of "POLYMERS IN MEDICAL AND PHARMACEUTICAL APPLICATIONS"

सत्यमेव जयते

10th National Awards for Technology Innovation

Runners - Up


Dr. K. V. Govindarajan


Shri K. Premchand


Smt. Tanu Srivastava

BRAHMOS AEROSPACE LTD.,
AN INDIA-RUSSIA JOINT VENTURE, HYDERABAD

Dr. K.V. Govindarajan is heading the Chemical Department of BrahMos Aerospace Ltd, Hyderabad for technology transfer and production, having an expertise of more than 25 years in Aerospace industry. Immensely associated with various DRDO Missile development programmes and has demonstrated the use of various chemicals / polymers / ablative liners / thermal insulation materials development. His main areas of interests are development of solid lubricant coatings, use of ablative cost effective liners for Hypersonic vehicles and carriers. He has published four papers in reputed journals.

Shri K. Premchand has joined BrahMos Aerospace Ltd., Hyderabad as Executive Assistant in year 2014. He is working on various types of polymeric coatings and silicon based products by using different analytical and mechanical techniques. His main areas of interests are corrosion science, polymeric composites, speciality elastomers and propulsion systems.

Smt. Tanu Srivastava is presently working as Scientist –'E' in DRDL, DRDO Hyderabad. She has got 17 years of experience in the field of design, development and characterization of thermal insulation systems, high temperature adhesives, sealants and composites. She has published twelve papers in conferences and journals and filed two patents. She has also won three DRDO awards.

INNOVATION IN POLYMERIC MATERIALS

"FLUORINATED TOP COAT ALONG WITH HEAT RESISTANT PRIMERS DEVELOPED FOR INDIAN SUPERSONIC MISSILES AND HYPERSONIC VEHICLES"

Dr. K. V. Govindarajan, Shri K. Premchand and Smt. Tanu Srivastava

Cutting edge technology of Fluorinated topcoat FP-566 Grey along with heat resistant chromate free Epoxy primer EP-0104 (Cured with Tertiary Amine) are widely used in Aerospace industry in protection of Supersonic/Hypersonic missile structures. Thermal insulation properties are crucial for many Aerospace subsystems due to severe operation conditions of temperature and high velocities. The components must have structural integrity under high temperature and flow conditions. In order to achieve these functional properties such as insertion loss measurement at a frequency of 9.4Ghz for radome and resistivity, the Fluorinated top coat FP-566 Grey on Heat Resistant Primer EP-0104 is used along with carbon fillers to give anti static and stealth coatings. This Fluorinated Coatings is chosen with temperature flexibility ranging from minus 60°C to plus 300°C.

Industry Partner M/s Grauer & Weil Ltd., Mumbai (formerly M/s Bombay Paints Ltd.) was selected and transfer of technology to produce this important coating materials is prepared by using liquid polymer resin carbinol SKF-32 & SKF-26 dissolved with carbon fillers and blended in organic solvents such as Butyl Acetate. The Most critical high end performance Fluoroplast polymeric materials used in Supersonic Missile applications and Hypersonic Vehicles paves way for high temperature resistant, water repellant, rain erosion and thermal properties up to 600°C & can with stand at High Mac speed of 4.

The prime advantage and significance of this high performance fluorinated paint systems are:

a) Available in India at Low cost and used extensively in Indian Aerospace Industries.
b) Can be used in various fields of Electronic Devices for Future technologies like Seeker, Honey Comb Structures, and missile integrations units, composite structures, aircraft antennas, stealth aircrafts and Hypersonic Vehicles.
c) Export potential by the Indian Industry to various European countries including Russia and Germany.
d) High import costs of these coatings is reduced to zero and became self reliant in last 5 years in Indian aerospace.

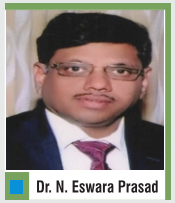
RUNNERS-UP


Dr. Dibyendu Sekhar Bag


Dr. Gobardhan Lal


Shri Raj Kumar


Dr. Durgeshnath Tripathi


Dr. N. Eswara Prasad

DEFENCE MATERIALS AND STORES RESEARCH AND DEVELOPMENT ESTABLISHMENT (DMSRDE), DRDO, KANPUR

Dr. Dibyendu Sekhar Bag, Scientist-'F', DMSRDE, Kanpur has successfully contributed on various projects and is recipient of few awards. He has more than 160 Papers in reputed Journals and Conferences, 7 Patents, 5 Book Chapters and 1 Book. He is also Editor of Journal of Polymer Materials.

Dr. Gobardhan Lal, Scientist-'E', DMSRDE, Kanpur has more than 32 years of research and development experiences in DRDO. He contributed in various projects and published 20 papers in Journals and Conferences.

Shri Raj Kumar, Technical Officer 'B', DMSRDE, Kanpur has served DRDO more than 28 years and gathered knowledge and expertise in polymeric materials' characterization and contributed in various projects.

Dr. Durgeshnath Tripathi, Scientist-'G', DMSRDE, Kanpur has vast experience of R&D and recipient of few awards. He has more than 70 publications in Journals and conferences, and ten patents.

Dr. N. Eswara Prasad is an Outstanding Scientist and Director, DMSRDE, Kanpur and has extensive R&D experiences with several Defence Systems, and Personal Protection Systems for the Indian Military. He has more than 130 Papers in International Journals, 35 Patents, 18 Edited Books and 40 Book Chapters. He has also received several prestigious awards.

INNOVATION IN POLYMERIC PRODUCTS

"PRODUCT DEVELOPMENT, UP-GRADATION OF MANUFACTURING PROCESS TECHNOLOGY, CERTIFICATION AND FREE FLOW BULK PRODUCTION OF 'PEEK' LIGHTNING INSULATOR PIPES FOR LIGHT COMBAT AIRCRAFT (LCA-MK-1, TEJAS)"

Dr. Dibyendu Sekhar Bag, Dr. Gobardhan Lal, Shri Raj Kumar, Dr. Durgeshnath Tripathi and Dr. N. Eswara Prasad

Lightning insulator pipes (5 types having diameter 20, 25, 32, 40, and 50 mm) based on PEEK (polyether ether ketone) polymer are developed for Light Combat Aircraft (LCA-Mk-1, Tejas) and are successfully inducted into the fuel system to protect the aircraft from lightning effect.

Such insulator pipes of high performance PEEK polymer are developed by the injection moulding process followed by machining using CNC machine. The manufacturing process technology has been established. Successfully the necessary certification procedures have been completed and obtained the Type approval/Clearancefor free flow bulk production of the products on November 2018.

PEEK lightning insulator pipes of 5 types of 3350 Nos. with the manufacturing partner, M/s MARS Auto Pvt. Ltd., Kanpur are handed over to LCA-TD(HAL), Bangalore and fitted into the LCA systemduring 2017-2020. As the demand of LCA production is increasing, now-a-days, further such insulator pipes are also demanded to cater the need.

Lightning effect in space is inevitable and such insulator pipes are crucial requirement in the aluminium fuel pipelines for safety of the aircraft. The products are strategic in nature and are not available in the open market. There is no alternative to the PEEK lightning insulator pipes known for the country for its LCA (Mk-1) production.

RUNNERS-UP


Shri Jigish R. Shah


Shri Shailesh G. Brahmbhatt

M/s MILACRON INDIA PVT. LTD., AHMEDABAD

Milacron is a global leader in the manufacture, distribution and service of highly engineered and customized systems within the plastic technology and processing industry. Established in 1995, Milacron has a full-line product portfolio that includes injection molding and extrusion equipment. Milacron maintains strong market positions across these products, as well as leading positions in maintenance, repair and operating supplies for plastic processing equipment. Milacron's strategy is to deliver highly customized equipment, components and service to the customers throughout the lifecycle of their plastic processing technology systems.

Shri Jigish R. Shah did Mechanical engineering and having 31 years of industrial Experience in Design and Development of Plastic Machinery. Presently working at Milacron and heading the technology and product development group. His portfolio includes the development of machinery for Plastic Injection Moulding, Blow moulding and Extrusion machines. He is also involved in various activity of educational institute.

Shri Shailesh G. Brahmbhatt has 31 years of industrial Experience in Design and Development of Plastic Machinery. Presently working at Milacron and heading the engineering of injection moulding machine of hydraulic toggle design. He is giving support India as well as European & American customers. His portfolio also includes the development of machinery for Plastic Injection Moulding.

सत्यमेव जयते

INNOVATION IN POLYMER PROCESSING MACHINERY, EQUIPMENTS, ROBOTICS & AUTOMATION

"Q-SERIES 280 MONO SANDWICH MACHINE"

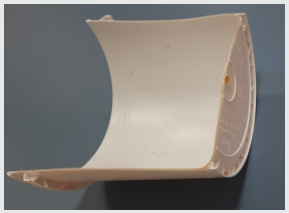
Shri Jigish R. Shah and Shailesh G. Brahmbhatt

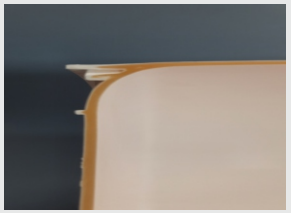
- ✓ With this Technology, Customer can use different core material based on application including recycled plastic material in the core and at the same time maintains looks and strength of finished product.
- ✓ Material cost savings
- ✓ Use of recycled core material
- ✓ Achieve Higher productivity with lower cycle time with parallel operation
- ✓ Reduce amount of pricy skin material

Mono sandwich-(MSW) technology is not the same as two component injection which widely used for different application. Here the structure is having core and skin material and can be different core and skin material based on application. One of the major advantages is possible to use regrind/ scrap material as core. Can be use low cost material as core and costly material as skin or hard material as core and soft material as skin. Lots of different core and skin combination possible.

On the machine, additional extruder fix on stationary platen. Extreme care has been taken in design & manufacturing to support additional extruder unit and perform consistently. Machine hydraulics and software architect are specially configured to get the best results from MSW along with main machine.

In **Q-Series 280 MSW**, we took trial with the single cavity mould without hot runner and the product thickness 1.5mm.
To reduce Energy consumption:- **1.** We used toggle platform- It gives tonnage with smaller hyd. cylinder **2.** All Electric Secondary Extruder.
3. Machine runs on servo hydraulics. To increase output, Machine equipped with parallel functions. MSW technology gives best material cost saving.

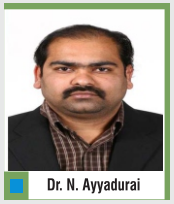




RUNNERS-UP

10th National Awards under the Category of
"INNOVATION IN POLYMER PROCESSING MACHINERY, EQUIPMENTS, ROBOTICS & AUTOMATION


Dr. N. R. Kamini


Dr. N. Ayyadurai


Dr. M. Aarthy


Shri George S. Antony

CSIR - CENTRAL LEATHER RESEARCH INSTITUTE,
CHENNAI

Dr. N. R. Kamini, Senior Principal Scientist and Head, Department of Biochemistry & Biotechnology, CSIR-Central Leather Research Institute (CLRI) has been working for the past two decades in different fields of Biotechnology. Her research expertise includes Microbial Enzyme Technology, Polymer Degradation, Waste Management, Production of Alternate fuels and Bioremediation. She has received various awards at national and international level. She has published more than 75 papers in reputed journals and 12 patents to her credit. She is currently working on several National and International Projects.

Dr. N. Ayyadurai, Principal Scientist, CLRI has vast experience in the field of Expanding and Engineering the genetic code for various applications. He is exploring the potential of Recombinant Congener Enzymes and Proteins in Biotechnology. His works are published in high impact journals and he has a number of externally funded projects.

Dr. M. Aarthy, Research Associate, CLRI is a budding post-doctoral fellow who has completed her doctoral work in the field of polymer degradation. She has expertise in Enzyme engineering,Bioprocessing and Molecular Biology. She is a recipient of three research fellowships and is currently focussing on recombinant collagen like proteins.

Shri George S. Antony, Senior Research Fellow, CLRI is a vibrant doctoral student working on Bioprocessing of Enzymes for environmental and chemical applications. He has been awarded UGC fellowship for his doctoral studies.

The principal inventor and her team had placed massive efforts in devising an innovative strategy for degradation of various polymeric materials and towards translation of the technology.

INNOVATION IN POLYMER WASTE MANAGEMENT

"BIODEGRADATION OF POLYMERIC MATERIALS BY A NON-CONVENTIONAL YEAST"

Dr. N. R. Kamini, Dr. N. Ayyadurai, Dr. M. Aarthy and Shri George S. Antony

Use of synthetic polymers has caused serious environmental problems due to its lack of degradability and their disposal is significantly increased now. Degradable polymers are considered as viable alternative and are susceptible to hydrolytic cleavage by microbial enzymes. Among enzymes, lipases exhibit multifaceted applications and screening of microorganisms could facilitate discovery of new lipases for polymer degradation. The innovation describes about the time controlled degradation of green polymeric material by a non-conventional yeast, *Cryptococcus* sp. MTCC 5455, which produces lipase in liquid and solid substrate medium. The enzyme and the organism degrades various aliphatic and aliphatic-aromatic polymers in mesophilic conditions. Degradation of different polymers by *Cryptococcus* sp. lipase makes the enzyme unique and this property could be applied in polymer waste management and biochemical monomer recycling. Other highlights include the degradation of polymers by the organism at ambient temperatures within a short period of time and utilization of the monomeric end products by the yeast. The yeast biomass also exhibited potential for degradation of commercially available biodegradable polymeric bags in a simple salt medium within a short span of time. Another feature of the innovation is that the biomass used for polymer degradation could be retrieved and reused for subsequent cycles. Utilization of whole fermentation medium for polymer degradation without discharging any biomass or liquid in to the environment is an added advantage. The invention would serve as a baseline for its exploitation in degradation of different polymeric materials and also provide an inventive solution for disposal of polymeric waste.

RUNNERS-UP


Shri Rajendra Prasad Bajpai


Shri Vivek Raj Bajpai


Dr. Smita Mohanty

M/s BALASORE CHEMICALS,
BALASORE
&
CIPET:SARP - LARPM, BHUBANESWAR

Shri Rajendra Prasad Bajpai, Proprietor, Balasore Chemicals, aged 82 years, is a Chemical Engineering graduate of 1962 batch and has 58 years of experience in production of various chemicals for plastic, paints and leather industries. He is the brain behind the designing of all the products developed by our company. Even at 82 years of age, he is developing new products.

Shri Vivek Raj Bajpai, General Manager, Balasore Chemicals. not only has 30 years experience of designing and manufacture of PVC Stabilisers and Lubricants but also their on-plant practical applications and trouble-shooting since he has been personally giving trials/demonstrations of our chemicals in all the PVC processing plants. He is one of those rare persons in the world, who have both, theoretical as well as practical experience of manufacture of PVC Stabilisers and Lubricants and also their on-plant end-use applications. Thus he is able to provide more accurate inputs for designing of new products. Both these talented persons work as a team and have achieved a market leader position in the Eastern India.

Dr. Smita Mohanty is the Principal Scientist of CIPET: School for Advanced Research in Polymers (SARP)-LARPM with more than 16 years of Research and Teaching experience. She has also initiated Advanced Research at SARP:LARPM, including Structural Composites/Nanocomposites, Polymeric Coatings, E-waste Recycling, Biopolymers from Natural Resources etc. She has published 200 papers in major International Journals and has 06 Indian Patents to her credit.

सत्यमेव जयते

INNOVATION IN GREEN POLYMERIC MATERIALS & PRODUCTS

"GREEN NONTOXIC CALCIUM ZINC HEAT STABILIZER AS A REPLACEMENT FOR TOXIC LEAD BASED STABILISER FOR POLYVINYL CHLORIDE (PVC) AND ECO-FRIENDLY PREPARATION METHOD THEREOF"

Shri Rajendra Prasad Bajpai, Mr. Vivek Raj Bajpai and Dr. Smita Mohanty

1. Two main innovations involved in this **PATENTED** design, in contrast to practices world wide are -
   a. A green, single step manufacture of Calcium and Zinc soap combination
   b. Unique combination of fifteen different ingredients
2. Currently the non-toxic PVC stabilisers are based on Calcium Soap and Zinc Soap of fatty acids. During their process of manufacture, there remains some un-reacted fatty acid. The novel process uses innovative combination of instigators which ensure complete conversion of the fatty acids into soaps. Thus the end product has better purity and consequently better efficiency.
3. Also, since the two fatty acid soaps of calcium and Zinc are manufactured in a single green step, in contrast to the two step reaction, they give better synergistic effects in stabilization.
4. The unique combination of fifteen ingredients enables us to vary the design of the product to meet various end use requirements of PVC processors.
5. There is no phase separation despite there being fifteen ingredients of various specific gravities in the composition, leading to prolonged physical storage stability.
6. Since all the ingredients are coated with special ingredient, it ensures prolonged shelf life.
7. End products manufactured using this invention have longer retention of aesthetic appearance during their useable life since this invention delays deterioration of the end product.

RUNNERS-UP


Shri Siddhartha Doshi

M/s RAY COLORS, ANAND

Ray Colors, a young & fast growing masterbatch manufacturing organization based in Anand, Gujarat, has deep roots in the masterbatch & colorants field due to a long history of the parent engineering company. Rather than a masterbatch manufacturer, Ray Colors is known as an innovator, a solution provider, a problem solver. They prefer to work over and offer specialty products only. Ray Colors has selected their niche & focusing on masterbatches & technologies for Agriculture Plastics. They strongly believe that offering ethically correct products to Indian farmer is very important for their trust on technology and therefore to double farmer's income.

Shri Siddhartha Doshi is an entrepreneur graduated in Industrial Chemistry and Mastered in Family Business Administration.He has over 20 years' experience in manufacturing of laboratory equipment and plastic masterbatches. He has wide experience in sectors like polymer, paints, inks, dyes & pigments.He has worked extensively in active packaging, solar pontoons, conductive plastics &Anti Viral Fabrics.

He has a huge field experience in agriculture plastics & has contributed some excellent solutions like

- Photo selective colored nets and mulching films for higher yield in horticulture crops
- Insect repellency in organic farming
- Cooling effect (IR reflective) in greenhouse films
- Anti-dust and anti-fog property in greenhouse films
- Being one of the most critical factors in horticulture crops, he has successfully developed packaging to extend the post harvest transit life/ shelf life of fresh produce. This reduces the wastage substantially & increases the export/transit reach.
- He has also worked on food contact safe solution for Rodent (Rats) repellency in grain storage plastics.
- Pesticide resistant UV stabilization.

He has presented a paper on “Algae control on fishnets” in world's largest Aquaculture Conference happened in New Orleans, USA. He is going to speak in world masterbatch conference, Germany about opportunities to work with INDIA in May, 2021.

सत्यमेव जयते

POLYMERS IN AGRICULTURE AND WATER CONSERVATION

"ALGRONIX- THE ANTI-ALGAE MASTERBATCH FOR GREENHOUSE FILMS"

Shri Siddhartha Doshi

Algae deposition on Greenhouse films is so far an unattended & one of the most troubling issues in Greenhouse farming in India and other tropical and subtropical countries across the world. Algal deposition on greenhouse film restricts solar radiations to enter the greenhouse resulting into plant diseases, pest attacks & stunted growth of plants grown inside the greenhouse. The greenhouse yield drops substantially due to restricted solar radiation by algae growth.

It would be a revolutionary solution if we can increase the greenhouse yield by controlling the algae growth on the surface of the greenhouse films.In our country, when we are targeting farmer's income to be doubled soon, productivity in precision farming & farmer's confidence in new technologyis going to play a vital role.

ALGRONIX masterbatch is non-toxic to humans, yet very effective in inhibiting algal and fungal growth through damaging iron-sulphur clusters of proteins essential for algal metabolism. ALGRONIX is very effective Anti-algae masterbatch at very low dosage levels.

This innovation has great potential to increase the greenhouse productivity. It can change many viability formulas & beliefs about Greenhouses. This can increase the Greenhouse adoption in INDIAN farmers.

Algal resistance testing has been carried out as per ASTM G 29 test protocol in NABL accredited laboratory.

RUNNERS-UP


Dr. S. Sridhar


Dr. Nivedita Sahu


Shri Dileep Kumar Fothedar


Shri Badrachalam Nakuti


Smt. Bhoga Arundhathi

Dr. S. Sridhar is working as a Scientist for the past 25 years at CSIR-IICT, Hyderabad. He has transferred several novel membrane separation technologies to chemical and allied industries, besides contributing immensely to rural and urban welfare through several water purification projects, and design of multilayered face masks during Covid-19. He has published 154 research papers, 2 Books, 39 book chapters with 12 international patents granted. Dr. Sridhar has received 45 Prestigious Awards including CSIR Young Scientist and NASI-Scopus Young Scientist Awards.

Dr. Nivedita Sahu is a Principal Scientist at CSIR-IICT, Hyderabad working on Applied Phycology, Industrial Microbiology, Biotransformation, Fermentation, and Algae, besides drinking water purification and industrial effluent treatment through microbial fuel cell and membrane bioreactor. She has 1 Patent, 1 Book, 4 Book Chapters, and 11 prestigious awards like CSIR Technology Award, GYTI Award and several research papers to her credit. Dr. Nivedita has designed novel face masks to combat covid-19. She is nominated State President, Telangana for Water Resource Council, WICCI.

Shri Dileep Kumar Fothedar is a Senior Research Fellow at CSIR-IICT, who completed his M.Tech in Chemical Engineering from JNTU, Hyderabad. He has authored 1 paper, 1 book chapter and 1 Indian patent. He received three national awards for his contribution to societal welfare in Villages and Hospitals through provision of drinking water and medical grade water.

Shri Badhrachalam Narkuti is a Research Scholar at CSIR-IICT. who completed his M. Pharmacy from JNTU, Hyderabad. He has contributed to societal welfare through implementation of pilot water purification plants for school children in Andhra Pradesh. He is working on purification of semiconductor grade chemicals and solvent drying. He has authored 2 research publications and 10 conference papers.

Smt. Bhoga Arundhathi is a Junior Research Fellow at CSIR-IICT, who passed her M.Tech in Chemical Engineering from Osmania University. She is working on design and development of a low cost electrolyzer device for the production of alkaline ionized water and nanocomposite membranes for ultrafiltration of surface water.

POLYMERS IN MEDICAL AND PHARMACEUTICAL APPLICATIONS

"INDIGENOUS AND INEXPENSIVE POLYMER MEMBRANE-RESIN INTEGRATED DEVICE FOR PRODUCTION OF TYPE-I AND TYPE-II ULTRAPURE WATER FOR PHARMACEUTICAL, DISTILLERY, MEDICAL AND SEMICONDUCTOR APPLICATIONS."

Dr. S. Sridhar, Dr. Nivedita Sahu, Shri Dileep Kumar Fothedar, Shri Badrachalam Nakuti and Smt. Bhoga Arundhathi

An inexpensive Import Substitute device based on polymer membranes and resins for generation of ultrapure water of Type-I and Type-II grade purity has been developed by Dr. S. Sridhar and team members of Membrane Separations Group, PETT Division of CSIR-IICT, Hyderabad, for application in pharmaceutical, distillery, medical and semiconductor applications. The process configuration involves cascaded reverse osmosis (CRO) followed by Electro-deionization (EDI). In the CRO process, the key is the indigenously developed hydrophilized polyamide membrane that provides high-flux, high impurity rejection with low fouling tendency and longer lifespan. The EDI system is a voltage driven process involving ion exchange polymer membranes and mixed bed resins for removal of trace ions from the CRO product water. The cation and anion transfer membranes are based on sulfoned and aminated polystyrene polymer crosslinked with divinyl benzene. The resin beads are capable of exchanging monovalent ions such Na^+ with H^+ and Cl^- with OH^- ions, respectively to remove trace concentration of salts. From a raw municipal water total dissolved solids (TDS) of 300-400 ppm, the CRO unit provides a permeate water of quality < 5 ppm which is free of any silica or microbes. The permeate is then fed to the EDI system to achieve a final product TDS of < 1 ppm, which is highly suitable for the preparation of medical grade water for haemodialysis and saline solution in hospitals, water for microbial cultures in biotech industries and academic laboratories, water for batteries in automobiles, soil test kits and caustic soda plant. The cascaded CRO + EDI integrated system is designed for continuous operation to produce Type-II water of resistivity in the range 1.0 to 5.0 megaohms.cm and Type-I water in the range of 5.0 to 18.2 megaohms.cm with a high rejection of up to >99.9% of the soluble ionic load with total removal of endotoxins. The CRO + EDI process is more economical than conventional evaporation and distillation, as it does not involve any phase change. The CRO system of 25–50 L/h capacity costs only Rs. 25,000/-, while EDI unit of 50 L/h capacity costs only Rs. 2.0 lakhs, which comes to a total of just Rs. 2.25 Lakhs to obtain Type-II grade water. The flow rate is then reduced to 30 L/h to obtain Type-I grade water. The CRO operating cost is only 7 Paise/L, while EDI opex is 8 Paise/L adding up to a total of only 15 paise/L, with minimum maintenance. On the other hand MNCs charge Rs. 5.0–15 Lakhs for units of similar capacity along with a maintenance cost of Rs. 1 Lakh per annum.

RUNNERS-UP


Dr. Pradip Munshi


Dr. Raksh Vir Jasra


Dr. Santosh Agrawal

M/s RELIANCE INDUSTRIES LIMITED, VADODARA

RIL is India's largest private sector company, with a consolidated turnover of 659,205 crore ($87.1 billion), cash profit of 71,446 crore ($9.4 billion), and net profit of 39,880 crore ($5.3 billion) for the year ended March 31, 2020. RIL's activities span hydrocarbon exploration and production, petroleum refining and marketing, petrochemicals, retail and digital services. RIL is the top-most ranked company from India to feature in Fortune's Global 500 list of 'World's Largest Companies' – currently ranking 96th. The company stands 71st in the 'Forbes Global 2000' rankings for 2019 – top-most among Indian companies.

Dr. Pradip Munshi is currently the group leader and heading organic division in Reliance Industries Limited. He obtained PhD from IIT Bombay in 2000. His area of expertise are Organic chemistry process development and research area includes Organic synthesis, Photochemistry, Green chemistry, Chlorination,CO_2 mediated reactions and utilization of industrial wastes. Other credentials are 44 publications, 1 Book chapter, 29 granted patents and 4 technology development.

Dr. Raksh Vir Jasra presently Senior Vice President (R&D) at Reliance Industries Limited is world renowned scientist who has developed 54 chemical processes- 20 commercialized. He has published more than 300 research articles, 200 Granted Patents (64 US, 94 Indian) and 1000 technical reports related to Petrochemicals industry. He is fellow of Indian Science Academy, Indian National Academy of Engineering, Gujarat Science Academy and Indian Chemical Society. Dr. Jasra is listed in top 2% Scientist in World in the field of physical chemistry (Stanford University, USA research).

Dr. Santosh Agrawal is currently the Senior Manager in RIL (R&D). He obtained PhD from CSMCRI, Bhavnagar. He is skillful in applying advanced organic synthetic techniques into industrial chemical processes. He credited 40 publications, 1 book chapter and 4 granted patents.

INNOVATION IN PETROCHEMICALS AND NEWER POLYMERS APPLICATIONS

"DEVELOPMENT OF CHLORINATED POLYVINYLCHLORIDE (CPVC) WITH SUPERIOR MECHANICAL AND THERMAL PROPERTIES PRODUCED BY VISIBLE BLUE LED LIGHT MEDIATED PHOTOCHLORINATION IN WATER"

Dr. Pradip Munshi, Dr. Raksh Vir Jasra and Dr. Santosh Agrawal

Reliance Industries Limited (RIL) has developed innovative green process for chlorinated polyvinylchloride (CPVC) production process employing visible light LED mediated photo chlorination of PVC. Globally, CPVC is largely produced by post chlorination of PVC using hazardous ultraviolet assisted photochlorination. RIL's visible light LEDs mediated photo chlorination of PVC employed for the first time in the world is safer and results into CPVC with superior properties. CPVC is a thermoplastic material used in hot water plumbing, fire sprinkler replacing metals pipes and fittings. India's present CPVC demand of 130KTA is met by import as only ~10 KTA is currently produced locally. Development of RIL's CPVC technology, therefore, is a significant step towards "**Atmanirbhar Bharat**".

RUNNERS-UP


Dr. Akansha Dixit

DEFENCE MATERIALS AND STORES RESEARCH AND DEVELOPMENT ESTABLISHMENT (DMSRDE), DRDO, KANPUR

Dr. Akansha Dixit obtained her M. Sc. Degree in Chemistry from C.S.J.M.U., Kanpur. Subsequently, she joined Dr. Bag's Group with DRDO JRF/SRF Research Fellowship at Defence Materials and Stores Research and Development Establishment (DMSRDE), Kanpur in 2014 and worked in the field of Smart and Self-healing Polymers and Hydrogels. She has obtained her Ph. D degree from Bundelkhand University, Jhansi and also obtained SERB-National Post Doctoral Fellowship (N-PDF), Govt. of India in 2021. She has published 9 Research Papers in reputed National and International Journals. Moreover, one Patent and one book Chapter are in her credit. She has also presented her research work in various conferences and obtained five best paper/ presentation awards.

RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY

(for research students of academic institute / research lab)

"DEVELOPMENT OF SELF-HEALING ACRYLATES AND HYDROGELS FOR SMART APPLICATIONS"

Dr. Akansha Dixit

Self-healing polymeric materials are developed in this innovation. Such an acrylate material is a copolymer of (alkyl)acrylate and an anionic co-monomer and having monovalent or divalent metal cations. Such self-healing ionomer (10-25 mole% ionic groups) has average MW of the order of 10^5, high glass transition (145°C) and thermal stability (200°C). It exhibited a self-healing property of more than 92%. The synthesis procedure of this material has been optimized in 5 lit batch sizes (1 Kg product).

A self-healable, highly swellable, and stretchable pH-responsive ionic double network (DN) hydrogel reported in this innovation is consisting of PVA-borax (1st network) and crosslinkedP(AM-co-Na-AA) (2nd network). Such a hydrogel exhibited high equilibrium degree of swelling [6494 % (at pH=8.5)], tensile strength (1670 kPa), stretchability(72 times the stretchable cycle of triple length) and self-healing efficiency (69%). The presence of borax in-built into hydrogel resulted in anti-infectious material, and incorporation of silver nanoparticles imparted antimicrobial properties.

The significance of this innovation is to impart self-healing property into polymeric materials resulting longer life-cycle and providing safety on their applications. Such materials are synthesized by simply free radical polymerization process. The developed self-healing acrylate is a new material in the acrylate family which may prevent catastrophic failure for its application in aircraft canopy and wind shield. Self-healing hydrogel is a unique soft material which is having combination of many properties and smart functions. It may find potential smart pH-sensors, actuators, and biomedical applications.

RUNNERS-UP


Grow With PLASTICS!

10th National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry

by

Prof. (Dr.) S. K. Nayak
Director General - CIPET &
Chairman - 10th National Awards Committee

The growth of the Petrochemical sector will accelerate the growth of the manufacturing industries including agriculture, pharmaceuticals, packaging, automotive, aerospace etc. The petrochemicals also facilitate the day to day needs of the society through its upstream, midstream and downstream industries, ranging from refining, natural gas processing to chemicals, polymers & their intermediates. As India is one of the fastest growing economy in the globe and having highest young population in middle class, the opportunity for the growth of the consumer industries, automotive and all other related sectors is positive. Polymers have been a material of huge interest in all these sectors because of their versatility, sustainability and easy procesibility. Their presence has become imperative in household as well as industrial sectors in applications ranging from packaging & transportation, building & construction, healthcare & biomedical, to defence & aerospace. Scientists and researchers have been constantly attempting to indigenize technologies and upgrade the existing ones through novel ideas. This has led to an increase in start-ups and entrepreneurs yearning to develop indigenous know-hows.

Single Use Plastics, which has been a global concern in the current scenario, shall be addressed by the scientific fraternity with various alternative solutions and test protocols for managing plastics waste in a systematic and effective manner.

The national policy on petrochemicals was envisaged with an objective of institutionalization of National Awards for Technology Innovation in various fields of Petrochemicals and Downstream Plastic Processing Industry. The Policy caters to (i) Development of value added, quality petrochemical products at globally competitive prices using eco-friendly processes and technologies and (ii) Innovation of newer application and products with focus on sustainable development achieved through promotion of Research & Development and Human Resource Planning & Development.

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, the scheme on “National Awards for Technology Innovation in Petrochemicals & Downstream Plastics Processing Industry” was successfully implemented by CIPET for last 10 years. There has been an enthusiastic participation of awardees, stakeholders/petrochemical industries and associations.

The 10th National Awards has been designed for the following categories:

01. **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.

02. **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.

03. **Innovation in Polymer Processing Machinery, Equipments, 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.

04. **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.

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

06. 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.

07. 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.

08. 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.

09. Innovation in Petrochemicals and Newer Polymers 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.

IMPLEMENTATION FRAMEWORK & OPERATIONAL MODALITIES:

273 applications were received under the aforementioned twelve 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, 04 nominations were selected as Winners and 09 nominations were selected as Runners-Up. The 10th National Award Function has been scheduled to be organized on February 23, 2021 at New Delhi to encourage and promote technology innovation in Petrochemicals sector. Shri D. V. Sadananda Gowda, Hon'ble Minister for Chemicals & Fertilizers, Government of India shall be presenting the National Awards to the awardees in the presence of Shri Mansukh Mandaviya, Hon'ble Minister of State for Ports, Shipping and Waterways (Independent Charge),Chemicals & Fertilizers Government of India.

सत्यमेव जयते

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY (CIPET)
(Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Government of India)
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CIPET; A five decade old Institution earmarked its beginning in 1968 as "Central Institute of Plastics Engineering & Tools" established by Govt. of India with the assistance of UNDP at Chennai. The primary objective of the Institute was to develop manpower in the discipline of Plastics Mould making & Tooling, since no similar Institute was in existence during the same period. Today, the Institute has poised its position creating several milestones in a long and arduous journey of last several years. CIPET now functions at 42 locations as an Autonomous Higher Academic Institute in broad area of inter-disciplinary Petrochemicals under the Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India with diversified range of activities focusing on **Skill, Technology Support, Academics and Research (STAR).** Further, with the expansion of the activities of the Institute, CIPET has been currently renamed as **"Central Institute of Petrochemicals Engineering & Technology"** with a broadened horizon of the activities establishing its foothold in the neighbouring countries, The Institute strategically plans to expand its wings covering all dimensions of Petrochemical base in the areas of Catalyst systems, Energy Storage & Harvesting, Lubricants, Nanotechnology, thus rendering services to Upstream, Midstream & Downstream Petrochemical Sector.

The Institute stands tall in establishing its foothold in providing multi-disciplinary activities in the following areas:

Academics & Blended Skilling:

The yesteryears of the Institute primarily focused on Master Programmes with concerted emphasis on Plastics & Mould Engineering. This resulted in shortfall in providing manpower to the Industry with not covering all the aspects. However in the recent years, with the emerging impact in interdisciplinary fields for catering to Industry requirements; the Institute has diversified its Academic Progammes embracing new technologies, fostering innovation and upskilling. ***Today, CIPET retains its own significance for housing the complete ten levels of Academics & Blended Skilling in accordance with 'The National Skill Qualification Framework (NSQF)', which under one roof represents a different level of complexity, knowledge and autonomy required to demonstrate the competence commensurate for that level***. Currently, the Institute provides UG, PG, M.Sc Tech, M. Tech & Ph.D Programme in the exclusive areas of Polymer / Plastics & Manufacturing Technology / Engineering, Material Science & Engineering, Polymer Nanotechnology, CAD/CAM Technology etc as per NSQF level 5 to 10. Additionally, in accordance with the Industries requirements NSQF level 1-4, the Institute also provides varsity of Diploma, Post-Diploma, Blended Skilling and Vocational Training Programmes in accordance with current Govt. **'Skill India Mission'** drive.

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CIPET also creates encouraging environment for the under privileged sections – Youths from Tribal and Naxalite areas; Women Empowerment thus generating employability. Thus the Institute demonstrates its excellence in creating **'Industry Ready Workforce'** ranging from Operator to Supervisory level of employees. ***During the last 5 years, 3,00, 000 Nos. of students are being trained by the Institute through various Academic & Skilling Programmes with the advanced state-of-art infrastructure and facility. The Institute has achieved notable success in generating employability of the graduating students in Private & Public sectors as well as propelling Higher Education in case of meritorious candidates.***

Technical Support Services:

The Institute provides Technical Support Services in different tiers establishing its customers base across the globe. The state-of-art infrastructure and expertise of the Institute are being extensively utilized by the leading Industries, MSMEs, for indigenisation activities in the sectors of - Aerospace, Automotive, Packaging, Agriculture, Electrical & Electronics, etc. With the current Government drive on **"START-UP, STAND-UP and MAKE-in-INDIA"**, CIPET has been assisting its indigenisation of various activities encouraging and hand-holding the young budding entrepreneurs in building a successful commercial venture. Also, the Institute has been rendering its on-spot Technical Consultancy and extension services to the Industries & MSMEs ***thereby signifying its capability as a 'Atmanirbharsheel CIPET' while making it Self-reliant as well.*** Nonetheless, the credibility of CIPET also provides fruitful outcome to the customers from Research Design and Standards Organisation (RDSO) - Indian Railways, Defence Production Units, Ordinance Factory Board, Thermal Power Plants, Aluminium & Cement Industries of the country. It is also worth pointing out that the Institute retains all its credentials in traceability and accuracy of its services in Testing & Calibration accredited by **National Accreditation Board for Testing and Calibration Laboratories (NABL).** Also, CIPET's expertise for Consultancy Services and as a 3rd Party Inspection Agency for Plastics Products are recognised by various Central and State Govt. Organisations for Pre & Post-Delivery Inspection of Plastics and allied Products majorly supporting the MSMEs. ***During the last 5 years, the Institute has undertaken 4,00,000 Nos. of Technology Support Assignments thereby supporting the Industries & this has majorly contributed towards self sustainability of the Institute. Additionally, the Institute aims to build-up its capability in providing service to the MSMEs/PSUs/MNCs for fetching alternatives to avoid dependence on other nations and targets 5,00,000 Nos. of Technology support Technology Support Assignments during the next 5 years.***

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Fostering applied Research and Developmental activity:

The Institute thrives for its sustainability and development fostering on knowledge driven growth based on innovation. The R&D wings of CIPET focus on inter-disciplinary areas of Science, Engineering and Technology in various applied areas such as Biopolymers, Recycling and Waste Management, Composites and Nanocomposites, Carbon fibre reinforced Composites, Fuel Cells, Solar Cells, Specialized Membranes Coatings & Adhesives, Super Capacitors, Nano generators etc. The quest for knowledge has translated the Institute in successfully completing several sponsored R&D projects and consultancy assignments in key domains Polymer Science, Engineering & Technology. ***More than 350 Research Projects have been completed by the R&D wings since last 5 years*** The Institute has also entered into MoUs with World renowned International Star-rated Universities and Research Institutions for Collaborative Research and Student Exchange programmes. ***The high standard Research of the R&D wings of CIPET has gained global acclamation through its 500 + scientific Peer Reviewed Research Publications in International Journals, many Text Books, Patents and Technology Transfers to the Industry.*** Also, in the recent years, the Institute has witnessed increased enrolment of students in Higher Education – Masters and Doctoral Programmes, thus evolving as a knowledge reservoir in International arena. ***The multi-faceted one-stop floor facility of the R&D wing has been assisting the Industries, MSMEs, Defence PSUs across the country in resolving multitude of engineering problems and innovating new materials / products, thus making it a*** **Self sustainable** ***model***

Atmanirbharsheel CIPET: Propagating 'Vocal for Local'

During the current COVID 19 pandemic with subsequent lockdown and unlock phases, the Institute has been broadly focusing on Indigenisation of technologies and high-end Research in niche areas of Healthcare, Defence, and Agricultural for developing import substitute products while contributing towards **Atmanirbhar Bharat – Make India a self reliant nation.**

Additionally, high volume of synthetic polymers, plastics products which are being currently imported from neighbouring countries are being strategized for establishing cost effective development activities by the R&D wings in collaboration with the Industries.

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CIPET has also been assisting in production and Testing of PPE Kits, Masks, Gloves, Face Shields, Sanitizers, and other Personal Protection Equipments for frontline Healthcare workers in accordance with NABL norms and criteria. Nevertheless, the R&D labs have also been engaged in various developmental activities which are including but not limited to; Anti Viral / Anti Bacterial Masks, Additive Manufacturing of Pharma / Healthcare Products – Prosthetics, Dentures, Cardio Vascular Patch, Ventilator Splitter etc.

Also, integrated online platforms for providing knowledge based programmes / workshops, webinars, are also been organised by the Institute to assist the START-UPS/STAND-UPS and Industries during the current situation with step by step solution while propagating the recent development in Petrochemical Sectors.

Ambitious Targets of the Institute:

Multi-tiered technical support: The Institute commits to provide the best possible service in the most efficient possible manner understanding of their level of responsibility and catering to customer response time commitments.

Mentorship to the START-Ups/ STAND-Up: The Institute through its Incubation centres shall mentor MSMEs and Young entrepreneurs/Students for nurturing environment for commercialization.

Prioritize Indigenised services: CIPET shall be assisting the DPSUs & Industries in development of Indigenised products reducing dependency on foreign economy. Priority shall be laid in providing Industrial eco-system resolving challenges in indigenisation and emphasizing MSME in the areas of Health care & Agricultural sector.

Expanding the Alumni Network: With strong **Alumni** base of over 100,000 Professionals, CIPET has emerged as an Apex plastics technology institution, not only in India but a unique institution of its kind in Asia. CIPET's Alumni network spreads across South-East, Middle-East countries, Africa, Europe, Australia, North America, etc. (Singapore, Malaysia, Thailand, Korea, UAE, Oman, Saudi Arabia, Nigeria, Kenya, USA, CANADA, Germany, etc.) The Institute shall focus on creating multitude of Alumni network across the globe to render services and popularize its credentials.

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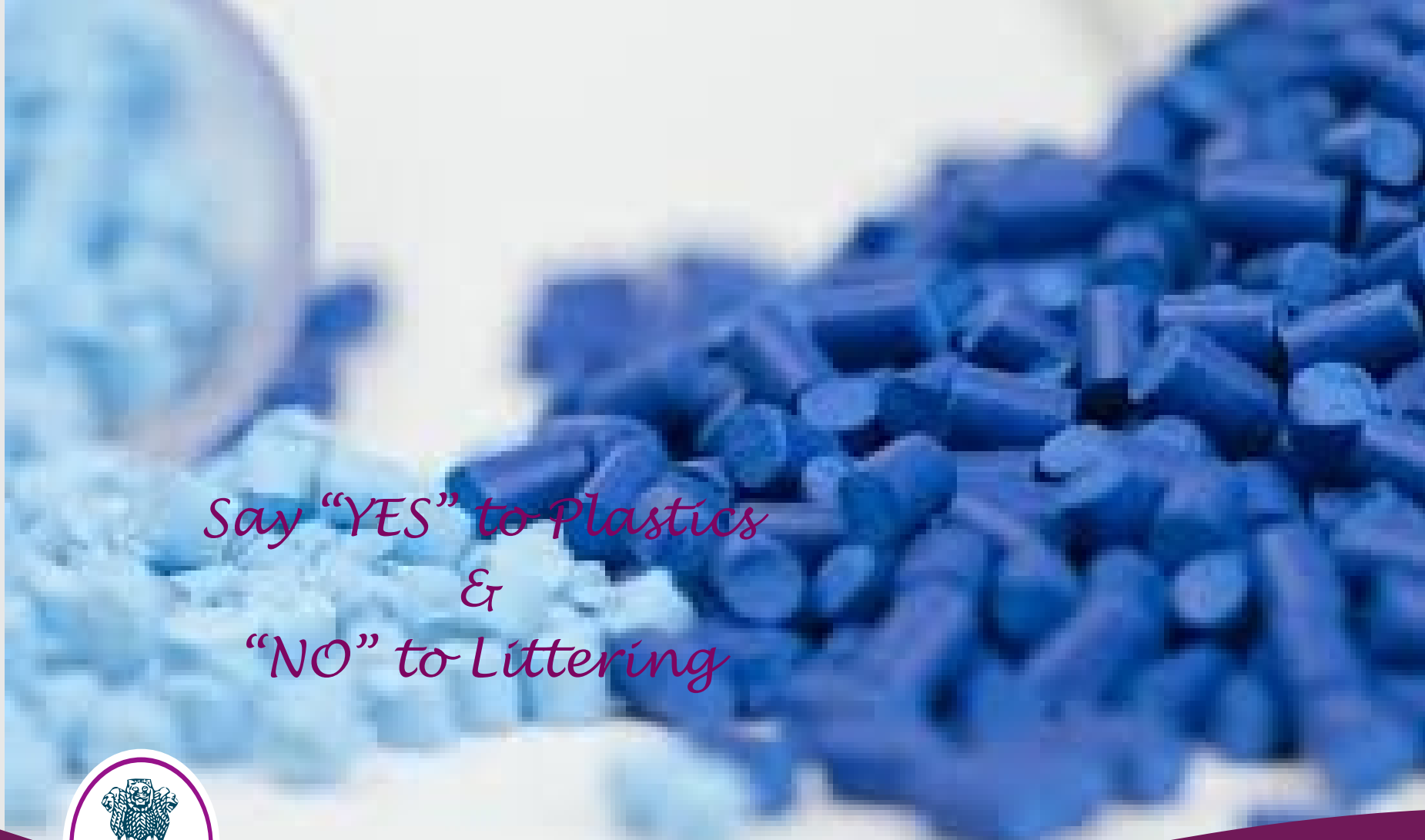
Global foot prints & Internationalization: CIPET had signed Memorandum of Understandings (MoUs) for joint collaboration in faculty & staff exchange, student exchange, collaborative research projects, exchange of academic materials, develop certification programs, technological support services, formulation of standards and specifications etc., with 19 world renowned Universities / Organizations at USA, Canada, Australia, Germany, Russia, South Korea, China, Brazil, Argentina, France, Poland, Mexico, South Africa, Durban etc. CIPET's International recognition shall be expanded to the entire gamut of Petrochemical sector for improved Industry-Academia Interface.

Digitized Platform: The Institute shall focus on Digitized Platform Strategy dedicated to creating online learning for the Academic & Technical venture — the rise of the platform as a business and organizational model.

Marching towards New Education Policy (NEP)-2020: CIPET commits itself to upgrade in line with the NEP with a paradigm shift to a Higher Education Institute with multidisciplinary Academic Programmes while keeping abreast with latest knowledge & skills. The Institute also aims to foster products, and technologies through innovative ideas and research to create itself as a self-reliant role model for the HEIs globally.



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