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

7th NATIONAL AWARDS

for

TECHNOLOGY INNOVATION

in

Petrochemicals & Downstream Plastics Processing Industry

2016-17

Wednesday, March 01, 2017

New Delhi

Shri AnanthKumar
Hon'ble Minister of Chemicals & Fertilizers
and Parliamentary Affairs
Government of India

I am happy to learn that the Department of Chemicals and Petrochemicals, in association with Central Institute of Plastics Engineering & Technology (CIPET), is organizing the Presentation of "7th National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry" on 1st March 2017 in New Delhi.

The Petrochemicals sector is a key sector of the global and Indian economy, and Petrochemicals & Downstream Plastics Processing Industries in India have been playing a predominant role in shaping growth of our economy.

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. These awards seek to encourage the petrochemical and downstream plastic industries to strive for innovation, excellence and improvement of services delivered so that they can position their products well in the global market.

I congratulate the award winners on their success and look forward to a higher level of participation in the future editions of the National Awards for Technology Innovation in the field of petrochemicals and downstream plastics processing industries.

(ANANTHKUMAR)

Shri Mansukh Mandaviya
Hon'ble Minister of State for Chemicals & Fertilizers,
Road Transport & Highways, Shipping
Government of India

The Department of Chemicals & Petrochemicals has taken an initiative to facilitate the growth of the Plastics Industry by incentivizing innovation and promotion of R&D in the field of Polymers through the National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industries.

I am happy to note that the National Awards scheme, launched by our Department is successfully completing seven consecutive editions and the distribution of National Awards to the awardees for the seventh edition has been scheduled on 1st March, 2017 in New Delhi.

The contribution towards the development of newer technologies in the field of Polymers is to be encouraged and I hope that the National Awards scheme would inspire and motivate young innovators, scientists and professionals to endeavour to excel continuously in this ever-growing field.

I congratulate all the awardees and wish them all the best in their pursuit of excellence. I hope that their innovative spirit, enthusiasm and dedication will inspire others to work towards constant innovation.

(MANSUKH MANDAVIYA)

Shri Anuj Kumar Bishnoi, I.A.S
Secretary to the Govt. of India
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers
Shastri Bhavan
New Delhi – 110 001

The Department of Chemicals and Petrochemicals has instituted the National Awards for Technology Innovation for rewarding outstanding professionals in the field of Petrochemicals and downstream plastics processing industries and to open new avenues for further Research and Development.

The Scheme is being successfully implemented, through CIPET since its launch in 2010-11. In these seven years since their introduction, the Awards have achieved a very high stature among professionals and researchers from the industry and R & D Institutions. A total of 85 'Winners' and 52 'Runners up' have been awarded till date.

To improve competitiveness in manufacturing, Research and Development have a very important role to play. R&D enables organizations to achieve faster growth and to generate more wealth over a period of time.

The Seventh National Awards for Technology Innovation 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.

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(ANUJ KUMAR BISHNOI)

Ms. Ranjana Kale
Economic Adviser
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers
Shastri Bhavan
New Delhi – 110 001

I am delighted to know that the Department, in association with Central Institute of Plastics Engineering & Technology (CIPET), is holding the Presentation of "7th National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry" on 1st March 2017, in New Delhi.

The National Awards for Technology Innovation have been designed with a view to encouraging the stakeholders of this industry to constantly innovate and move with times to meet the fast changing requirements of Petrochemicals Industry. The National Awards for Technology Innovation provide an opportunity to appreciate the innovation and innovators' contribution to techno-economic development of the country.

I believe that innovations, using green technologies, are the way forward for sustainable growth and realization of the true potential of the industry where development will also take into account environmental concerns. Innovative Research & Development in the areas of Petrochemicals will improve the efficiency and productivity of the existing technology.

I congratulate all the awardees of the 7th National Awards for Technology Innovation in Petrochemical & Downstream Plastics Processing Industry for their achievement.

Ranjana Kale
15/2/17

(RANJANA KALE)

Awardees

Prof. (Dr.) Balasubramanian K

Prof. (Dr.) Balasubramanian K is the Senior Scientist, Dean, Professor & Head of Materials Engineering, Defence Institute of Advance Technology (DU), Ministry of Defence, Government of India, Pune since 2010. Prior to the Professorship, he had worked as Research Manager (Materials Technology) with UK Materials Research Institute (UK Matri), Pera Innovation Park, Melton Mowbray, UK for a period of 12 years. He was actively involved as an Academician and Visiting Research Fellow at the Department of Materials Engineering, Loughborough University (UK) and Birmingham University (UK).

He is having rich experience in evaluation of DTI (UK), TSB (UK), FP6 and FP 7 European research programs, DST, Brussels, Belgium. He has guided 05 PhD Students (08 students on going) and more than 60 M Tech's in the last five years at DIAT (DU). He has authored more than 250 International research papers, 08 book chapters, 14 patents and about 10 technology transfers. As a Professor of Materials Engineering he is supervising and guiding PhD & M Tech student officers of Army, Air Force, Navy, Defence Research Establishments and other PSUs. His areas of expertise are Polymer Nano composites for Automobiles, Aero space and Defence, Ablative NanoComposites, Super Hydrophobic and Bio Mimic Coatings, Energy Harvesting and Intelligent Textiles, Carbon and Graphene Technology, Camouflage technology, Stealth Technology and Radar Absorbing composites.

"CARBON BASED NANOSTRUCTURED ENVIRONMENTALLY BENIGN HYDROPHOBIC COMPOSITE SURFACE"

Prof. (Dr.) Balasubramanian K

The theme presents a novel platform for synthesis of carbon nano particles derived from controlled combustion of camphor and candle in a single step flame process (designed in a perforated and engineered reaction chamber). The resultant soot particles exhibited spherical carbon nano structure of uniform shape exhibiting superhydrophobic functionality and antifouling properties. This Patented invention incorporated the cost effective carbon additive in different types of polymeric materials for fabrication of excellent water repellent and self cleaning substrates. The coating proved to have an excellent bio fouling and anticorrosive properties. The unique selling point in this patented innovation is the process of manufacturing the carbon nanoadditive and incorporation of this eco friendly non halogenated additives in various polymers to enhance the superhydrophobic properties. Importantly, this superhydrophobic coating process can be applied to any substrate regardless of any geometry. Any standard methods can be used for coating of these composition, like spin-coating, dip-coating, spray coating, and also ink-jet printing. It was observed that the superhydrophobic property could be retained after exposure to harsh environment. The technologically significant feature of this coating is, its ability to be engineered in achieving any contact angle from 160 to 172 ^{0}, between the temperature (subzero to 300^{0}C). It was also observed that the coating had a self-cleaning characteristic which makes it suitable as an antimicrobial coating.

Prof. (Dr.) Balasubramanian K is the WINNER of 7th National Awards (2016-17) under the Individual Category of "INNOVATION IN POLYMERIC MATERIALS"


Dr. S Sridhar


Shri Siddhartha Moulik


Smt. Pavani Vadthya


Shri Shiva Prasad


Ms. M. Madhumala

Dr. S. Sridhar is a chemical engineer and working as a Scientist for the past eighteen years at CSIR-Indian Institute of Chemical Technology, Hyderabad where he heads the Membrane Separations Group. He has developed several novel separation technologies and system designs based on Nanofiltration, Electrodialysis, Reverse Osmosis and Gas Separation for many chemical industries.

Shri Siddhartha Moulik is a Scientist at CSIR- Indian Institute of Chemical Technology, Hyderabad. He pursued his B.Tech in Chemical Engineering from Heritage Institute of Technology, Kolkata and M.Tech from CSIR-Indian Institute Chemical Technology, Hyderabad. His field of specialization deals with solvent dehydration, industrial effluent treatment, drinking water purification and computational fluid dynamics.

Mrs. Pavani Vadthya is working as Scientist in Chemical Engineering Division, CSIR – Indian Institute of Chemical Technology (IICT), Hyderabad. She graduated from National Institute of Technology Warangal in Chemical Engineering and post graduated in Process Engineering Science from Academy of Scientific and Innovative Research, India.

Shri Shiva Prasad is working as a Junior Research Fellow in Membrane Separations Laboratory, Chemical Engineering Division at CSIR-IICT. He completed his graduation in chemical engineering from CVSR College of Engineering Affiliated to JNTU, Hyderabad.

Ms. M. Madhumala is working as a Research Associate in Membrane Separation Laboratory, Chemical Engineering Division at CSIR-IICT. She completed her B.Tech., MS and Ph.D. (submitted) in Chemical Engineering from University College of Technology, Osmania University, Hyderabad.

"HIGHLY COMPACT CASCADED POLYMER MEMBRANE SYSTEM AS A LOW COST REPLACEMENT FOR IMPORTED DM WATER PRODUCTION UNITS"

Dr. S. Sridhar, Shri Siddhartha Moulik, Smt. Pavani Vadthya, Shri Shiva Prasad & Miss M. Madhumala

Demineralized (DM) water production is an energy intensive process due to the phase change involved during conventional evaporation or distillation processes. DM water has wide and varied applications in several industries; its production by a cost effective method is highly desirable. The Membrane Group has designed a DM water production unit consist of compact cascaded membrane system where the feed raw water is initially pumped at a given pressure through a series of two high flux membrane modules based on a proprietary polymer material in Stage 1. The permeate obtained thus is again automatically introduced as feed to another series of membranes placed in parallel in Stage 2, to generate a final permeate of 0–2 ppm total dissolved solids (TDS) which is further treated by UV light. The process is much more economical and effective compared to highly expensive membrane units supplied by multinational companies including Millipore (MilliQ) or Sartorius.

Salient Features & Applications

- Cascaded compact RO system of 40 – 60 L/h capacity costs Rs 35000/- only as compared to Rs 5 - 10 Lakhs charged by multinational companies.
- Novel polyether urea RO membrane that provides high TDS rejection.
- Cost per Liter of DM water produced is 5 Paise only.
- The process can be scaled up to higher levels.
- Preparation of ultrapure water for saline and dialysis fluids in hospitals, microbial cultures in biotech industry, boiler feed in caustic soda and power plants, radiators and batteries of automobiles etc.
- Maintenance free compared to multinational companies that charge Rs 1 lakh per annum.
- Many systems have been successfully installed in IICT, JNTU and NIPER Laboratories.

Team - Dr. S. Sridhar, Shri Siddhartha Moulik, Smt. Pavani Vadthya, Shri Shiva Prasad & Miss M. Madhumala are the RUNNER - UP of 7th National Awards (2016-17) under the Category of "INNOVATION IN POLYMERIC MATERIALS"


Dr. Raksh Vir Jasra


Dr. Ajit B. Mathur


Dr. G.S. Srinivasa Rao

The Reliance Group, founded by Dhirubhai H. Ambani (1932-2002) is India largest private sector enterprise with business in the energy and materials value chain. The Flagship Company, Reliance industries Ltd, is a fortune global 500 company and enjoys global leadership. Starting with textiles in the late seventies, Reliance pursued a strategy of backward vertical integration - in polyester, fiber intermediates, plastics, petrochemicals, petroleum refining and oil and gas exploration and production - to be fully integrated along the materials and energy value chain. RIL has World's largest refining capacity at any single location at Jamnagar and is a major global player in polyester fiber and yarn, propylene, PVC, PE and synthetic elastomers.

Dr. Raksh Vir Jasra, FNAE, PhD from IIT, Delhi has research experience of 35 years in area of chemicals and petrochemicals. He has more than 280 research articles and 100 granted patents. Dr. Jasra, Fellow of Indian National Academy of Engineering is nationally and internally recognized scientist with 15 awards to his credit. He joined Reliance in 2008 as Head of R&D Centre, Vadodara which is focused on Petrochemicals research.

Dr. Ajit B. Mathur, PhD from HBTI, Kanpur is an expert in polymer processing and product development. He holds experience of 33 years working in this area.

Dr. G.S. Srinivasa Rao, PhD is an expert in polymer synthesis, reactive processing and polymer product development. He has been working in this area for the last 28 years.

Other Team Members:

Dr. Mahuya Bagui, Dr. Yogesh P. Patil, Dr. Devesh Shukla, Dr. Sateesh Bonda , Shri Viral Kumar Patel

INNOVATION IN POLYMERIC MATERIALS

"NOVEL POLYETHYLENE MATERIAL AND ITS HIGH THERMALLY CONDUCTIVE PRODUCT FOR ELECTRONIC APPLICATIONS"

Reliance Industries Limited, Mumbai

Present innovation deals with the development of high strength films with high axial thermally conductivity. The thermal conductivity of the developed film is 130W/mK, which is highest ever reported for polyethylene product and is higher than 50% of the known metals. Conventional polyethylene is thermally insulating with thermal conductivity value of ~ 0.1 W/mK. The light weight and electrical insulation properties are added features of these films which can make it acceptable for thermal management systems.

The novel polyethylene material, used for making film, has been developed in-house with unique molecular morphology such that while attaining high molecular chain orientation during processing, its crystallinity is retained.

The ease of processing makes such film a low cost alternative in applications like heat exchanger, heat management system in electronics like cell-phone, laptop, packaging for computer chips, functional packaging, solar hot-water collector etc.

Reliance Industries Limited, Mumbai is the WINNER of 7th National Awards (2016-17) under the Industry Category of "INNOVATION IN POLYMERIC MATERIALS"


Prof. V. S. Moholkar


Shri Sushobhan Pradhan


Shri Arup Jyoti Borah


Shri Pritam Kumar Dikshit


Shri Maneesh Kumar Poddar

Dr. V. S. Moholkar is a Professor of Chemical Engineering at Indian Institute of Technology (IIT) Guwahati. He received Ph.D. from University of Twente. His main research interests are cavitation assisted physical, chemical and biological processing and thermo- and biochemical routes to biofuels.

Shri Sushobhan Pradhan holds B.Tech (Chemical Engineering) from Indira Gandhi Institute of Technology, Sarang, Odisha and M.Tech (Chemical Engineering) from Indian Institute of Technology Guwahati in 2016. Currently, he is pursuing his Ph.D. at Oklahoma State University, Still water, Oklahoma, USA.

Shri Arup Jyoti Borah holds B.Sc. in Biotechnology (Bangalore University) and M.Sc. Applied Microbiology (VIT, Vellore). He also holds two PG Diplomas in Intellectual property rights (IPR) and Criminology and Forensic Science from Annamalai University. He is currently pursuing Ph.D. in Center for Energy at IIT Guwahati.

Shri Pritam Kumar Dikshit is currently pursuing PhD in Chemical Engineering at IIT Guwahati. He holds B.Tech. (Biotechology) from Biju Patnaik University of Technology, Odisha and M.Tech. (Biotechnology) from Karunya University, Coimbatore.

Shri Maneesh Kumar Poddar is a research scholar at I.I.T. Guwahati. He obtained his Bachelor degree in Chemical Engineering from Thapar University, Patiala. He joined IIT Guwahati for M.Tech in Chemical Engineering in July 2012, which was converted in PhD program in July 2013.

Polyhydroxyalkanoates (PHAs) produced using fermentation route are potential biodegradable substitutes for conventional plastics. PHB is synthesized by various micro–organisms intra cellularly as carbon and energy reserve material. In fermentation based processes, the cost of substrates makes major contribution to overall manufacturing cost of the product. *Parthenium hysterophorus* is one the most noxious invasive weed in India that has infested and destroyed thousands of acres of arable land. Exposure to *P. hysterophorus* also causes dermatitis and respiratory problems in humans and animals. However, high holocellulose content of *P. hysterophorus* makes it a suitable substrate for fermentation.

The preliminary attempt of experimental work in this project was to synthesize PHB from fermentation route using *P. hysterophorus* as substrate. The experimental protocol essentially comprised of acid pretreatment, delignification and enzymatic hydrolysis of *P. hysterophorus*, and fermentation of the resulting pentose and hexose rich hydrolyzates by microbial culture of *Cupriavidus necator*. The PHB was further extracted from the cells using a novel ultrasound assisted method. The dry cell mass contained 20 wt% PHB. The extracted and purified PHB was characterized by various techniques such as ^{1}H NMR, ^{13}C NMR, FTIR, DSC, XRD, and TGA. This PHB had higher thermal degradation temperature and higher glass transition temperature. This project has thus presented a potential process for highly economic production of PHB biopolymer through an extremely cheap substrate of *P. hysterophorus*. This process offers a simultaneous solution to two present day problems for environment, viz. effective utilization of invasive weeds and a simple route to production of biopolymer PHB with attractive economy.

Indian Institute of Technology, Guwahati is the WINNER of 7th National Awards (2016-17) under the Academic and R&D Institution Category of "INNOVATION IN POLYMERIC MATERIALS"


Dr. Swapan K. Dolui


Dr. Bhaskar Jyoti Saikia

Tezpur University was established by an Act of Parliament in 1994. The objects of this Central University as envisaged in the statutes are that it shall strive to offer employment oriented and interdisciplinary courses to meet the local and regional aspirations and the development needs of the state of Assam and also offer courses and promote research in areas which are of special and direct relevance to the region and in emerging areas in Science and Technology.

Dr. Swapan K. Dolui obtained his Ph.D from IIT Kharagpur in 1986. Currently he is Professor in the Department of Chemical Sciences, TezpurUniversity, India. He has guided 21 PhD students, authored more than 130 research papers and 6 book chapters, and inventor in 9 patents.

Dr. Bhaskar Jyoti Saikia obtained his Ph.D degree on "Synthesis of functional polymer through Atom Transfer Radical Polymerization, their fluorescent and self-healing characteristics" from Tezpur University, India in 2016. Currently he is Assistant Professor in the Department of Chemistry; N. N. Saikia College, Titabar, Assam, India. He authored 12 papers in international journals and one book chapter.

Inspired by the nature's most astonishing features of self-repairing, the development of self-healing polymeric materials has been a subject on the frontier of research over the last decade. In this innovation, we have designed an efficient self-healable polymeric system based on direct CuAAC via semi encapsulation approach which has the flexibility of choosing any matrix and simultaneously enjoy reinforcement by MWCNT. The main strategy for this semi capsulation method is that a matrix was prepared with implanted azide functionality with embedded copper catalyst ($CuBr(PPh_3)_3$) and urea formaldehyde(UF) microcapsules containing the compliment alkyne functionality. As soon as the damaging event occurs the liquid cross linker in presence of catalyst embedded in the matrix will initiate the crosslinking reaction between azide and alkyne and thus healing the cracks.

The unique features of the innovation are:

- A well-dispersed azide functionalized multiwall carbon nanotubes/urea formaldehyde-microcapsule/epoxy composites having self-healing ability was fabricated.
- The UF micro capsules containing the cross linker have good storage ability at room temperature and exhibit a good thermal stability below 150 °C, which can tolerate the moderate or high temperature processing of polymeric composites.
- The composite shows a high healing efficiency of 65%.
- This research provides a novel semiencapsulation based self-healing system which can be applied in any polymer matrix requiring

Tezpur Univeristy, Napaam, Assam is the RUNNER - UP of 7th National Awards (2016-17) under the Academic and R&D Institution Category of "INNOVATION IN POLYMERIC MATERIALS"


Dr. Debdatta Ratna


Shri Anil Sudhakar Patankar


Shri Rama Kant Kushwaha

Dr. Debdatta Ratna did his M.Tech in Materials Science & Engineering and Doctorate in Polymer Science from Indian Institute of Technology, Kharagpur. He was a visiting scientist to Monash University, Australia on BOYSCAST Fellowship in 2000, sponsored by DST, India. He was also a visiting scientist to Technical University, Kaiserslautern, Germany on a prestigious Alexander von Humboldt Fellowship from 2006 to 2008. Dr. Ratna has been working as a scientist in Naval Materials Research Laboratory (NMRL) Ambernath, for the last 21 years and developed several products for Indian Navy.

Shri Anil Sudhakar Patankar obtained B.Sc in Chemistry from Mumbai University. Presently he is working as Technical Officer in NMRL, Ambernath. He is working in the area of Radar absorbing materials, paint processing and its application and testing analysis. He has 03 papers in his credit.

Shri Rama Kant Kushwaha obtained M.Sc in Physics from Mumbai University. Presently he is working as Technical officer in NMRL, Ambernath. He has 06 papers and one Indian patent in his credit. He is working in the area of radar absorbing materials and polymer composite.

"DEVELOPMENT OF TOUGHENED AND NANOREINFORCED EPOXY BASED COATING AND FRP COMPOSITES FOR NAVAL APPLICATION"

Dr. Debdatta Ratna, Shri Anil Sudhakar Patankar & Shri Rama Kant Kushwaha

The innovation deals with modification of epoxy resin to develop technologies/products (coating and composites) for naval application. The necessity for this innovation was to develop technology for INDIAN NAVY. Though conventional epoxy resins are widely used in coating and composites for civil/ industrial applications, they cannot satisfy the naval specification in terms of water resistance and stringent impact performance. The strategies in combination used in the present innovation are chemical modification of epoxy resin, selection of hardener system (combination instead of single hardener) and use of organically modified clay (nanoclay). The modified epoxy formulations have been used to develop vibration damping mastic, radar absorbing paint and FRP composites. The developed products shows better performance compared their import substitutes. Using these technologies, the underwater noise and radar signature can be reduced significantly which is required to prevent the detection of our naval platforms. The invention is particularly important in the perspective of self reliance and make in India mission of our country. Though the technologies are developed for naval applications they will find applications in the civil area as well namely damage tolerant light weight structure and structural vibration damper.

Team - Dr. Debdatta Ratna, Shri Anil Sudhakar Patankar & Shri Rama Kant Kushwaha is the WINNER of 7th National Awards 2016-17 under the Category of"INNOVATION IN POLYMERIC PRODUCTS"


Shri G.Rajesh


Dr Manoj Kumar Patra


Shri P.S.Methia


Mr Mohit Mohan Patra

ADVANCED SYSTEMS LABORATORY, HYDERABAD
DEFENCE LABORATORY JODHPUR, JODHPUR
DEFENCE RESEARCH & DEVELOPMENT LABORATORY, HYDERABAD
BRAHMOS AEROSPACE, HYDERABAD

Shri G.Rajesh is working as Scientist E and Head Elastomers Division, Advanced Systems Laboratory (ASL). His main area of interest are Rubber Compounding, life prediction, Radar Absoring materials. He is guiding the team of scientists from various laboratories for developments of specialized rubber parts for aerospace vehicles. He has work experience of 13 years in the field of Rubber Technology and filed two Indian patents, published articles in 4 journals.

Dr. Manoj Kumar Patra is working as Scientist E in Defence Laboratory, Jodhpur. His main areas of interests are magnetic based radar absorbing materials, nanostructured materials for stealth applications in Defence. He has work experience of 16 years in the field of magnetic absorbing materials and published more than 45 research papers in International Journal including two review articles and filed four Indian patents.

Shri P.S.Methia is working as Scientist D in Defence Research & Development Laboratory (DRDL). His main areas of interests are sealing technology, propulsion systems and composite structures.

Mr. Mohit Mohan Patra completed M. Tech in Mechanical Engineering from IIT Bombay in Year 2009. He joined General Motors Technical center Bangalore and worked for 4.5 years before joining BrahMos Aerospace as system Engineer in the Year 2014. His main area of interest are Indigenous substitutes of rubber and composites in the various subsystems.

INNOVATION IN POLYMERIC PRODUCTS

"RUBBER COMPOSITES FOR MICROWAVE ISOLATION IN RADIO ALTIMETER INSTRUMENTS"

Advanced Systems Laboratory (ASL), Defence Laboratory Jodhpur (DLJ), Defence Research & Development Laboratory (DRDL) & BrahMos Aerospace

Radio Altimeter is an essential instrument used for accurate height measurements for cruise systems flying at low altitudes above sea level. A typical setup for a radio altimeter consists of a transmitter/receiver antenna and display unit. For correct operation, the receiving antenna should detect only the reflected signal from the surface and the signal coming directly from the transmitting antenna must be ignored. Both the transmitting and receiving antenna are generally kept widely to avoid cross talk; however, there are chances of interference between transmitting and receiving signal, which affects the accurate height measurement. Most interference of the signal arises due to leakage of side lobes from the transmitting antenna to the receiving antenna, which therefore mandates a use of suitable material to prevent such a leak. One way of preventing this is use of microwave abosrbing materials of desired frequency at the antenna periphery. Rubber materials due to its flexibility, light weight are right choice matrix for incorporating magnetic loss materials which forms the basis for the isolating mechanism. In order to achieve functional properties of microwave abosprtion in frequency range of 4-5 GHz Ethylene Propylene Diene Mehtylene Rubber (EPDM) was chosen as a matrix and Nickel Spinel Ferrite was the filler material along with other rubber compounding ingredients. The matrix was chosen considering that EPDM rubber can be incorporated with higher loading of filler and has better ageing properties. The Technological challenge of this rubber composite product is to enable the system to which it is mounted qualifies isolation characteristics, aerodynamic and thermal loads with optimum thickness of the product.

This innovation "Rubber composites for microwave isolation in radio altimeter instruments" deals with the development and successful use of Rubber composite as a isolator for radio altimeter systems in supersonic cruise missile . The product has undergone qualification and acceptance tests like aerodyanmic tests to confirm the structural integrity in temperature of 300 C with velocities of air flow 3-4 Mac for duration of 30 s. In addition the product has undergone all environment cycle tests of low temperature(-40 C) and high temperature (160 C) with thermal shock. The scope of product could be expanded to fabricate light weight absorbers for aircraft indus

Advanced Systems Laboratory (ASL), Defence Laboratory Jodhpur (DLJ), Defence Research & Development Laboratory (DRDL) & BrahMos Aerospace is the WINNER of 7th National Awards 2016-17 under the Academic and R&D Institution Category of"INNOVATION IN POLYMERIC PRODUCTS"


Dr. S. Sridhar


Dr. N.L. Gayatri


Shri Shiva Prasad


Miss. B. NagaSandhya


Miss Bukke Vani

CSIR-Indian Institute of Chemical Technology (IICT) based at Hyderabad is one of the leading Research & Development (R&D) laboratories in India that was established in 1944. IICT has been primarily engaged in solving challenging problems associated with several industries especially in the area of drugs & pharmaceuticals, agrochemicals, lipids, catalysis, polymers and functional materials, environmental, analytical, biological and engineering sciences, as well as societal welfare projects.

Dr. S. Sridhar is a chemical engineer working as a Scientist for the past 18 years at CSIR-Indian Institute of Chemical Technology, Hyderabad where he heads the Membrane Separations Group. He has developed several novel separation technologies and system designs based on Nanofiltration, Electrodialysis, Reverse Osmosis and Gas Separation for many chemical industries.

Dr. Lakshmi Gayatri Nimmagadda is working as a women scientist (WOS-B) in Membrane Separations Laboratory, Chemical Engineering Division at CSIR-IICT. She completed her Ph.D. in Organic chemistry from IICT, affiliated to Osmania University, Hyderabad.

Shri Shiva Prasad is working as a Junior Research Fellow in Membrane Separations Laboratory, Chemical Engineering Division at CSIR-IICT. He completed his graduation in chemical engineering from CVSR College of engineering affiliated to JNTU, Hyderabad.

Miss Bala Naga Sandhya is a dissertation student working under the guidance of Dr. S. Sridhar in Membrane Separations Laboratory, Chemical Engineering Division, CSIR-IICT. She completed her B.Tech in JNTU, Anantapuramu and M.Tech from Osmania University, Hyderabad.

Miss Bukke Vani is working as a Research Assistant under the guidance of Dr. S. Sridhar in Membrane Separations Laboratory, Chemical Engineering Division, CSIR-IICT. She completed her B.Tech & M.Tech in Sri Venkateswara Engineering College, SV University, Tirupathi.

INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS

"DESIGN OF A NOVEL INEXPENSIVE SPINNERET FOR PRODUCTION OF ULTRAFINE HOLLOW FIBERS FOR HEMODIALYSIS/WATER TREATMENT APPLICATIONS"

Dr. S. Sridhar, Dr. Lakshmi Gayatri Nimmagadda, Shri Shiva Prasad, Ms. Bala Naga Sandhya & Ms. Bukke Vani

Chronic kidney disease (CKD) is a worldwide health crisis. 10% of the population worldwide is affected by CKD and millions die each year because they do not have access to affordable treatment. The number of patients diagnosed with the disease continues to increase at a rate of 5-7% per year. These people require renal replacement therapy to sustain their lives. Renal replacement therapy remains unaffordable for the majority of the affected and causes severe financial hardship for those who do have access to it. Over 600 million people cannot afford renal replacement at all—resulting in the death of over 1 million people annually from untreated kidney failure. Motivated by this cause our team took up the research project to develop dialysis membrane modules which will serve the Indian population who cannot afford dialysis in hospitals. In this process we developed a novel and versatile spinneret for the preparation of ultra fine hollow fibers required for dialysis. We have been successful in achieving the dimensions of 200 to 250 micron outer diameter of the fibres. This spinneret is indigenously designed and fabricated at our institute at a low cost. The spinneret can also be used directly for surface water purification or its dimensions could be easily altered to prepare larger fibers for clarification and disinfection of drinking water and pretreatment of wastewater.

The objective of the present study is to develop a novel but inexpensive extruder (spinneret) which can be multiplied subsequently to meet the ever-rising demand for dialysis kits. Synthetic hollow fibers are spun by forcing a polymeric solution, under pressure, through a plurality of orifice formed in a spinneret from which the polymeric material issues in the form of continuous fibers which undergo phase inversion with an appropriate non-solvent. The spinneret design disclosed in the present invention is for making synthetic polymeric hollow fibers having different sizes which are used for Dialysis and water purification. The spinneret comprises a housing enclosing a reservoir for holding a polymeric solution. The said reservoir is designed in such a way which is connected to a Venturi shaped taper with varied sizes of diverging art. A passageway runs through the housing connects the exterior of the housing with the reservoir through which the polymeric solution can be introduced into the reservoir. A mounting means is located on an interior wall of the housing onto which a bore fluid pin can be mounted so as to extend into the reservoir. The bore fluid pin has a tapered end which extends into the venturi shaped diverging part/annular slit connected to the polymeric reservoir with through which the polymer solution in the reservoir can be extruded to the exterior of the housing. The size of the detachable bore fluid pin is 2mm longer than the annular slit/diverging part of the reservoir. This project has potential for high commercial value in terms of replacement of the expensive imported dialysis membrane modules. This project aims to serve the poor people of India suffering from kidney disease at a low affordable cost. We are looking to produce hemodialysis membrane modules at 50% of the cost at which present membranes are available in the Indian market.

Team – Dr. S. Sridhar, Dr. Lakshmi Gayatri Nimmagadda, Shri Shiva Prasad, Ms. Bala Naga Sandhya & Ms. Bukke Vani is the WINNER of 7th National Awards 2016-17 under the Category of "INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS"

Prof. (Dr.) Balasubramanian K

Prof. (Dr.) Balasubramanian K is the Senior Scientist, Dean, Professor & Head of Materials Engineering, Defence Institute of Advance Technology (DU), Ministry of Defence, Government of India, Pune since 2010. Prior to the Professorship, he had worked as Research Manager (Materials Technology) with UK Materials Research Institute (UK Matri), Pera Innovation Park, Melton Mowbray, UK for a period of 12 years. He was actively involved as an Academician and Visiting Research Fellow at the Department of Materials Engineering, Loughborough University (UK) and Birmingham University (UK).

He is having rich experience in evaluation of DTI (UK), TSB (UK), FP6 and FP 7 European research programs, DST, Brussels, Belgium. He has guided 05 PhD Students (08 students on going) and more than 60 M Tech's in the last five years at DIAT (DU). He has authored more than 250 International research papers, 08 book chapters, 14 patents and about 10 technology transfers. As a Professor of Materials Engineering he is supervising and guiding PhD & M Tech student officers of Army, Air Force, Navy, Defence Research Establishments and other PSUs. His areas of expertise are Polymer Nano composites for Automobiles, Aero space and Defence, Ablative Nano Composites, Super Hydrophobic and Bio Mimic Coatings, Energy Harvesting and Intelligent Textiles, Carbon and Graphene Technology, Camouflage Technology, Stealth Technology and Radar Absorbing composites.

"DESIGN OF EXTRUDER/COMPOUNDER FOR EXFOLIATION AND DEISPERSION OF NANOADDITIVES IN POLYMER MATRIX"

Prof. (Dr.) Balasubramanian K

Dispersion of nanoparticles in the matrix is necessary to fully utilize the nanoparticle properties to achieve optimal performance. In the absence of repulsive interactions, van der Waals forces of attraction between nanoparticles favours clustering and aggregation. Nanoparticles can be prevented from aggregating by using chemically treated nanoparticles with the polymer substrates. Traditionally, coupling agents or surfactant have been widely used to stabilize the nanparticles. The patented technology is on the development of stronger nanocomposites of thermoplastic and thermoset polymers with enhanced properties (mechanical and thermal). The developed system supported in increasing the dispersion of nanoadditives in any type of polymer nanocomposites. In the invention the screw includes a plurality of alternate threaded portions and unthreaded portions, and also a plurality of pairs of opposed ultrasonic probes. The threaded and unthreaded portions are preferably alternately positioned on the screw. In this embodiment a pair of opposed ultrasonic probes is positioned in close proximity with each of the unthreaded portions. The arrangement of threaded portions, unthreaded portions and opposed pairs of ultrasonic probes advantageously improve the mechanical properties of the output polymer composite matrix. The system of the present invention enables to achieve the objectives for increased polymer flow, reduced energy consumption, reduced wall thickness & reduced cycle times - resulting in reduced part costs of the nanocomposite.

Prof. (Dr.) Balasubramanian K is the RUNNER - UP of 7th National Awards 2016-17 under the Individual Category of "INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS"


Shri T. S. Rajan


Shri Susmit Patel

Windsor is a global plastic processing machinery manufacturer with its manufacturing facilities in India & Italy. It is one of the few companies engaged in manufacturing of Injection Moulding, Pipe Extrusion and Blown Film machineries, all under one roof. With cutting edge product designs and latest technologies in its portfolio, Windsor continues to serve and support the varied needs of plastics processing industry across 65 countries, by harnessing its vast experience spanning over five decades. A recent takeover of ITALTECH (Italy) and continued partnering with KUHNE GmbH (Germany), THE MACHINES (Switzerland) and PROTOOL (Switzerland), has enabled us to move rapidly against competition and build "Technological Excellence". As a responsible corporate player in the industry for over 50 years, Windsor has succeeded in its mission of creating "Happy Customers" across the globe.

Shri T.S. Rajan is the Executive Director & CEO of Windsor Machines Limited. He has completed his B.E. (Mech) from SVNIT, Surat and his MFM (Masters in Financial Management) from JBIMS, Mumbai. Having a rich industry experience of over 3.5 decades spanning across various functions and organizations, Mr. Rajan has been instrumental in lot of technology acquisitions and imbibing them into the Windsor domain. An astute leader who always believes in Leading from the Front.

Shri Susmit Patel is a graduate Mechanical Engineer with 13 years of experience in the field of machine design, product design, and tool design with expertise in CAD/CAM/CAE. With his core knowledge and experience of machine design, he has played a key role in design and optimization of two platen injection moulding machine technology.

Windsor has developed the Two Platen machine series to provide value added features and flexibility to the customers. The machine series has most advanced specifications in the world, which helps customer to use most optimum clamp and injection combination for their moulding requirements.

The innovations build in these machines are free, suspended and short tie bars which helps in smaller foot prints, tie bar regulation mechanism to hold the tie bars straight and ensure longer service life. Same casting is used for stationary and moving platen which enhances mould life by double. Special materials are used to remove lubrication demand. This helps in maintaining clean mould area. The machines are driven by efficient servo hydraulics to ensure lower energy demand for effective part produced.

Synchronized movement of nuts increases machine reliability. Larger moulds can be adopted due to longer mould supports. Use of linear guideways up-to 650 ton machines helps in maintaining smooth mould movements with less energy demand, faster machine operation is possible due to close loop clamp hydraulics and proportional valves, flexible moving platen to adjust the mould parallelism as per mould requirements, advanced control system for ease in machine operation and production control.

All these innovations are developed keeping in mind future requirements of customers to run moulding operations effectively and efficiently.

Windsor Machines Limited, Gujarat is the WINNER of 7th National Awards 2016-17 under the Industry Category of "INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS"

Shri. R. N. Doshi

Mr. Rajesh N. Doshi, Chairman and Managing Director co-founder of the Rajoo Group, is responsible for the overall operations of the Group. He comes with over 3decades of experience in plastic processing, machinery manufacturing and product developments. His astute identification of new technologies and the novel paradigm to 'control cost without compromise' are responsible for the sustained technology and business edge enjoyed by the group. Project execution remains a strong forte of Mr. R. N. Doshi.

At Rajoo the metamorphosis was quick. It all began in 1986 and the last 30 years have witnessed the transformation of a modest beginning in a relatively unknown town of Manavadar (Junagadh) in Gujarat to an expansive global footprint with offices in India and overseas with partners world-over. Well-known in global circles as a mature and respected organisation with a zeal for quality, price consciousness and latest in extrusion technology, Rajoo comes with the right blend of experience, expertise and excellence

The industry has always recognized Rajoo as an innovator, quality supplier and a forefront RUNNER - UP in empowering the processing industry with advanced technologies. This recognition was further reinforced when Rajoo with its technology partner Bausano SpA, Italy collaboration has given rise to India's first WPC (Wood Plastics Composite) Extrusion Machine. The construction, flooring and decking companies would significantly benefit as these machines come with a range of capacities (200 kg/hr to 1200 kg/hr) to manufacture profiles and boards that would use up to 80% of wood powder, a first ever in the industry.

As, our axiom has always been – Excellence in Extrusion" and we came up with the indigenously designed and developed with greenwood approach Wood Plastics Composite (WPC)Extrusion Machinery.

WPC - Environmental Impact

No trees are cut: wood comes from processing scraps.

Raw materials: renewable materials and polymers for the creation of the composite - 100% environmental friendly recyclable product.

The constant study of new machinery for the production of WPC is not a casual choice but allows for several advantages from the point of view of technical-application, durability, comfort, construction costs but also allows for the absence of maintenance when compared, in particular, to wooden structures. Wood plastic composite is a relatively new material that has many potential uses. The markets for WPC decking lumber, board and laminates have been expanding and new applications are being pursued. Door and window components, deck handrails and fencing are the major markets for the WPC industry. The flexibility of manufacturing methods and product performance attributes provide the potential for a variety of new markets.

Rajoo Engineers Limited, Gujarat is the RUNNER - UP of 7th National Awards 2016-17 under the Industry Category of "INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS"

Shri Digvijay Dhabriya

DHABRIYA POLYWOOD LIMITED,
JAIPUR

Dhabriya Polywood Limited, with the motto of 'save trees' has been creating and selling various kinds of high quality wood substitute products like uPVC Doors, windows, wall paneling, false ceilings etc. since 1992. We have now come up with this breakthrough marble substitute product in the brand name of Dstona.

Mr. Digvijay Dhabriya, the Chairman and Managing Director of Dhabriya Group of Companies. Pursued B.E. Mechanical Engineering and Post Graduate Diploma in Plastics Engineering from CIPET Chennai in the year 1989. Then in 1992, he started a manufacturing unit of PVC Profiles in the brand name of "polywood" for uPVC Doors, Windows, Wall Panelling, False Ceiling, Fencing etc.

He has indigenously designed and developed a wide range of products and Sections and also owns the credit to launch many products for the first time in India like

* Folding Doors, Designer Doors
* Garden Fencing
* WPC Products
* Work Station Sections in Aluminium
* PVC False Ceiling etc. Dhabriya Polywood Limited was the first company in Rajasthan to get listed at the BSE-SME Platform.

"USE OF MARBLE MINING WASTE FOR MANUFACTURING OF ENGINEERED MARBLE MOULDINGS AND SHEETS"

Shri Digvijay Dhabriya

Dstona is an innovative product which substitutes the uses of natural marble. It is an engineered marble manufactured first time in India by using the extrusion technology. The product majorly contains 60-70% marble mining waste, 20-30% of PVC Resin as a binder and 10-15% of other processing aids. Dstona is available as flat sheets of size 8 feet X 4 feet having 3.3mm thickness and as beautiful moldings of 10 different designs and in various marble textures!

Dstona is used for Building interior purpose. The applications of Dstona range from Decorative Lift Jambs, LCD walls, Tables, Wardrobes, and various kinds of designer wall cladding. Designs are custom and therefore Dstona gives a whole new dimension to interior decoration.

Dstona can be easily fixed by any semi-skilled carpenter as it comes in standard sizes and can be cut according to the required custom design and fixed onto the required surface to give a very pleasing and lavish appearance in very less time.

The specialty of this Dstona are the beautiful moldings that are available in both marble and wooden textures, therefore the known alternatives are marble and wood themselves. The advantages are:

1. Dstona is 100% recyclable whereas marble and wood are not.
2. Dstona is water proof, whereas wood isn't.
3. Dstona is fire retardant, whereas wood isn't.
4. Dstona is insect proof, whereas both marble and wood aren't.
5. Dstona cuts and pastes almost like wood and thus is very easy to install. It's a ready material which doesn't need any post processing or maintenance after fixing.
6. Dstona is much less brittle than marble and that makes it much more durable to bear impacts and thrusts during handling and transportation; which means much lower wastage.

Dstona is highly cost effective compared to both marble and wood. Especially when it comes to moldings, which are readily available as extruded profiles in Dstona, but in marble and wood they need to be worked very carefully with attention and detail leading to much increased costs.

Shri Digvijay Dhabriya is the RUNNER - UP of 7th National Awards 2016-17 under the Individual Category of "INNOVATION IN POLYMER WASTE MANAGEMENT & RECYCLING TECHNOLOGY AND GREEN POLYMERIC MATERIALS & PRODUCTS"

Shri P. Parthasarathy

E-PARISARAA PVT. LTD.
BENGALURU

Shri P. Parthasarathy is a B.Tech., from A.C. College of Technology, University of Madras -1977 and M.S. in Chemical Engineering from IIT in Chennai - 1981 and PhD in Earth Science and Resource Management, Department of Applied Geology, Kuvempu University, Karnataka - 2010. He has about 33 years experience in the field of precious metals coating, recovery and refining with about 14 years in recycling of Electronic Waste with a few papers and several presentations in these fields.

Presently, Founder and Managing Director of E-Parisaraa Pvt. Ltd., located at Dobaspet which is 50km from Bangalore, started during 2004 for Electronic Waste Management for first time in India with low cost, cleaner technologies and to implement 3R best practices. E-Parisaraa is engaged mainly in resource recovery of metals, plastics and glass in an environmental friendly way from E-waste. E-Parisaraa is certified ISO 9001:2008, ISO14001:2004, OHSAS 18001:2007 & R2 Certified Company. Also founder and CEO of Surface Chem Finishers, specialist in Electro Plating of Precious Metals since 1995, engaged in Recovery of Precious Metals from E-waste.

"RECYCLING OF ELECTRONIC WASTE PLASTICS"

E-Parisaraa Pvt. Ltd., Bengaluru

Electronic waste contains about 1/3rd by weight Plastics and Polymers such as ABS, HIPS, PP, PC, PE, PVC, PMMA, etc., and commonly known as Engineering Plastics. E-Parisaraa is a pioneer in E-waste Recycling, started in the year 2004, presently audited and approved for Environment Health & Safety by several reputed producers and corporate customers for recycling.

E-Parisaraa has been continuously innovating various solutions for different E-waste Plastics and Polymers streams. Characterization and study of various types of E-waste Plastics, Methods for identification and estimation of Flame Retardant (FR) Plastics, PVC from wires and cables, Mechanical recycling of Circuit Boards (CB) to separate metals from Plastics, Pyrolysis of CB Plastics to enable further metals recoveries. The process of Mechanical recycling by pelletizing and granulation using thermal reflow methods are being adopted locally by downstream vendors who are also audited continuously by E-Parisaraa team for compliances. E-Parisaraa also conducted Pyrolysis trials with Polystyrene (Thermocol) multi film laminates used in Food Packaging Industries. Process developed for resources recovery from Li-ion, Ni-Mh, Ni-Sodium Batteries. E-Parisaraa has been actively engaged with several reputed Scientific Research Organization such as C-MET, CIPET, NML etc.

E-Parisaraa has joined hands with C-MET, Hyderabad under the Department of Information and Technology, for a project titled "Environmentally Sound Methods for Recovery of Metals from Printed Circuit Boards" by which all the Precious Metals, Rare Metals, Noble Metals, and Energy Metals are recovered.

Many papers are published in well-known publications and presented in several National and International conferences. Few Indian patents are also filed.

E-Parisaraa Pvt. Ltd., Bengaluru is the WINNER of 7th National Awards 2016-17 under the Industry Category of "INNOVATION IN POLYMER WASTE MANAGEMENT & RECYCLING TECHNOLOGY AND GREEN POLYMERIC MATERIALS & PRODUCTS"


Dr. R. P. VijayaKumar


Shri Ganesh S.Bajad


Shri Ajay G. Gupta

Visvesvaraya National Institute of Technology (VNIT), Established first as Visvesvaraya Regional College of Engineering (VRCE) in 1960, it was recognized as an 'Institute of National Importance' by an Act of Parliament and thus came to have the name with which it is now known. Department of Chemical Engineering at VNIT was established in 2006.

Dr. R. P. VijayaKumar is working as Assistant Professor in the Department of Chemical Engineering at Visvesvaraya National Institute of Technology (VNIT), Nagpur. He obtained his Ph.D. in Chemical Engineering from IIT Bombay. His area of research includes Polymer Processing, Composites, Nanocomposites, Sustain ability and Environmental aspects of Polymers. He is co-author of 8 articles in international journals and co-inventor in two Indian patent applications.

Shri Ganesh S. Bajad is currently working as Assistant Professor in the Department of Chemical Engineering at University Institute of Chemical Technology, North Maharashtra University (NMU), Jalgaon. He has submitted his Ph.D thesis in Chemical Engineering from VNIT, Nagpur. He has about 5 years of industrial experience at Aarti drugs Ltd. and at Reliance Patal Ganga Complex.

Shri Ajay G. Gupta is currently working as Production Engineer at Indian Oil Corporation Ltd. (IOCL) Barauni Refinery, Bihar. He has completed his B.Tech from Visvesvaraya National Institute of Technology (VNIT), Nagpur and co-inventor in one Indian patent application.

"PRODUCTION OF LIQUID HYDROCARBONS, CARBON NANOTUBES AND HYDROGEN RICH GASES FROM WASTE PLASTIC IN A MULTI-CORE REACTOR"

Visvesvaraya National Institute of Technology, Nagpur

The study on effective utilization of plastic wastes by mechanical recycling or by means of pyrolysis/gasification has been reported in the literature. Studies on production of high–valued products such as carbon–based nano materials from plastic waste have been carried out by different groups. However, challenges remains with purity, morphology and capital costs for the large–scale production of CNTs using waste plastic as precursor.

This innovation is based on intensification of conventional multiple reactor system into single compact reactor design. In this multi-core reactor, the thermal energy from central core was utilized for the pyrolysis of waste plastic and synthesis of CNTs. Pyrolysis of waste plastic was carried out in the outer chamber of reactor followed by catalytic decomposition of pyrolysis gases in the inner chamber. Inner chamber containing multiple tray arrangement works as a vertical chemical vapour deposition reactor.

It is advantages to have a vertical reactor rather than horizontal, as it occupies minimum floor area. Removable tray arrangement provides ease of catalyst loading and unloading of CNTs. The compact design of Multi-core reactor minimizes the energy consumption during the production of CNTs.

The process utilizes waste plastic for the production of CNTs and hydrogen rich gases. The compact reactor design facilitates its use in small/micro scale industries. The small-scale polymer moulding industries can take the advantage of reactor to produce CNTs and further its application in CNT-polymer composites.

Visvesvaraya National Institute of Technology, Nagpur is the WINNER of 7th National Awards 2016-17 under the Academic and R&D Institute Category of "INNOVATION IN POLYMER WASTE MANAGEMENT & RECYCLING TECHNOLOGY AND GREEN POLYMERIC MATERIALS & PRODUCTS"

Shri Sachin D. Awatade

JOHN DEERE INDIA PVT. LTD.
PUNE

JOHN DEERE

John Deere & Company, founded in 1837, is a Fortune 500 Company and is the world's leading manufacturer of agricultural, construction and forestry equipment with revenues of US$ 28.86 billion, net income of US$ 1.94 billion in the year 2015. John Deere spent US$ 1.43 billion on R&D in 2015.

India operations started in the year 1998, with manufacturing of tractors for sales in India and export to more than 110 countries worldwide, and markets agricultural equipment and services through a network of 19 area offices, 6 Regional offices and close to 450 authorized dealers spread across in India. Today, John Deere has total six manufacturing and service units in India.

Shri Sachin D. Awatade, is currently working as Senior Tech Specialist, Advanced Polymer at John Deere, Asia Technology Innovation Center. He is working with the company for last 9 years & leading the research on advanced composite. He obtained Master Degree in Polymer Science & Engineering from Indian Institute of Technology, Delhi in 2001.

RIM PDCPD technology is new to the Indian market. There are only couple of resin manufacturers of this resin in the world. The tractor proto components were molded by our supplier in India. This material is good for the body components due to its lower density, high impact resistance, ability to regain its original shape, class-A painted finish, provides styling & integration freedom etc.

- Weight reduction of 20-30%, cost reduction of 20-30%, cheaper aluminum mold (30-40% to steel molds), and smaller press size due to liquid monomers.
- Possibility of variable part wall thickness allows effective stress management.
- Semi rigid system helps improve impact energy absorption & reduced NVH compared to rigid system.
- Possibility of part repair in case of minor damage.

Application Highlights

Tractor fender is a challenging application considering the load goals & usage. Tractor operates in highly abrasive & rough environmental conditions. Multi material assembly addresses these needs very effectively.

- Agricultural industry uses lot of chemicals, polymer helps in corrosion resistance resulting in improved life.
- Multi material hybrid concepts improve design ability to take more load.
- Adhesively bonded assembly & bolting transfer stresses on metal which protect plastic.
- Structural foam and molded in metal inserts help improve structural stiffness, torqueing ability & NVH.
- Part consolidation reduces joints, improve aesthetics and reduces assembly time by avoiding post molding operations. Reduction in carbon foot print due to less material handling, lower weight & energy consumption

John Deere India Pvt. Ltd Pune is the WINNER of 7th National Awards 2016-17 under the Industry Category of "POLYMERS IN AGRICULTURE AND WATER CONSERVATION"

Dr. D. K. Antala

Dr. D. K. Antala has obtained his Ph. D. degree in Agricultural Process and Food Engineering, Junagadh Agricultural University, Junagadh (Gujarat). Presently he is working as Post-Harvest Engineer (Assistant Professor), College of Agricultural Engineering and Technology, JAU, Junagadh. He has published more than 15 papers in national and international journals, 2 books and filed 1 patent. He got Kejriwal Award-2008 for Best Article of Interest to the Industry and Best Teacher Award-2014. His area of specialization is food packaging, transportation, food processing and plasticulture technology.

Fresh fruits and vegetables are highly perishable due to their tender texture and high moisture content. Poor handling and improper packaging during transportation causes physical, physiological, biochemical and pathological deterioration, mechanical damage and impairs the quality of the produce.

A completely foldable and reusable enclosed container made from corrugated polypropylene sheet for transportation of horticulture crops through road, railways, sea and air. The container has cells which can be adjusted as per the size of fruit to enhance the safety of fruits. Separation sheets are provided to support the fruits and to minimize load of the fruits of upper layers. Perforation is provided in the container for aeration to the fruits. The container has unique velcro strips for erecting and folding the container. Reinforcement is provided on corners of the container to sustain the load of upper stacks. This innovation has successfully demonstrated the transportation of tomato and sapota fruits without any damage through road. The unique design of container will help to reduce the post-harvest losses, increase shelf life and improve efficient marketing of fresh horticultural produces. It saves cost of high inputs, energy, drudgery and time for cultivation of crops by increasing availability of food by using the container. It can be used in option of wooden box and CFB carton and preserves forest and water resources. It is cost economical and preserves environmental and ecological balance. It can evolve food safety, security and strengthens the farmers. It will improve self-sufficiency, processing and export opportunities of the nation.

Junagadh Agricultural University, Gujarat is the WINNER of 7th National Awards 2016-17 under the Academic and R&D Institution Category of "POLYMERS IN AGRICULTURE AND WATER CONSERVATION"

Dr. Lizymol P.P.

Dr. Lizymol Philipose Pampadykandathil was awarded Ph.D in polymer chemistry by Mahatma Gandhi University. She is currently working as scientist E in SCTIMST. She has more than 26 years of research experience. She has successfully completed many sponsored projects with diverse and applied nature, developed many products, which made her achieve numerous recognitions from both national and international levels. She has received the Fast Track Award for young scientists, DST, Govt. of India and the Kerala state young scientist award of Government of Kerala. She was conferred with the Dr.S.Vasudev Award for the year 2014, instituted by the KSCSTE for the best project completed under the Science Research Scheme(SRS) of KSCSTE . She has filed 20 patents, delivered invited talks and presented papers in many international conferences in India and abroad, chaired sessions and published more than 100 papers. She is a reviewer as well as editorial board member of many international journals. She is teaching and guiding Ph.D, M.Phil and M.Tech students. Her team received many best paper awards in National and international conferences. Her current area of interest is synthesis and characterization of novel polymers for medical applications, development of polymeric biomaterials, bionanocomposite, and smart dental restorative composite for dental tissue remineralization.

In the present work, the problems of polymerization shrinkage and toxicity aspects of conventional organic polymer based dental restorative composite is solved with the development of a new tooth compatible three-dimensional organically-modified ceramics (ormocer) based cross-linked photopolymerized polymer composite. Conventional restorative materials based on organic resins and inorganic fillers have a limited life span and ultimately require replacement. Ineffective bonding with the inorganic filler and organic matrix is one of the main causes for polymerization shrinkage. Most common reasons for secondary caries are polymerisation shrinkage of dental composites and biofilm (plaque) formation on the margin of the tooth and restoration. Moreover, a significant percentage of these restored teeth ultimately undergo pulpal necrosis, requiring either tooth extraction or endodontic treatment and prosthetic build up. Therefore, development of novel techniques to regenerate, as opposed to repairing, lost tooth structure would have significant benefits. The materials was formulated as a novel three-dimensional cross-linked polymer through sol-gel precursors. Ormocers consist of three components – organic and inorganic portions and the polysiloxanes. Alkoxysilyl groups of the silane permit the formation of an inorganic Si-O-Si network by hydrolysis and polycondensation reactions. The methacrylate groups are available for photochemical polymerization. The new material showed excellent mechanical properties and low polymerization shrinkage. Effective bonding between the organic and inorganic parts within the resin enhances the filler-matrix bond strength so that the water leachable inorganic materials leads to cytotoxic effects are inhibited.

Dr. Lizymol P.P. is the WINNER of 7th National Awards 2016-17 under the Individual Category of "POLYMERS IN PUBLIC HEALTH CARE"


Dr. Abi Santhosh Aprem


Dr. P.Raghukumar


Dr. Raghu Ram K.Nair


Mrs. Suja.B

Dr. Abi Santhosh Aprem is currently Deputy Vice President (R&D) at HLL Lifecare Ltd, Trivandrum. After obtaining his PhD in the area of Polymer technology from Mahatma Gandhi University Kottayam, Kerala, he works in HLL for the last 15 years and was instrumental in setting up the Corporate R&D Division for the company. During this period, he has executed several projects, many of which have led to commercially viable products for the company.

Dr. P.Raghukumar obtained his PhD in Physics from Mahatma Gandhi University, Kottayam, Kerala. He has many publications in the field of radiotherapy especially in brachytherapy. Presently he is working as Additional Professor of Radiation Physics in Regional Cancer Centre, Thiruvananthapuram, Kerala. His area of specialization is brachytherapy, quality assurance and dosimetry.

Dr. Raghu Ram K.Nair obtained his PhD in Physics from the University of Kerala and is currently Professor and Head of Radiation Physics Division of Regional Cancer Centre, Thiruvananthapuram Kerala. He has more than 60 publications in the field of Medical Physics. His areas of interest include Radiotherapy Physics, Imaging Physics and environmental radiation.

Mrs. Suja.B is a polymer technologist, who is currently working in Corporate R&D division of HLL Lifecare Ltd. She has got 18 years experience in developing polymer products and has bagged national award for her contribution. She also bears a Masters in Business Administration .She has one International patent and two Indian patents to her credit. She also co-authored two international publications.

"CERVICAL SPACER FOR REDUCING RADIATION DOSAGE ON CRITICAL ORGANS DURING THE BRACHYTHERAPY TREATMENT"

HLL LifeCare Limited & Regional Cancer Centre
Thiruvananthapuram

Cancer of the uterine cervix is the most common cancer seen in women in developing countries. More than 1,22,000 cases are diagnosed every year in India. Radiation is commonly used for treating this cancer. Brachytherapy is an essential component in the treatment of most cases of this cancer. This is done by placing special applicators inside vaginal cavity and uterine canal. Bladder and rectum are the nearby organs that can get high dose during this procedure. Conventionally, this dose is reduced by packing the vagina with wet cotton gauze to increase the separation between the applicators and the nearby organs. The whole process need to be repeated for each treatment fraction adding pain and discomfort to patient. It is also difficult to maintain the same amount of packing in all these fractions.

The cervical spacer is a device consisting of two independently inflatable specially designed balloons joined together which can be kept along with the applicator. Saline is used for inflating these balloons and the amount of saline can be reproduced in successive applications there by achieving better reproducibility compared to gauze packing. The clinical evaluation of the device was done by Regional Cancer Centre, Trivandrum, Kerala and PGIMER, Chandigarh and found to be effective in reducing the dose to critical organs to a maximum of 15% compared to gauze packing. Reduced procedural time, increased patient comfort, reproducibility of packing, reduction of dose and ease of application are the added advantages of this device.

The Cervical spacer is jointly developed by HLL Lifecare Ltd and Regional Cancer Centre, Trivandrum. An Indian patent has been filed for this project (Patent no: No. 584/CHE/2011).

HLL LifeCare Limited & Regional Cancer Center, Thiruvananthapuram is the WINNER of 7th National Awards 2016-17 under the Industry Category of "POLYMERS IN PUBLIC HEALTH CARE"


Dr. Naresh Bhatnagar


Dr K K Gaur

Prof. Naresh Bhatnagar obtained his PhD in Mechanical Engineering from IIT Bombay in 1992, worked in industry till 1998 and then joined IIT Delhi as faculty. He published more than 225 International journal and conference articles, 15 patents, graduated 20 PhD's, 16 PhD in progress, 76 M.Tech thesis and co supervised 12 MDS thesis. His area of research interest ranges from FRP Composites, Polymer processing, Injection molding, Microcellular foam polymers, Biomaterials, Medical device design and manufacturing, Dental implants, Hip implants and is currently working on Bioresorbable cardiac stents and Bullet Proof Material system development. He is the national Domain Coordinator of Security & Defense of IMPRINT India initiative of MHRD, invited expert member of NITI Ayog on “Make In India” of Personnel Body Armor and Ex- Asso.Dean (R&D) of IIT Delhi.

Dr. Kumresh Kumar Gaur obtained his PhD degree from Indian Institute of Technology, Delhi under supervision of Prof Naresh Bhatnagar on “Design and Development of Low Velocity Impact Hip Protection Polymers”. Currently he is serving as Scientist `E` in DRDO, Delhi. He has published more than 6 papers and filed 1 patent. His area of specialization is Polymers Processing and Manufacturing, Injection Molding, Polymer blends and fibers.

"INJECTION MOLDED MICROCELLULAR THERMOPLASTIC HIP PROTECTION DEVICE"

Defence Research and Development Organisation & Indian Institute of Technology, DELHI

The fractures of the proximal part of a femur bone or hip joint are an important public-health problem and a major source of mortality and morbidity among the elderly. The incidence of fractures of the hip due to fall increases exponentially with age. Consequently, nearly one of three women and one of six men could sustain a fracture of the hip due to fall by the age of ninety years. Thus, prevention of hip fractures can significantly contribute to the reduction of health care costs which are currently of primary concern of Government & insurance companies with increase of aging population.

This innovative technology relates to a hip protective device made of microcellular foamed thermoplastic LDPE that is formed into an elliptical domed shape by injection molding so as to cover a hip portion corresponding to human neck of a femur at the Greater Trocanter, having flexibility and excellent compressive strength to take shock and impact loads. Therefore, the device deforms elastically on an impact, resulting in a shock absorbing effect and endurance. Microcellular injection molding process has been adopted for the first time globally for the design and manufacture of thermoplastic hip protection device for providing light weight and improved impact resistance. The process involves use of super critical fluid as a foaming agent in a polymer, producing a consistent microcellular structure in the core of a solid polymer device.

The developed device will make seniors feel more secure and less afraid of falling, so they are more active; this may be important for maintaining healthy bones and reducing the burden of bedridden old patient to the modern society, which is becoming nuclear day by day. The patented product is transferred to the industry and the product (TRO-Guard) is available online at www.ozlahealthcare.com for use by the seniors.

DRDO & IIT, DELHI is the WINNER of 7th National Awards 2016-17 under the Academic and R&D Institution Category of "POLYMERS IN PUBLIC HEALTH CARE"


Dr. S. Reshmi


Dr. G. Santhosh


Dr. Shreejith.M


Smt. S. Gayathri


Shri Linson Paul


Shri N. Binu

Dr. S. Reshmi obtained her PhD degree from Indian Institute of Science, Bangalore. She is currently working as Scientist/Engineer 'SF' and heading the propellant development activities in Propellant Engineering Division of Vikram Sarabhai Space Centre. She has over sixteen years of experience in the area of solid propellant development for key projects of ISRO and research on energetic materials.

Dr. G. Santhosh obtained his PhD degree from Mahatma Gandhi University, Kerala, and did his postdoctoral research in NUS & NTU, Singapore. He is currently working as Scientist/Engineer in Propellant Engineering Division of VSSC, Trivandrum. He has over ten years of research experience in the area of energetic materials and his current research includes the synthesis of energetic oxidizers and binders.

Dr. Sreejith M is currently working as Scientist/Engineer 'SD' at Propellant Engineering Division, VSSC. He has obtained his PhD from University of Mysore. His area of interest includes research and development of solid and liquid propellants.

Smt. Gayathri S has obtained Master's Degree in Chemistry from Kerala University in the year 2009. She is currently working as Sr Scientific Assistant in Propellant Engineering Division of VSSC. She has seven years of experience in the production area and development of solid propellants. Her area of interest involves synthesis of energetic binders and specialty materials.

Shri Linson Paul is currently working as Technician- F at Propellant Engineering Division of VSSC. He has 8 years of experience in the field of solid propellant research and production for various launch vehicle projects of ISRO.

Shri N. Binu is currently working as Technician- F at Propellant Development Section of PED/VSSC. He has 7 years of experience in the field of solid propellant research and production for various launch vehicle projects of ISRO.

"ENERGETIC TRIAZOLE BINDERS FOR DEFECT FREE GREEN COMPOSITE SOLID PROPELLANTS"

Dr. S. Reshmi, Dr. G. Santhosh, Dr. Shreejith.M, Smt. S. Gayathri , Shri Linson Paul & Shri N. Binu

Composite solid propellants are extensively used in launch vehicles and missiles for boosters, igniters and gas generator applications. The popular composite solid propellants used in the country for both launch vehicle and missile applications is based on ammonium perchlorate (AP) as oxidiser, metallic fuel like aluminium powder and polybutadiene binders like hydroxyl terminated polybutadiene (HTPB).

The innovation is on the development of a unique class of energetic triazole polymeric binder system for ***'green'*** solid propellants. The development has been effective in meeting the requirements of superior energetics and good mechanical properties, yielding defect free propellants. The system is isocyanate free and is compatible with 'green' oxidisers that can replace AP. The binder has been evaluated successfully in prototype solid motors. It can find use in propellants for solid boosters, gas generators and pyrogen igniter applications.

Key Benefits

- The drawbacks of the current polybutadiene/urethane propellant have been addressed using a novel energetic triazole binder.
- Zero defect propellants can be realized through an isocyanate free route.
- The propellant composition has the advantages of superior performance with respect to improved energetics, compatibility with 'green' chlorine free high energy oxidizers, ease of process ability and good mechanical properties.
- This development has paved way for a new technology for future eco-friendly solid propellants in launch vehicles and missiles, which are essential for the country.

Team - Dr. S. Reshmi, Dr. G. Santhosh, Dr. Shreejith.M, Smt. S. Gayathri , Shri Linson Paul & Shri N. Binu is the JOINT WINNER of 7th National Awards 2016-17 under the Category of "RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY"

Dr. Raja Shunmugam

Dr. Raja Shunmugam received his bachelor degree in 1994, master degree in 1996 from V. O. C. College, Manonmaniam Sundaranar University, Tamil Nadu. He received his PhD from the Indian Institute of Technology Madras under the guidance of Professor R. Dhamodharan. He then joined Professor Gregory N Tew's laboratory in the Polymer Science and Engineering Department at the University of Massachusetts, Amherst as post doctoral research associate from 2003 to August 2008. From September 2008 to 2013, he was an Assistant Professor in the Department of Chemical Sciences at the IISER-Kolkata. Since January 2014 he has been Associate Professor in the Department of Chemical Sciences at the IISER-Kolkata. He was the Head of the Department since February 2014 to March 2016. He was a recipient of the prestigious Ramanujan Fellowship from the Department of Science and Technology, Government of India. He also received Joint RUNNER - UP-Up award in the 6th NATIONAL AWARD FOR TECHNOLOGY INNOVATION under the Polymeric Materials category, 20 January 2016.

"POLYNORBORNENE DERIVED 8- HYDROXYQUINOLINE PAPER STRIPS FOR ULTRASENSITIVE CHEMICAL NERVE AGENT SURROGATE SENSING"

Dr. Raja Shunmugam

Chemical Warfare Agents are produced not only to kill people in war, but also to terrorize people even in peace. Among the nerve gas agent family, Sarin is the most dangerous and frequently used for the attack. It is well known that nerve gases act as a scavenger for acetylcholinesterese, inhibiting its reactivity in the nervous system, which leads to several neurological disorder and even death. Existing techniques are facing operational complexiblity, high cost and long detection time. So there is always a need of a portable and facile sensing system. Nerve agents simulants, such as, diethyl chlorophosphate, diisopropyl fluorophospahte, diphenyl chlorophosphate are explored in the literature as they are less toxic. According to Centres for Disease Control and Prevention, the concentration of sarin that is immediately dangerous to life is to be 0.1 mg m^{-3} (1.7 ppm vapour). So there is always need for a very sensitive system which can be used as 'in-field' detector.

Though many existing nerve agent sensors are reported in the literature, polymer based sensors for 'in-field' application is not explored so far. Here we report a polymer based "turn-on" fluorometric sensing approach with norbornene derived 8-hydroxyquinoline motif. 8-hydroxyquinoline (8-HQ) acts as a weak fluorophore due to excited state intramolecular proton transfer (ESIPT) from oxygen to nitrogen. When 8-HQ is attached to the norbornene functionality by click chemistry, a triazole functionality is generated. Photoinduced electron transfer (PET) from the triazol nitrogen to 8-HQ is the reason for non-emissive nature of **NCHQ**. As the non-bonding electrons are involved in phosphorylation, it is obvious that they are not available for PET process. Due to this a turn-on response is achieved. The sensing response of **NCHQ** and its polymer, **PNCHQ**, to the stimulant of nerve agent surrogate is highly sensitive and selective. To the best of our knowledge, this is the first report on polymeric sensor that has instantaneous 'turn-on' response and ppb level detection limit upon exposure to the nerve agent stimulants.

Dr. Raja Shunmugam is the JOINT WINNER of 7th National Awards 2016-17 under the Individual Category of "RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY"

Dr. Tarun K. Maji

Ms. Chinmayee Saikia

Dr. Tarun K. Maji obtained his PhD degree in Polymer science and Technology from Calcutta University in 1992. Currently he is professor in the department of Chemical Sciences, Tezpur University, Assam. His area of interest includes drug delivery, controlled release polymer for agrochemicals and insect repellents, wood-polymer nanocomposites, bio-nanocomposite for removal of contamination from water etc. He has guided 15 PhD students, authored more than 90 research papers in international journals and 9 book chapters.

Ms. Chinmayee Saikia obtained her MSc degree in Applied Chemistry taking polymer as the specialization, from Tezpur University. She is currently doing PhD on polymer based targeted drug delivery systems. She authored 7 papers in international journals and one book chapter.

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

"DEVELOPMENT OF POLYMER COATED IRON OXIDE MAGNETIC NANOPARTICLES FOR TARGETED DELIVERY OF ANTICANCER AGENT"

Dr. Tarun K. Maji & Ms. Chinmayee Saikia

Delivery of effective amount of drug to the specific target site causing minimum side effects is the main strategy of designing a targeted drug delivery system. The continuous efforts of the researchers have made remarkable progress in drug delivery area and these practices lead to the development of magnetic nanoparticles. Their biocompatibility, ease of surface modification and magnetic properties have made them an auspicious candidate for the next generation of drug delivery applications.

The present innovation is on the development of starch coated iron oxide magnetic nanoparticles for targeted delivery of anticancer drug 'curcumin' using co- precipitation technique. Starch was modified with thiol and amine functional groups in order to increase its water solubility along with mucoadhesivity. Incorporation of montmorillonite and halloysite into the nanoparticle systems improved drug encapsulation efficiency and controlled the drug release rate. Zinc oxide was incorporated to utilize its anticancer property and thereby to enhance the inhibitory effect of the curcumin loaded nanoparticles. Genipin was used as the crosslinker, which not only controlled the drug release by cross linking the polymer chain but also exhibited some inhibitory effect on cancer cells. The FITC tagged nanoparticles showed better internalization into the HepG2 cancer cells, promoted ROS production in the cells and thereby reduced the cell proliferation significantly.

Team - Dr. Tarun K. Maji & Miss. Chinmayee Saikia is the RUNNER - UP of 7th National Awards 2016-17 under the Category of "RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY"


Shri Kundan Kumar Verma


Shri Kotresh M Gaddikeri


Shri Dinesh BL


Dr. Ramesh Sundaram

National Aerospace Laboratories (NAL), a constituent of the Council of Scientific Research (CSIR), India, is the only government Aerospace R&D laboratory in the country's civilian sector. CSIR-NAL is a high-technology oriented institution focusing on advanced disciplines in aerospace. CSIR-NAL has provided significant value added inputs to all the Indian National Aerospace Programs. Its contributions over the last five decades have enables it to create a niche for itself in advanced Aerospace Research and Technology development. CSIR-NAL has also developed many critical technologies for strategic sector and continues to support the mission-mode programs of the Country.

Advanced Composites Division (ACD) of CSIR-NAL has been working in the design, prototype development and testing of polymer composite structures. ACD has significantly contributed to the design and development of polymer composite structures for both military and civil aircrafts. The division with a judicious mix of basic research and applied R&D has strived hard to identify future trends and stayed at the forefront of technology. It has a high level of expertise in the areas of design, fabrication, non-destructive evaluation, repair and structural testing capable of delivering “Concept to Certification“ solution. The division has developed and patented a cost effective manufacturing process, namely VARITY (Vacuum Enhanced Resin Infusion Technology) for the fabrication of carbon fibre composite wing of SARAS.

"DEVELOPMENT OF COINFUSED AND COCURED FULLY INTEGRAL WING INTERSPAR BOX USING VERITY PROCESS"

CSIR – National Aerospace Laboratories, Bangalore

Composite materials have been used extensively in the national aircraft programs like Light Combat Aircraft (LCA-Tejas), SARAS aircraft and the like. Autoclave moulding using prepregs is a benchmark process used worldwide for aircraft structures. The major drawbacks are the cost of autoclaves, prepreg and their storage and high processing costs. CSIR-NAL has developed an in-house processing technology called Vacuum Enhanced Resin Infusion Technology (VERITy) that hybridizes autoclave process and VARTM (Vacuum Assisted Resin Transfer Moulding) process to achieve parts with acceptable fiber volume fraction (58-60%) and void content (<2%) in processed structures at 15-20% reduction in cost! The principle of VERITy is to infuse the reinforcement held in tool cavity with resin using differential pressure maintained using vacuum. The building block approach was adopted starting from simple laminates to large structures. Critical process parameters were identified like resin temperature, mould temperature, degassing of resin mix, use of resin distribution medium, effect of preforming, preform thickness and the like. Extensive experimental data was generated through building block studies before scaling up the process. The target structure, SARAS wing consisting of bottom skin, stringers, interspar ribs and spars with gussets was infused and cocured to realise an integral structure. Several complementing technologies like integrated tooling, automated resin infusion system and flow sensors were developed to help in realising the wing structure. The major benefits of this process are a) Reduced material handling cost b) Large scale integration leading to reduction in assembly cost c) Reduction in stress concentration and better fatigue performance due to elimination of fasteners holes.

CSIR – National Aerospace Laboratories, Bangalore is the WINNER of 7th National Awards 2016-17 under Academic and R&D Institution Category of "RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY"

Shri Makarand Narayan Joshi

Shri P Chandra Sekhar

TRIMOORTY AUTO DECO COMPONENTS PRIVATE LIMITED
PUNE

SREE TRIO POLY TECH
HYDERABAD

M/s. Trimoorty Auto Deco Components Private Limited, Pune a leading convertor and manufacturer of Polyurethane Foams and Felts including Flexible, Rigid and Moulded components with latest State of Art Technology, has its manufacturing plants in Pune and Chennai. With 25 years of extensive service in Automotive, HVAC, Sound Proofing canopies, Medical foot care industry etc, it has an aim to develop various products to support the ever changing needs of the customer.

The dedicated team of company is comprised of knowledgeable and experienced people who are experts in their respective fields. The company targets the satisfaction of the customers. The quality and superior technical properties of Their products are certified by various laboratories. The work environment is eco-friendly.

Shri P. Chandra Sekar Bachelors in Chemical Technology from Loyola Academy with extensive experience in Polymers and Polyurethane applications for over 23 years, trained under the Father of Polyurethanes, Late Shri M Sarangapani. He has been an inventor in 2 patents (1 patent has been already granted) in the USA, EU and India. They have earned esteemed reputation as Techno Commercial Specialist and leading manufacturer of Specialty Polyurethane Elastomers, Flexible Foams, Moulded Foams and Rigid Foams.

Trimoorty Auto Deco Components and M/s. Sree Trio Poly Tech , Focusing on Indeginising Polyurethane Components in Automotive Sector, branding the image of "MAKE IN INDIA".

Moulded polyurethanes do absorb high amounts of water which leads to fungal generation in HVAC which in turn reduces the efficiency of AC and in a long run affects the passenger in the compartment. Microcellular Polyether polyurethane has excellent antibacterial property and excellent flexural strength at low temperatures, and particularly excellent hydrolysis resistance, as compared to normal moulded polyurethane. These components exhibit high tensile strength, elongation, resilience, and in addition have excellent tear strength, particularly 90° angle tear.

The polyoxypropylene glycol has a long oxyalkylene chain, it effectively functions as a soft segment in the polyurethane foam, thereby imparting excellent elongation properties and flexural properties to a resulting polyurethane foam. Since the polyoxyalkylene glycol is previously reacted with a polyisocyanate compound, the formation of primary hydroxyl group at the terminal is not necessarily required, and ethylene oxide may be added to the terminal hydroxyl group, or it may not be added at all. In the prepolymer, there may be included a reaction product of methylenediphenyl diisocyanate or a modified product thereof with a chain extender.

The blowing agent includes water, hydrocarbons, chlorofluorocarbons, hydrogenated fluorocarbons, and the like. Those blowing agents may be used alone or in admixture thereof. From the viewpoint of environmental protection, it is desirable to use water alone. Polyurethane foam having high hardness, high percentage of open cells, and excellent physical properties such as fracture strength, elongation at break, tear strength, split tear, and low compressive permanent strain.

Features & Benefits

- Eco Friendly water blown Polyurethane system
- Minimal water absorption of around 2% as against 40% of previous version.
- High Elongation and tear strength even at low shore Hardness of Shore A - 8 to 10.
- Antibacterial, hence no fungus generation, passenger compartments are safe in Automotive.
- Quick demould time with increased productivity
- Heat loss is arrested as the foam doesn't absorb water which helps in less consumption of fuel.

Trimoorty Auto Deco Components Private Limited & Sree Trio Poly Tech is the RUNNER - UP of National Awards 2016-17 under the Industry Category of "INNOVATION IN PETROCHEMICALS AND NEWER POLYMER APPLICATION"

"SAY YES TO PLASTICS & NO TO LITTERING"

MAKE IN INDIA
National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry (2016-17)

by
Prof.(Dr.)S.K.Nayak
Director General-CIPET &
Chairman- 7th National Awards Committee

Global trends and fundamental shifts in the competitive advantage have considerably characterized the petrochemical industry of the past decade. The emerging patterns such as globalization, free trade, and the mobility of capital form the basis of the petrochemical industry in the 21st century. In today's scenario, substantial challenges associated with increasing reliance on base organic chemicals which constitute the building blocks of our modern society are being faced and the petrochemical industry will make substantial contributions to fulfilling society's needs. Innovations in Petrochemical sector shall play a critical role in order to make these precious natural resources stretch further, create new applications and ensure that we extract the greatest value possible.

The vision of National Policy on Petrochemicals – ***(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 will be achieved through the promotion of Research and Development and Human Resource Planning and Development.

Additionally the objective of this the policy envisaged institutionalization of National Awards for Technology Innovation in various fields of Petrochemicals and Downstream Plastic Processing Industry.

Central Institute of Plastics Engineering & Technology (CIPET), an autonomous body under the administrative control of Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India was entrusted the responsibility of implementing the award scheme. Accordingly, the scheme was successfully implemented by CIPET and six successful "National Awards for Technology Innovation in Petrochemicals & Downstream Plastics Processing Industry" with the enthusiastic participation of awardees, stakeholders/petrochemical industries and associations have been successfully completed and now the 7th National Award.

The categories of the Award Scheme are given below:

1. Innovation in Polymeric Materials:

New Polymers, Blends & Alloys, filled materials, Fibers, Polymer, Composites and Nano composites, Smart Materials etc.

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.

3. Innovation of Polymer Processing Machinery &Equipments:

Development of new processing techniques, Modification of machinery for higher efficiency/productivity/Automation, Energy conservation, product quality improvement, Improvement in Moulds, Dies and Auxiliary equipments.

4. Innovation in Polymer Waste Management & Recycling Technology and Green Polymeric Materials & Products:

Newer technology in plastic waste utilization into products/energy recovery, Recycling Technology, Plastic waste collection, Segregation techniques, Product design for improved recyclability, Biopolymers, Biodegradable/Compostable Polymers, Time controlled degradation, Green material filled polymers, Biodegradability evaluation techniques.

5. 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, micro nutrients etc., Innovative packaging for agriculture, floriculture and horticultural produce, Controlled permeability films & packaging for improved shelf life, Novel Usage of plastics for food security.

6. Polymers in Public Health Care:

Affordable/cost effective implants, implements and devices, New innovative products for medical application, Polymer based new drugs delivery system, Polymer body implants, Drinking water storage & transportation, Polymer membrane for water purification / Desalination, Devices for waste water, drainage, sewage treatment system.

7. Research in the field of Polymer Science & Technology (for Researchers working in Academic Institute /Research lab.):

Individual/Team of researchers in R&D Institutions & Laboratories, Original research work in polymeric materials processing etc. leading to prototype development & future industrial applications.

8. Innovation in Petrochemicals and Newer Polymer Applications:*Sub-categories are: (i) Micro / Cottage Industries; (ii) Small / Medium Industries and (iii) Large Scale Industries.*

Petrochemicals & newer polymer applications in any field to enhance the working environment, life cycle, energy efficiency, re-cyclability etc.

As decided in the Prize Award Committee meeting of 6th National Award, the category 8 from *"Innovation in Polymer Application"* has been modified into *"Innovation in Petrochemicals & Newer Polymer Applications"* with sub categories of (i) Micro / Cottage Industries (ii) Small / Medium Industries and (iii) Large Scale Industries.

IMPLEMENTATION FRAMEWORK & OPERATIONAL MODALITIES:

415 applications were received under eight 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, 16 nominations were selected as Winners and 07 nominations were selected as Runners-Up.

The 7th National Award Function to encourage and to promote technology innovation in Petrochemicals & Downstream Plastics Processing Industry (2016-17) is being organized on March 01, 2017 at VigyanBhavan, New Delhi. Hon'ble Minister for Chemicals & Fertilizers and Parliamentary Affairs – Shri AnanthKumar ji will present the 7th National Awards to the awardees in the presence of Hon'ble Minister of State for Road Transport & Highways, Shipping, Chemicals & Fertilizers – Shri Mansukh Mandaviyaji.

CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TECHNOLOGY (CIPET)
(Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India)
Head Office : Guindy Chennai - 600 032. Tamil Nadu.
Tel : 044 - 22254781, E-mail : pdscipet@gmail.com

Central Institute of Plastics Engineering & Technology (CIPET) is a premier National Institution devoted to Academic, Technology Support & Research (ATR) for the Plastics & allied industries in the India. CIPET operates at 29 locations spread across the length & breadth of the country, which includes 5 – High Learning Centres, 13 – Diploma Learning Centres, 3 – R&D Wings, 4 – Specialized Centres, 6 – Vocational Training Centres. All the CIPET Centres have uniform infrastructural facilities in the areas of Design, CAD/CAM/CAE, Tooling, Plastics Processing, Testing & Quality Control to cater to the needs of plastics and allied industries in the country.

CIPET offers blend of various specialized Academic Programmes in the field of Plastics Engineering & Technology (Doctoral, Post Graduate, Undergraduate, Post Diploma or Diploma) in order to provide techno-skilled human resource to plastics & allied industries. The Technology Support Service (TSS) to the industries and ingenious research are the important product portfolios of CIPET.

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.

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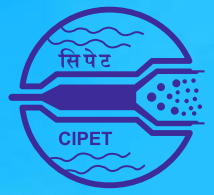
With a vision to be recognized as global R&D hub, CIPET has established three R&D centres, viz., Advanced Research School for Technology & Product Simulation (ARSTPS) at Chennai, Laboratory for Advanced Research in Polymeric Materials (LARPM) at Bhubaneswar and Advanced Polymer Design & Development Research Laboratory (APDDRL) at Bengaluru. These laboratories work towards developing novel indigenous technologies to cater the current requirements in the areas of Polymer Composites, Nano composites, 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 expertise, Test and Evaluation, Product Evaluation & Commercialization along with training to Post Graduate Students and Research Scholars.

CIPET has signed various Memorandum of Understanding (MoUs) for collaborative projects, faculty & student exchange, exchange of academic materials etc., with leading international Universities/organizations at USA, Canada, Australia, Germany, France, Korea, Poland, Mexico, China, South Africa, Russia & Brazil.

With strong Alumni base of about 45,000 professionals, CIPET has emerged as an apex Plastics Technology Institution, not only in India but a unique Institution of its kind, in Asia.

Organized by :



सेन्ट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी (सिपेट),

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