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

9th NATIONAL AWARDS

for

Technology Innovation
in
Petrochemicals & Downstream Plastics Processing Industry (2018-19)

Thursday, 13 February, 2020

Bengaluru

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9th National Awards for Technology Innovation

Shri D.V. Sadananda Gowda

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

It has been more than 100 years since plastics have befriended human race. Plastics have unlimited applications in different fields like automobile, packaging, construction, healthcare, coatings, adhesives and many more. They have been nurturing technological advancements to make life much easier.

Indigenization of various technologies, in particular, Defence, Healthcare as well as Automotive/Aerospace sectors are of prime requirement in the country, to reduce dependency on foreign economy and promote Make in India. The National Awards for Technology Innovation have been designed with a view to encourage the stakeholders of this industry to constantly innovate and move with the time to meet the fast changing requirements of Petrochemicals industry.

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

I with all the success to the award winners and look forward to a higher level of participation in the forthcoming editions of the National Awards.

D. V. Sadananda Gowda

Shri Mansukh Mandaviya

Hon'ble Minister of State for Shipping (Independent charge),
Chemicals & Fertilizers, Government of India

We all know that plastics and polymers play a significant role in the economic growth of a country. Plastics is an incredibly versatile material and it plays a vital role in our everyday lives, with manifold applications in household to industrial and commercial sectors.

The current Govt.'s drive in various schemes like Make in India, Start-up India, Stand-up India, digital India etc. have created a platform for next-generation research and technological advancements in key sectors.

Development of newer technologies in the field of polymers needs to be encouraged and it is hoped that the National Awards scheme would inspire and motivate young innovators, scientists and professionals to excel continuously in the vibrant field of innovation / development.

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 work for constant innovation / development.

Mansukh Mandaviya

Shri P Raghavendra Rao
Secretary to the Govt. of India Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Shastri Bhawan, New Delhi - 110 001

The global consumption of polymers has increased manifold in the last 50 years. Today resource-efficient polymers arc present in an infinite range of products and applications, helping us to save energy, CO_2 emissions, water and even food. They contribute to circular economy, health and safety and other functional requirements. However, the India accounts for only 11 kg per capita consumption of polymers, which is very much on the lower side compared to global standards.

Considering the projected growth rate of petrochemical industry at CAGR of around 9.3% by 2025, the Department of Chemicals & Petrochemicals (DCPC), has taken up responsibility for setting up Plastic Parks in the Petroleum, Chemicals and Petrochemicals Investment Region (PCPIR) clusters and also supporting research ventures in petrochemical sector through its 'Centres of Excellence (CoE)' scheme. This would facilitate the Scientists and Researchers to set-up exclusive R&D facilities in specific areas, formulate technologies and transfer to the industries while promoting start-ups.

Also, the Department of Chemicals & Petrochemicals has instituted the National Awards for Technology Innovation for recognizing outstanding contribution in the field of R&D leading to conservation of energy, efficient management of plastic waste, increase in product life cycle, development of innovative products, quality standards, recycling and other emerging areas.

I thank the Members of the Expert Committee for expeditiously evaluating the proposals and appreciate CIPET's support in conducting successfully the National Awards function for the ninth year in a row. I congratulate the award winners for their great contribution in development of polymer sector and believe that they will carry forward these initiatives in newer areas.

P. Raghavendra Rao

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

As research and innovation constitute the foundation of any industry, the National Awards for Technology Innovation have been instituted, and its 9th edition would be held on 13th February 2020 at Bengaluru. It is important to mention that innovation and research is a key parameter to recognize a country and Department of Chemicals and Petrochemicals is committed to these activities by recognizing innovations in the area petrochemicals.

These awards are envisaged to improve the performance of the existing products and their quality, leading to better acceptance and increase in demand of the products in the competitive market of polymers and plastics as well as benefit all segments of the enterprises, including Cottage Industry and MSMEs.

Since inception, the National Awards of the Department have become very popular and achieved peer recognition among professional entrepreneurs and researchers from various industries and R&D institutions. I am confident that the 9th National Awards for Technology Innovation will also work towards the most outstanding usage of technology in multi-disciplinary applications of Polymers.

I convey my heartiest congratulations to all the awardees and wish them all the best.

Kashi Nath Jha

सत्यमेव जयते

9th National Awards for Technology Innovation


Say “YES” to Plastics
&
“NO” to Littering

Awardees

Shri Ganesh Srinivasan

RESIL CHEMICALS PVT. LTD.,
BENGALURU

Shri Ganesh Srinivasan is a University Gold Medalist in Chemistry & Rubber- Polymer Technology from Madras Institute of Technology, Anna University. He joined Resil Chemicals in 1992 in technical sales and support, and then went on to set up three manufacturing plants for silicones & silver in Bangalore. Along his long-term affiliation with Resil he set up N9 World technologies, Vista car care brands and implemented SAP ERP. Presently he has grown up the ladder to become CEO in the organization.

As a Leader-Innovator, his key areas of focus include, R&D, Innovations, collaborations, Technology strategy Business development and commercialization in Silicones, Nano Materials, and Advanced Materials for Textiles, Plastics and wide variety of industries Industrial applications.He has won the National award for innovation in the Silver Technology in Bangalore Nano 2013, CII-IPR awards in 2015, 2016, 2017 and top 25 innovative company award from CII in 2018 along with numerous other credentials to his accolades. He was featured in the BBC for innovative silver technology commercialisation. He is associated with SNWG – USA, CASP- Japan, is also a committee member of BIS MTD-33. He is also a member in ASM International (American society for Materials).

"NANO SILVER - SILICA - SILICONE COMPOSITE & SMART MATERIALS ETC."

Shri Ganesh Srinivasan

Plastics are prone to attack microbes/ bacteria due to moisture and additives such as plasticizer, surfactant, oils etc. due to which the physical appearance and aesthetics of the plastics is depleted, causing degradation, discoloration, staining, biofilm and malodour. This novel technology is based on nano silver which are embedded into silicone oil and silica as a carrier, i.e. silver-silica-silicone composite. This unique carrier system helps in uniform dispersion and strong bonding of silver to the polymer matrix, thereby possess non leaching property. This composition contains silver unique particle and because of its unique shape, size and high surface area, it performs as an excellent antibacterial property with lower silver concentration.

Significance & benefits: Articles treated with this Antibacterial composition in end use applications such as storage water tank, water purifier tanks, air coolers, school bus interiors, house hold articles, white goods, food containers, food packaging, toilet seats, flush knobs, lunch boxes and prevent bacteria in the tank and improve hygiene, prevent malodor and improve the air quality, improved water quality, reduced bacterial load.

WINNER

9th National Awards under the Category of "INNOVATION IN POLYMERIC MATERIALS"


Dr. Kana M. Sureshan


Shri Pratap Annamalai

Dr. Kana M. Sureshan obtained his PhD from University of Pune in 2002. Availing the prestigious JSPS fellowship by the Govt. of Japan, he has done his postdoctoral research at Ehime University, Japan for two years. In 2004, he moved to the department of Pharmacy and Pharmacology, University of Bath U.K. as a research officer. In 2006, he received the prestigious Alexander von Humboldt Fellowship and carried out his postdoctoral research at the Max Planck Institute for Molecular Physiology, Dortmund, Germany. In 2008, he returned to India and joined the Institute of Life Sciences, Hyderabad as a senior Scientist. In 2009, he joined IISER Thiruvananthapuram as an Assistant Professor and now rose to the rank of Full Professor. His research interests are in the areas of Supramolecular chemistry, Organic Chemistry and Materials Chemistry. He has published about 90 papers and filed six patents. He has been awarded various awards/ fellowships which include Ramanujan fellowship, SwarnaJayanti Fellowship, CRSI Bronze Medal, MRSI Bronze medal, Young Scientist award of YIM-Boston (USA) and Bhagyatara award. He has also won the innocentive award (USA) for designing the shortest and economical route for the tuberculosis drug, PA824. His author profile has been published in Angewandte Chemie, which is a rare recognition given to authors who publish at least ten papers in this high-profile international journal in a span of ten years. He is elected as a Fellow of the Indian Academy of Sciences and inducted as a Fellow of the Royal Society of Chemistry, U.K. as a leader of the filed.

Shri Pratap Annamalai has obtained his Master degree in chemical science from Anna University, Chennai and has done PhD from IISER Thiruvananthapuram, under the supervision of Prof. Kana Sureshan. Currently, he is a JSPS postdoctoral researcher at RIKEN, Japan.

"COVALENT-NONCOVALENT POLYMER BLENDS AND COMPOSITES FOR MARINE OIL-SPILL RECOVERY AND WATER PURIFICATION"

Dr. Kana M. Sureshan & Shri Pratap Annamalai

Marine oil spills pose serious threats to the ecosystem and economy. There is much interest in developing sorbents that can tackle such spills. We have developed a novel composite by impregnating cellulose pulp with a sugar-derived phase selective organogelator (PSOG), 1,2:5,6-di-O-cyclohexylidene-mannitol, which self-assemble and make a non-covalent polymer in oil making the liquid oil into an oil gel. The gelator molecules mask the surface-exposed hydroxyl groups of cellulose making the fibers temporarily hydrophobic. This sorbent absorbs oil effectively, selectively and instantly from oil–water mixtures due to its hydrophobicity. Then the gelator molecules get released uniformly in the oil and later self-assemble to fibers, congealing the oil within the matrix. This hierarchical entrapment of the oil by non-covalent polymeric fibers within a covalent polymer matrix makes the gel very strong and rigid, making it suitable for practical marine oil-spill recovery. The gelator being a biodegradable sugar derivative, the method developed is environmentally benign and green.

Dibenzo-18-crown-6 ether (CE) and diisopropylidene-mannitol (DIM) are two gelators of styrene; the former self-assemble through weak noncovalent interactions (NCIs) such as CH···O and CH···π interactions and the latter through stronger OH···O H bonding. These two gelators together also congeal styrene via their individual self-assembly. Polymerization of styrene gels made from CE and **DIM**, followed by the washing off of the sacrificial gelator **DIM**, yields robust porous polystyrene-crown ether hybrid matrix, having pore-exposed CEs. This blend is efficient in sequestering alkali metal ions from aqueous solutions and can be recycled.

RUNNERS-UP

9th National Awards under the Category of "INNOVATION IN POLYMERIC MATERIALS"


Dr. Reji John


Shri Shiv Kumar


Shri R.S. Arun Sundar

NAVAL PHYSICAL & OCEANOGRAPHIC LABORATORY, DRDO, KOCHI

Dr. Reji John is working with Naval Physical & Oceanographic Laboratory (NPOL), Kochi, Defence Research and Development Organization (DRDO), Min. Of Defence, Govt. Of India, for the past 26 years. He had taken his Ph.D from IIT Madras in Chemical Engineering after his M.Tech in Polymer Technology from Cochin University of Science and Technology. Currently he is scientist –G and Group Director (Materials) at NPOL, Kochi. He is engaged in the R & D of Materials and structures for various ongoing and futuristic projects of DRDO. He has done pioneering work in the field of smart materials and devices for which he has obtained 7 international patents in various countries such as USA, UK, France, Japan and India and also he had filed 10 more patents which are in the advanced stages of granting. He has published 27 internal and 15 national journal papers. He is also recipient of several awards including Technology Group award of DRDO, Science Invention award of Swadeshi Science Movement, Smart Technology Award of Indian Society for Advancement of Science and Processes Engineering, Science Day Inventor award and "Laboratory Scientist of the Year award from NPOL, Kochi and Technology Invention award from Indian Institute of Metals and DMRL, Hyderabad. He is a member in editorial board of International Journal of Nanofluids, published by American scientific society, USA and guest editor of Defence Science Journal, DRDO, Ministry of defence. Technologies developed by him are being used by Indian navy and being commercialized for civilian applications.

Shri Shiv Kumar is post-graduate in Chemical Engineering from IT-BHU, Varanasi (currently known as IIT BHU) and graduate in Chemical Engineering from Bundelkhand Institute of Engineering and Technology, Jhansi. He joined NPOL, DRDO under Ministry of Defence in 2002. He has been working in the field of Sonar and Transducer related materials development and testing. His area of interest is Smart Materials based devices and Structural Composites. Apart from filing 4 patents, he also has 2 International Journal Publications and 20 conference paper to his credit. He is also recipient of DRDO Team Technology Award for the year 2018.

Shri R.S. Arun Sundar received M.Sc. degree in chemistry from Manonmaniam Sundaranar University, Trinelveli, India, in 2007. He was with one of the DRDO labs (INMAS), New Delhi from 2008 to 2011. Since 2011, he has been a Technical Officer with the Naval Physical and Oceanographic Laboratory, Kochi (DRDO). His research interest includes smart materials i.e.Magnetorheological fluid , polymer and composite materials for underwater applications. He is a recipient of DRDO Technology Group award and innovation award of Indian Institute of Metals-DMRL, Hyderabad.

"MAGNETORHEOLOGICAL FLUID"

Dr. Reji John, Shri Shiv Kumar & Shri R.S. Arun Sundar

Executive Summary of the Innovation

The antisubmarine warfare capabilities, performance of SONARs and stealth features of ships and submarines are largely depend on how effectively suppresses unwanted low frequency vibrations of on-board machineries. As of now, all ships and submarines employ Russian origin passive vibration isolators and these isolators are ineffective for isolating low frequency vibrations whereas all mechanical vibrations occur in low frequency region. In order to address this problem the team has come up with an innovative solution by making two inventions viz.

(1) A smart fluid, called magnetorheological fluid formulated from Petrochemicals, and

(2) A semi-active low frequency vibration isolator employing the above smart fluid (closed loop feedback controlled MR fluid semi-active vibration isolator).

For developing closed loop feedback controlled semi-active vibration isolator, the team has developed a magnetorheological fluid using petrochemicals stable in marine environment for the first time. The viscosity of the fluid can be reversibly changed over a large range of values typically from 300 cps to 100000 cps. Under the influence of a magnetic field, the fluid can be like honey, gel or near solid consistency within a few milliseconds. Various patents have been filed and obtained for the fluid. The unique characteristics of this smart fluid is that it can effectively interface with mechanical system and electronics/ electrical devices, which makes the devices smart and work in real time. In addition to military applications, the fluid can be easily spin-off for civilian applications also. Efforts are being taken by the team for technology spin-off for smart automobile shock absorber applications.

WINNER

9th National Awards under the Category of "INNOVATION IN POLYMERIC PRODUCTS"


Dr. Subhendu Ray Chowdhury


Shri Atanu Jha


Shri K.S.S. Sarma

BHABHA ATOMIC RESEARCH CENTRE,
IRAD, BARC, MUMBAI

Dr. Subhendu Ray Chowdhury is a Scientific Officer of Bhabha Atomic Research Centre (BARC), Trombay, Mumbai. After obtaining his Ph.D degree from Indian Institute of Technology (IIT), Kharagpur he worked in USA for seven years in various world renouned Institutions, which inclue Cornell University, Pennsylvania State University and NanoPulse, LLC, NJ (NASA sponsored Company), USA. He has authored 4 book chapters, more tan 60 research articles in peer reviewed international journals and over 50 conference papers. Additionally, he is also co-inventor of many patents. He represented himself from India as a 'National Expert Committee' member' in 'Annual Review Meeting for the RCA/UNDP project on 'Electron Beam Applications for value Addition to Food and Industrial Products and Degradation of Environmental Pollutants in Asia Pacific region' in 2013, Philippines. He is also a Category A, International Faculty in IAEA/RCA/UNDP PROJECTs.

Shri Atanu Jha joined in radiochemistry and isotope group, BARC in 2014 as a scientific officer, after completing his M.Sc in chemistry from IIT Madras. He completed his B.Sc from Ramakrishna Mission V C College, Rahara, and Kolkata with a gold medal (university topper in Chemistry). Mr. Jha is pursuing PhD under technical guidance of Dr. Subhendu Ray Chowdhury in BARC, HBNI. He has published seven papers in journals and obtained 02 (two) patents (filled).

Shri K.S.S. Sarma joined in Bhabha Atomic Research Centre (BARC) Mumbai as a Scientific Officer in 1982, after completing his post graduation in Physics (Nuclear Physics). Mr. Sarma's key interests were electron beam processing of materials, EB dosimetry, O&M of industrial EB accelerator (ILU-6). He had been member of numerous DAE bodies and committees, namely Atomic Energy Regulatory Board (AERB) committee for radiation processing plants, BRIT safety committee, BRIT management committee, particle accelerator safety committee etc.

"RADIATION ASSISTED BIODEGRADABLE SUPERABSORBENT DEVELOPMENT FOR OIL AND OILY SUBSTANCE REMOVAL FROM WATER SURFACE AS WELL AS UNDERWATER ENVIRONMENT"

Dr. Subhendu Ray Chowdhury, Shri Atanu Jha & Shri K.S.S. Sarma

The water pollution by oil or oily toxic, hazardous substance is an alarming issue now-a-days to combat this problem a super-hydrophobic/ super-oleophilic cotton based superabsorbent (capacity around 30gm/gm) is developed through biomimicry by molecular scale surface engineering (tuning surface energy and surface roughness) with the help of radiation assisted covalent integration of a long chain hydrocarbon onto cotton microfibre. This modified sustainable material has revealed it's efficient capability of separating immiscible as well as emulsified oil from surface and underwater environment. It is physically and chemically robust, maintaining properties for hours in various pH and boiling water. Such superabsorbent is an unavoidable demand of the society and industry. It can be used for solving many water pollution related problems.

The developed material will have numerous applications, few of such are oil/water and harmful oily substances/water separation, cleaning of industrial or municipal waste water containing benzene, toluene, ethylbenzene, chloroform, dichloro methane, tributyl phosphate(TBP), triphenyl phosphate(TPP) etc, separation of mixed solvents in laboratories and industry, oil cleaning from solid surface (oil station spillage, spillage on road etc) and so on. Most interesting part is that the absorbed liquid can be recollected and the absorbent can be used 50-100 times at least. After multiple time use the disposal of the absorbent does not create any issue as the base material is biodegradable.

The large scale production technology has also been developed and demonstrated and technology will shortly be transferred to industries.

This is the first example of developing multifunctional cotton based superabsorbent in an economic way.

RUNNERS-UP

9th National Awards under the Category of "INNOVATION IN POLYMERIC PRODUCTS"

Shri Vijay Kumar Singh

THE SUPREME INDUSTRIES LIMITED,
PUNE

The Supreme Industries Ltd. is founded in 1942, Supreme is an acknowledged leader of India's plastics industry. Supreme offers wide range of plastic products with a variety of applications in Molded Furniture, Storage & Material Handling Products, XF Films & Products, Performance Films, Industrial Molded Products, Protective Packaging Products, Composite Plastic Products, and Plastic Piping System & Petrochemicals.

Shri Vijay Kumar Singh, Designation – Head -Process Improvement & Project Management, Total experience- 20.5 years, Responsible for complete designing of the equipment parts as per final concept and features of the planetary Foam extruder. Design and developed planetary extruder & die for enhanced product quality.

INNOVATION IN POLYMER PROCESSING MACHINERY & EQUIPMENTS

"PLANETARY PE FOAM EXTRUSION MACHINE FOR 100 KG/HR. OUTPUT WITH UNIQUE OPERATING FEATURES AND LOW PROCESSING COST"

Shri Vijay Kumar Singh

Planetary foam extruder is a unique design of multistage single line foam extrusion process in which each stages are functionally independent with each other, which is not possible earlier in any single screw foam extruder. The equipment is designed for precise control of temperature to meet functional requirement of superior quality foam processing. It is a great challenge to achieve mixing of liquid to polymer and powder in a single screw foam extrusion without increasing the temperature due effect of mixing element and frictional heat. The effect of compounding in this planetary extruder is almost similar to tandem extruder and melt temperature is well controlled due to 3 stage barrel design with interconnected screw. The equipment is developed to reduce the capital investment to produce low density high quality foam which is so far not possible in a single screw foam extruder. The best achievement is reduction of density of foam and power consumption as against similar capacity of any single screw foam extruder. The overall output is also increased due to smooth flow of compounded polymer from one stage to other stage. The foam quality is also enhanced by superior nucleation process through planetary mixing arrangement inside the extruder. The product is having better cushioning and strength which is very important for any packaging application. The other important features are low consumption of liquid physical blowing agent due higher absorption rate in the polymer which is possible for the unique design of extruder in which special mixing elements are incorporated.

WINNER

9th National Awards under the Category of "INNOVATION IN POLYMER PROCESSING MACHINERY & EQUIPMENTS"

Shri Nikunj Bhaia

NEPTUNE PLASTIC & METAL INDUSTRIES, KOLKATA

NEPTUNE PLASTIC, is a family owned business founded by Mr. GK. Bhaia in the year 1968. The torch is carried forward by his sons Mr. Satish K Bhaia and Mr. M G Bhaia. Technology focused Innovation at cost effective pricing is one of the focus areas of the company

Shri Nikunj Bhaia, a Chartered Accountant by qualification is a passionate individual with over 5 years of experience in the plastic industry. Mr. Manish G Bhaia, is an Electronics & Tele-communication Engineer from MIT University, Pune with over 20 years of experience in Plastic Polymer Processing. Together they have constantly strived towards developing innovative and cost effective technologies for the industry while also enhancing user experience and learning.

"LEARNEX - LINES FOR SMALL & BIG INSTITUTION"

Shri Nikunj Bhaia

NEPTUNE PLASTIC has seen a steady growth over five decades within the Plastic Extrusion machine industry. Neptune Plastic is one of the Leading Manufacturers & Exporters of Plastic extrusion lines for film, pipes, monofilament and special application. The company's commitment towards quality and innovation has been the driving force behind its growth and success.

The NEPTUNE 5-in-1 Lab line is a versatile and cost-effective solution for BOTH the Industry & Education Institutes. On one hand, it solves the problems of manufacturers by empowering them to take control by providing a closer simulation with the actual machine, while also being a powerful tool for training, research and development of manpower under the 'Skill India' initiative of the government.

Similarly, educational institutes can benefit from the 5-in-1 model by replacing traditional commercial extruders with technologically advanced Lab-Lines. Low optimised output and Modern technology used in the 5-in-1 model allows the students to LOOK, LISTEN, FEEL, TOUCH and operate on it. It provides an opportunity to the young trainees to play and learn with Raffia tape, film, filament, pipe and recycling on the same extruder by minimizing the usage of costly material (from the traditional lines).

It is therefore a smart solution to both LEARN & EARN from the same Extrusion line.


Dr. Hoshiyar Singh Dhami


Dr. Bipin C. Joshi


Dr. R. P. Joshi

UTTARAKHAND RESIDENTIAL UNIVERSITY, ALMORA

R I INSTRUMENTS & INNOVATION INDIA, HALDWANI

Dr. Hoshiyar Singh Dhami, former Vice Chancellor of Uttarakhand Residential University (URU) Almora, Kumaun University Nainital, H N B Medical University Dehradun (Addl Charge) and G B Pant University of Agriculture and Technology (Addl Charge) is basically a mathematician who has several awards to his credit in addition of 07 patents and publication of 158 research papers and 06 books. He has successfully supervised 20 research scholars for their awards leading to the Ph.D. degrees in the different applied areas of Mathematics, Information Technology and Mathematical Modelling. As a founder Vice Chancellor of URU (established in 2016), his aim was to develop it as a holistic learning centre focused on understanding and responding to societal concerns by making continuous efforts to become a think tank, innovative driver, catalyst and a partner providing sustainable and inclusive technologies and research

Dr. Bipin C Joshi obtained his Ph.D. degree in Natural Product Chemistry from Lucknow University. After completing two and half years in USA for his Post Doctoral prograamme at California State University, he came back to India and joined Department of Chemistry, LSM Govt. Post Graduate College, Pithoragarh, Uttarakhand. Dr. Joshi is currently working as a Registrar in Uttarakhand Residential University, Almora. He has published more than 35 research papers in National and International journals. Dr. Joshi's research interest lies mainly in the field of Green Chemistry and Natural product chemistry. He has received Uttarakhand State Young Scientist Award for 2013 under the discipline of Chemical Science for excellence in teaching and research. Presently Dr. Joshi working on a project of Graphene and Biofuel synthesis from Polymer waste and plant weeds in his Graphene synthesis Laboratory in Uttarakhand Residential University, Almora.

Dr. R. P. Joshi is a Physicist and an Instrumentation professional having more than 20 years of experience in India and abroad. He had started his career from National Physical Laboratory New Delhi in the year 1996. Presently he is working as a Founder and CEO of RI Instruments & Innovation India, RI Nanotech India, Founder Director of RI Agritek NZ Ltd. He also has privilege to start an instrumentation company for making upper end research instruments in India and these are like Raman Spectrometer, RIMS and RIUS Spectrometer, Cost Effective Solar Simulator, XRD and more. He has developed several cost-effective upper end research instruments in the domain of spectroscopy and nano technology. There are15 patents and 12 research papers in his credit. One of his cost-effective innovations RIMS (Modular Spectroscopic Work Station) was highly appreciated across the globe and now working satisfactorily in several parts of India and abroad. In one modular instrument setup, researchers could measure several parameters and these are like Raman, Fluorescence, Absorbance, Transmittance, Reflectance, irradiance, CRI, Micro-absorbance, Spectro-electrochemistry and this system is cost effective also unique of its kind in the world.

"GRAPHENE OXIDE BASED LI ION/SULPHAR BATTERY WITH REPLACEABLE ELECTRODES"

Dr. Hoshiyar Singh Dhami, Dr. Bipin C. Joshi & Dr. R. P. Joshi

The problem for which solution was researched is, to increase the life cycle and charge storage capacity of batteries with the facility of replaceable electrode at the click of a push button. To increase the surface area of anode and cathode in order to enhance the charge storage capacity and replaceable electrodes mechanism was introduced. The provision of replaceable cathodes has been made to address the problem of environment hazards as users won't be throwing the waste batteries in the atmosphere. It reduces the dependency of Li by reducing its composition by using Sulphur ions. The basic material used in the preparation of batteries is from waste polymers and harmful wild grasses whose patents have been already filed.

Also developed Li/S-MoX doped with rGo batteries where replaceable (electrodes) cathode fabricated on Al doped rGo. Anode is made of Graphene foam/Aerogel doped with Li/S-MoX fabricated on a Cu doped rGo. It is for the first time anywhere across the globe that the electrodes have been made replaceable which in addition of providing safety measures and cost effectiveness too. The batteries have been designed in such a manner that, when electrodes do not function up to a satisfactory level after expiry of initial few years (as recommended), further customers can purchase two new electrodes with nominal cost in order to make the batteries refreshed and could be made hassle free workable for few more years. Battery has passed all test / measures as per international norms as recommended. In total performance was found approximately 20 % better than available batteries in the same segment. Replaceable electrodes have been made circular in shape in order to enhance high surface area.

Another novel feature of the batteries, there are handy provisions for making the batteries scalable so that it can be used like, either class AA or AAA batteries in the same segment. The basic material used in the preparation of batteries is from waste polymers and harmful wild grasses whose patents have been already filed.

RUNNERS-UP

9th National Awards under the Category of "INNOVATION IN POLYMER WASTE MANAGEMENT"


Dr. Smita Mohanty


Dr. Sonalee Das


Shri Indrajeet Singh

CIPET:SARP - APDDRL, BENGALURU

CIPET:SARP - LARPM, BHUBANESWAR

Central Institute of Plastics Engineering and Technology (CIPET) has established Schools for Advanced Research in Polymers (SARP) for providing cutting edge R&D facilities in the niche areas of Polymeric Materials, Product Development, Waste Management and Energy Harvesting & Storage. Laboratory for Advanced Research in Polymeric Materials (LARPM) at Bhubaneswar and Advanced Polymer Design & Development Research Laboratory (APDDRL) at Bengaluru, the exclusive R&D labs of CIPET established under the aegis of SARP serve to cater the research needs and techno-socio-economic requirements of the country. The R&D wings provide *"stop-shop facility'* for technology conception to product development and commercialization in major sectors like automotive, aerospace, healthcare, packaging, construction, energy, defence and additive manufacturing.

Dr. Smita Mohanty is the Director (Principal Scientist) and In-charge of LARPM with more than 16 years of Research and Teaching experience. She has published more than 250 papers in major International Journals and has many patented technology and textbooks/chapters to her credit. She has initiated several advanced areas of research at the R&D units of CIPET and has successfully completed several sponsored projects as Principal Investigator in the burning topics like E-waste Recycling, Biopolymers from Natural Resources, Polymer Electrolytes, Value addition for bio-medical plastic wastes, Polymer composites for automotive application and Development of non-HCFC technology for foam sectors etc. She has also guided many Ph.D and M.Tech students in the aforementioned areas.

Dr. Sonalee Das is working as Junior Scientist in SARP-APDDRL, Bengaluru. She has nearly 06 years of Teaching and Research expertise in the areas of Bio-based polymers, Green coatings, Nanocomposites, Nanoparticle synthesis and Development of eco-friendly foam formulations. She has published 12 nos. of articles in various peer-reviewed International Journals, 03 book chapters and 01 patent filed with 160 citations till date. She has also guided B.Tech, M.Sc and M.Tech students in the research areas pertaining to UV resistant Coatings, Nanocomposites and Polymer Synthesis.

Shri Indrajeet Singh is a Ph.D scholar in SARP-LARPM, Bhubaneswar. He has 03 years of experience in polyurethane foam formulation and synthesis. He has published 03 nos. of research articles in peer reviewed international journals. He pursued M.Sc Tech degree from CIPET, Bhubaneswar in 2016 and has been awarded for his distinguished performance.

"DEVELOPMENT OF ECO - FRIENDLY GREEN POLYURETHANE FOAM BASED ON NON HCFC AND LOW GWP BLOWING AGENTS"

Dr. Smita Mohanty, Dr. Sonalee Das & Shri Indrajeet Singh

India as a part of Vienna Convention (1985) and Montreal Protocol (1987) is currently phasing out HCFC-141b blowing agent by 2020 to protect the ozone layer. Most of the foam enterprises and MSMEs have already shifted to non-HCFC and low global warming potential (GWP) blowing agents such as cyclopentane and Ecomate (i.e. Patented by Foam Supplies Inc.). However, the major drawback behind using these non-HCFC blowing agents is the lack of technical awareness, know-how of chemical ingredients, required infrastructure and optimization of formulations. Indian case studies indicate that Ecomate can be used for application with density above 35 kg/m^3. On the other hand, for thermoware and discontinuous panel applications etc. the requirement of density is quite lower wherein, higher shrinkage is observed. Thus, the need of the hour is exclusive R & D activities in the field of developing eco-friendly foam formulations using alternative eco-friendly blowing agents for the successful eradication of HCFC-141b by 2020.

The present invention is aimed to establish foam formulations with similar properties (i.e. density, gel time, cream time and tack free time) using Ecomate as blowing agent in place of HCFC-141b for thermoware and discontinuous panel applications. The major problem addressed in the present study was to optimize foam formulations using Ecomate with shrinkage less than 5 % and for density range varying within 22-24 kg/m^3. The various advantages of the developed foam formulation included improved processability, excellent dimensional stability and negligible shrinkage with uniform cell morphology.

WINNER

9th National Awards under the Category of "INNOVATION IN GREEN POLYMERIC MATERIALS & PRODUCTS"


Dr. Johnsy George


Dr. R. Kumar


Dr. V A Sajeev Kumar


Dr. S N Sabapathi


Shri Sunny Kumar

DEFENCE FOOD RESEARCH LABORATORY, MYSURU

The Defence Food Research Laboratory (DFRL), Mysore was established in December, 1961 under the aegis of Defence Research & Development Organization (DRDO), Ministry of Defence to cater to the strategic, operational requirements of our Services and to provide logistical support to the Armed forces in the area of food supplies. The R & D efforts at DFRL are aimed at designing and developing light weight, convenient, pack rations for the Army, Navy, Air force and other paramilitary forces, which do not require any elaborate cooking or preparation at the consumer's end and remain shelf-stable under varying climate condition for periods ranging from 6 months to 1 year. DFRL is the leader in convenience foods and packed ration developments in this country.

Dr. Johnsy George is a Scientist in Food Engineering & Packaging Division of Defence Food Research Laboratory, DRDO, Mysore, Karnataka. His research areas include the development of newer polymeric materials and their nanocomposites suitable for food packaging applications. He obtained Ph.D. in Polymer Science and Technology from Visvesvaraya Technological University, Belgaum, Karnataka. He has published 35 international research publications, 5 book chapters and got three patents to his credit. His research work has been recognized by a number of awards including Dr. M. Mahadeviah award, AIFPA, New Delhi and Laljee Godhoo Smarak Nidhi Award, AFSTI, Mysore in recognition of excellence in R&D activities in the field of food packaging materials. He is a recipient of the DRDO Technology Group Award during 2012, 2014 and 2019. He is a member of Scientific Panel on Packaging, Food Safety and Standards Authority of India (FSSAI).

Dr. R. Kumar, obtained his M.Sc in Food Science & Nutrition from Tamil Nadu Agricultural University, Coimbatore and Ph.D in Food Science from Bharathiar University, Coimbatore. Presently working as Scientist 'F' & Head, Food Engineering & Packaging Technology Division in DRDO- Defence Food Research Laboratory (DFRL) Mysore. He has 90 research papers and 15 patents to his credit. He has received many awards including DRDO Performance Excellence Award and Thomson Edition Award. He has 24 years of experience in food packaging, thermal and non thermal food processing technologies. He has transferred technologies such as retort pouch processing and tender coconut water processing for commercialization.

Dr. V. A. Sajeevkumar is working as Scientist 'F' in Defence Food Research Laboratory, Mysore. He completed his Ph D in Chemistry (Infrared Spectroscopic Studies on Molecular Interactions) from IIT Madras in 1998. He has 3 Indian patents granted and 3 submitted in Indian Patents Office. He is also having more than 35 publications to his credit. His area of interest is applications of Infrared Spectroscopy in food and packaging analysis.

Dr. S. N. Sabapathi obtained his M.Sc in Chemistry from Annamalai University and Ph.D in Chemistry from University of Mysore. Retired as Scientist 'G and Head, Food Engineering & Packaging Technology Division during May 2019 in DRDO- DFRL, Mysore. He has 120 research papers and 20 patents to his credit. He has received many prestigious awards including DRDO Performance Excellence Award, Thomson Edition Award, Technology Group Award and Laboratory scientist of the award. He has more than 33 years of rich research experience in the field of food packaging, thermal and non thermal food processing technologies. He has transferred technologies such as retort pouch processing and tender coconut water processing for commercialization.

Shri Sunny Kumar is working as Technical Officer at Defence Food Research Laboratory, Mysore. He is pursuing his B Tech Degree in Electrical Engineering from Institution of Engineers, Kolkata. He had been associated with several projects directly related to defence forces, at DFRL, Mysore. He has one patent submitted to Indian Patent Office and more than 10 publications in reputed journals. His current area of interest is smart electronic devices.

"DEVELOPMENT OF A MODIFIED PACKAGING SYSTEM FOR SEA DYE MARKER THAT RELEASES FLUORESCENT DYE WHEN COMES IN CONTACT WITH WATER"

Dr. Johnsy George, Dr. R. Kumar, Dr. V A Sajeevkumar, Dr. S N Sabapathi & Shri Sunny Kumar

Sea Dye Marker is a visual distress signalling system, that helps a search aircraft to locate the position of a pilot/person who accidentally fell in the water during an emergency. The sea dye marker consists of a fluorescent green dye, which fluoresce brilliantly when dissolved in water. When the dye is released into the sea or any other water body it leaves a trail or pattern that is visible from a distance of 1 km or more by rescue aircraft. The bright, fluorescent green colour increases the likelihood of being identified and enhances the chance of rescuing a pilot/person landed in the sea during an emergency.

The packaging design was made in such a way that it can extend the shelf life of the fluorescent dye and helps to maintain its quality for a longer period. The use of a non woven polyolefinic fabric in making the pouch that contains fluorescent dye makes enable heat sealing that makes the process of pouch making much easier. In this innovation, a thermoplastic PU coated fabric was used as a heat sealed envelope to enclose the dye containing pouch, which has better mechanical properties, abrasion resistance and tear strength. This fabric is having other advantages such as it remains soft and supple without cracking, light in weight and also breathable. This technology has been developed primarily for Indian Air Force, as an import substitute in life saving personal survival pack items.

WINNER

9th National Awards under the Category of
"INNOVATION IN PACKAGING TECHNIQUES INCLUDING CREATIVE DESIGN"

Dr. Swati Shukla

BIOLMED INNOVATIONS PVT. LTD., PASHAN, PUNE

BiolMed Innovations is an innovation-driven medical products company. We develop and manufacture tissue regeneration (implants) and wound healing products, based on biopolymers. The technology is based on a proprietary knowhow backed by international patents. BiolMed Innovations is a spin-off of CSIR-NCL, a premier national laboratory. BiolMed's founders are experienced biomed technology developers with backgrounds from IIT, UDCT, Delaware, Cambridge, MIT and GE. Currently, BiolMed is incubated at Venture Center, Pune. VC is a technology business incubator.

Dr. Swati Shukla, Co-founder and Chief Operating Officer, Dr. Shukla has a long and varied experience in the field of life sciences. She has a Ph.D. from University of Pune and has led various research projects. She brings life sciences insights and leads BiolMed Innovations activities, as Chief operating officer.

"NOVEL BIOPOLYMER BASED OSTEOCONDUCTIVE BONE GRAFT SUBSTITUTES FOR OSTEOPOROTIC FRACTURES"

Dr. Swati Shukla

Worldwide, osteoporosis causes more than 8.9 million fractures annually, resulting in an osteoporotic fracture of hips, shoulders spine and wrist, every 3 seconds. Overall, 61% of osteoporotic fractures occur in women. Surgeon use a bone graft or its substitute to support healing. However, none of the bone graft substitutes based on synthetic materials (polymers, ceramics, metals and their composites) match the performance of bone grafts. The challenge is achieving optimum combination of porosity, mechanical properties along with biocompatibility. Our flagship product Serioss® addresses this unmet need. It is a bone void filler with autograft like properties and can be used to fill defects or voids in the bone, caused due to trauma, infection, cancer, ageing etc.

Serioss®, the novel osteoconductive bone graft substitute is based on a natural polymer the recently completed preclinical studies on Serioss® shows outstanding results. In laboratory and in animal studies, Serioss® has been demonstrated to be safe/nontoxic as well as promoting bone healing and supporting deposition of new bone. Serioss® out-performs all other alternative products in the market by at least 100% in bone growth and deposition studies. Serioss®, thus matches performance of an autograft, while retaining the convenience of use of a bone graft substitute. It provides appropriate mechanical, chemical and structural cues for new bone formation. It can be made in a variety of shapes and forms for the surgeon to choose appropriately depending on the fracture site and cavity size.

Serioss® is first of its kind, which has potential to be strong contender to become most desirable bone void filler, both in Indian and global market.

WINNER

9th National Awards under the Category of "POLYMERS IN PUBLIC HEALTH CARE"

Dr. Lakshminarayanan Ragupathy

Dr. Rajmohan Gopimohan

HLL LIFECARE LIMITED,
TRIVANDRUM

Dr. Lakshminarayanan Ragupathy is a polymer chemist and working as a Deputy Vice President (R&D), HLL Lifecare Limited (A Government of India Enterprise), Thiruvananthapuram, Kerala (2012-current). He completed his Ph.D. at Heriot-Watt University, Edinburgh, UK (2002-2006). Further, he worked as a postdoctoral fellow (2006–2012) at University of Manchester (UK), Max Planck Institute for Polymer Research and University of Ulm (Germany).

At HLL, Dr. Ragupathy's team is working to develop polymer based biomaterials and devices for personal and pharmaceutical applications (e.g. 2-dimensional materials incorporated natural/synthetic rubber thin films based next generation condom/gloves/catheter/power chains, polymer based nanomaterials for controlled immunostimulation, leukocyte filters etc.). During his work at HLL, he has successfully developed an innovative technology (patented) to produce few layers pristine graphene incorporated natural rubber latex condoms [concept to prototype, scale up (1 to 2000 L), pre-clinical and human clinical trial] and this project is fully supported by Bill & Melinda Gates Foundation (BMGF), USA with US $ 1.1 million. He is also fruitful in receiving a number of research grants (5 Nos. as a PI and 3 Nos. as Co-PI) from various national and international funding agencies viz., BMGF, DST, DBT, ICMR and HLL. So far, he has 12 research articles published in international journals and filed 6 Indian patents (includes 1 PCT).

Dr. Rajmohan Gopimohan is working as a Deputy General Manager, HLL Lifecare Limited (A Government of India Enterprise), Thiruvananthapuram, Kerala (2012-current). He did his MBBS in Alleppey Medical College, Kerala and completed his internship in 2001. He was engaged in clinical practice and went on to do a PhD in tissue engineering at National Institute of Immunology, New Delhi and completed on 2010. Further, he worked as a postdoctoral fellow (2010–2011) Sree Chitra Tirunal Institute of Medical Science and Technology, Trivandrum, Kerala.

At HLL, his team is entrusted in carrying out clinical research of products developed at the corporate R&D center of HLL Lifecare Ltd. They successfully carried out the clinical evaluation of the indigenously developed hormonal IUD device (Emily), which is currently available in the market. He received a research grant from BIRAC, Department of Biotechnology for carrying out the clinical evaluation of the drug Ormeloifene for the treatment of advanced breast cancer. The clinical trial is currently progressing in TATA memorial hospital, Mumbai. He is assisting Dr. Lakshminarayanan R. in the clinical evaluation of the novel graphene incorporated condom, which is funded by Bill & Melinda Gates Foundation, USA. He has number of research articles published in international journals and has a US patent for the fabrication of tissue engineering scaffolds.

"GRAPHENE INCORPORATED NATURAL RUBBER LATEX NANOCOMPOSITE THIN FILMS: A POTENTIAL WAY TOWARDS NEXT GENERATION CONDOMS"

Dr. Lakshminarayanan Ragupathy & Dr. Rajmohan Gopimohan

Graphene, a sp^2 hybridized two dimensional material, exhibits several unique properties such as (a) superior thermal conductivity (~5000 W/mK), (b) high modulus (~1100 GPa) (c) elasticity (20 % of its initial length) and etc. They envisaged that the incorporation of graphene into natural rubber latex (NRL) could help to overcome the current limitations of NRL condoms i.e. (i) the thickness is >70 μm, which cannot be reduced further (i.e. <55 μm) and (ii) very low thermal conductivity (0.15 W/mK). This result in NRL condoms are acting as an insulator, hence, may hinder the warmth flow in between the partners during intercourse. Therefore, the large population believes that condoms reduce the sexual pleasure and not willing to use regularly, eventually increases the incidence of STIs and unexpected pregnancies.

They have developed a simple, scalable and safe processing method to produce few layers defect free graphene incorporated NRL condom, which has increased (a) thermal conductivity (400-900%) and (b) tensile strength (up to 40%) without affecting its % of elongation. (a) would help to increase the sensitivity and the sexual pleasure of the users whereas (b) would allow to decrease the condom breakage and thickness (>70 to ~50 μm) and both will increase the number of condom users worldwide regularly. This technology has also been scaled up (1 to 2100 L) and the produced graphene condom is under human clinical trial in India, South Africa and Nigeria.

RUNNERS - UP

9th National Awards under the Category of "POLYMERS IN PUBLIC HEALTH CARE"


Shri Sachhidananda S


Dr. Siddaramaiah


Smt. Shilpa K N


Dr. Nithin K S


Shri Jagajeevanraj B M

SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING, MYSURU

THE NATIONAL INSTITUTE OF ENGINEERING, MYSURU

Sri Jayachamarajendra College of Engineering, conceived in 1963, is the dream child of Jagadguru Dr. Sri Shivarathri Rajendra Mahaswamigalavaru, the 23rd pontiff of Sri Suttur Mutt. It comes under the aegis of JSS Mahavidyapeetha, which is the primary institution of many such institutions. It offers a unique learning ecosystem for the young minds with high order complex thinking, constant mentoring & motivation focusing on emerging areas of technology.

Shri Sachhidananda S is Senior Research Fellow (awarded by CSIR, New Delhi) and full-time research scholar in the Dept. of Polymer Science and Technology, Sri Jayachamarajendra College of Engineering, Mysuru, Karnataka. He has authored more than 10 papers in peer reviewed journals, 35 conference papers, 03 book chapters and is a co-inventor for 02 patents. His research interest includes polymer based flexible spectral converters for advanced photonic and opto-electronic applications.

Smt. Shilpa K.N. is Part-time PhD Scholar in Dept. of Polymer Science and Technology, Sri Jayachamarajendra College of Engineering, Mysuru, Karnataka and Principal, Sri Viveka Vidyalaya Pre-university College, Mysuru. She has authored more than 10 papers in peer reviewed journals, 30 conference papers, 02 book chapters and is a co-inventor for 02 patents. Her research interest includes stimuli-responsive polymers for sensing and actuation applications.

Dr. Siddaramaiah is Dean Faculty of Science, Sri Jayachamarajendra college of engineering Mysuru, Karnataka. He has authored more than 380 research articles in reputed referred journals, around 300 conference papers, 12 book chapters, 4 review articles, 3 books and is a co-inventor of 3 patents. He is a recipient of 'Young Scientist Award-1997', in 'Chemical Science' awarded by KAAS, Bangalore, India and 'Sir C.V. Raman Young Scientist Award - 1999' in 'Chemical Technology' by KSCST, Government of Karnataka, Bangalore (2002).

The National Institute of Engineering (NIE), founded in 1946 at Mysuru is one of the oldest private engineering colleges of the country. NIE takes pride in producing some of the foremost thought leaders of the country, in its journey nearing seven decades. It seeks to create original thinkers who will lead the knowledge society of the future.

Dr. Nithin K.S. is Asst. Professor and Coordinator (NIE-Centre for Research and Development), Department of Chemistry, The National Institute of Engineering, Mysuru, Karnataka. He has authored more than 50 papers in peer reviewed journals, 40 conference papers, 08 book chapters, 04 review articles, 02 books, 04 editorials, 01 monograph and is a co-inventor for 04 patents. He is also a recipient of 'Best Ph.D., Thesis Award' from International Society for Energy, Environment and Sustainability (ISEES) and 'PROJECT OF THE YEAR' award and "Certificate of Commendation", from Karnataka State Council for Science and Technology, Bangalore.

Shri Jagajeevan Raj B.M. is a full-time PhD scholar in Department of Chemistry, The National Institute of Engineering, Mysuru, Karnataka. He has authored 06 papers in peer reviewed journals, 05 conference papers, 02 book chapters and is a co-inventor for 01 patent. His research interest includes photo-responsive polymer nanocomposites for photonic applications.

"POLYMER BASED UV ACTIVE SPECTRAL CONVERTERS WITH MULTIPLE FUNCTIONALITIES FOR IMPROVED PHOTON HARVESTING APPLICATION"

Shri Sachhidananda S, Dr. Siddaramaiah, Smt. Shilpa K N, Dr. Nithin K S & Shri Jagajeevanraj B M

Energy from sun is abundant and is projected to meet a large proportion of future energy demands. However, despite significant developments in photo-voltaic technologies, the cost-effectiveness and sunlight to electricity conversion efficiency remains a daunting task. Besides, conventional photo-active layers often suffer from fundamental spectral losses arising from relatively narrow photonic absorption response. An additional loss factor is the thermalization of photons via non-radiative relaxation of photo-excited electrons. Which have all contributed to lessened energy conversion efficacies. Lately, the scientific community has been exploring various stratagems to minimize the inherent thermalization and non-absorption losses, so as to widen the absorption response of solar cells. One such approach involves using multiple sensitizers with complimentary photonic absorption, while the other includes use of tandem devices with varied topologies. However, these approaches often present quite a few fabrication issues, which limits their practical applicability. Consequently, this invention presents an important stratagem towards extending the short wavelength limit of solar cells via a third-generation photon-to-electron conversion phenomenon, that takes advantage of passive luminescent materials as spectral manipulators. The said invention is related to the development of design flexible polymer based spectral manipulators with advanced multiple-functionalities such as enhanced mechanically flexibility, improved UV endurance, large stokes shift, easy self-cleaning abilities and high luminiscence quantum yields. The application of such films as spectral manipulators in solar cells will eliminate any competitive optical phenomenon and hence, would inherit a substantial increase in the number of affective photons reaching the solar cells. Which in-turn lead to appreciable increase in the number charge carriers and hence, improved energy conversion efficacies.


Shri Simanta Doley


Dr. Swapan K. Dolui

TEZPUR UNIVERSITY,
NAPAAM, ASSAM

Tezpur University is a Central University situated in Tezpur, Assam, India, established by an act of Parliament, in 1994. The university has four schools of studies which is divided into 21 departments. The university offers undergraduate, postgraduate degrees and conducts research in various subjects.

Shri Simanta Doley has completed his postgraduate degree in chemistry from Cotton University, Guwahati, Assam. Currently, he is pursuing PhD on the development of bio-based non isocyanate polyurethane and its nanocomposites under the supervision of Prof. Swapan K. Dolui. He has authored five papers in peer reviewed journals and two book chapters.

Dr. Swapan Kumar Dolui is a professor in the department of chemical sciences, Tezpur University. He is presently the editor of Journal of Polymer materials; (An international Journal, MD publisher, New Delhi). He has supervised more than 30 PhD students. He has authored more than 133 research articles in peer reviewed journals, six book chapters, three popular articles, nine patents and completed seventeen sponsored projects.

"DEVELOPMENT OF VEGETABLE OIL-BASED NON-ISOCYANATE POLYURETHANE THROUGH CO_2 INSERTION AND ITS COATING APPLICATION: GREEN METHODOLOGY WITH MITIGATION OF GREENHOUSE GAS"

Shri Simanta Doley & Dr. Swapan K. Dolui

Polyurethanes are an exceptional group of polymeric material which is globally the sixth most extensively used polymer. This unique polymer demonstrates excellent mechanical and physical properties like abrasive resistance, flexibility, chemical resistance, toughness and durability etc. However, traditionally Polyurethanes are synthesized by the polymerization reaction between short and long chain polyol and polyisocyanate which are petroleum-based.

Since isocyanates are petroleum dependent as well as highly toxic chemicals, so from the viewpoint of environment-friendly, health and economy, development of non-isocyanate Polyurethanes (so-called NIPUs) mainly those made from renewable resources is very important.

In this regard, they have prepared sunflower oil based non-isocyanate polyurethanes by utilizing the green house gas CO_2. Firstly, sunflower oil based cyclic carbonates were synthesized by reaction of epoxidized sunflower oil with CO_2 which is further reacts with different amine to give NIPUs. Further, the nanocomposites of the prepared NIPUs were synthesized. The prepared NIPUs exhibited a tensile strength (5.2 MPa), corrosion rate (0.0391504 mmpy) and its nanocomposites with multi walled carbon nanotubes (MWCNTs) showed an improved tensile strength (8.92 MPa), better flame retardancy properties (LOI= 30%) and microwave absorbance behavior (-17 dB).

RUNNERS - UP


Grow with
PLASTICS!

9th National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry

by
Prof. (Dr.) S.K. Nayak
Director General - CIPET &
Chairman - 9th National Awards Committee

Petrochemical Sector, one of the pioneering sectors facilitating day to day needs of the society through its upstream, midstream and downstream industries, ranging from refining, natural gas processing to chemicals, polymers & their intermediates. The industry offering substitutes for natural products, has the capacity to meet the constantly growing demand to prevent depletion of natural resources. Polymers have been a material of huge interest because of their versatility, sustainability and easy procesibility. Their presence has become imperative in household as well as industrial sectors in applications ranging from packaging & transportation, building & construction, healthcare & biomedical, to defence & aerospace. Scientists and researchers have been constantly attempting to indigenize technologies and upgrade the existing ones through novel ideas. This has led to an increase in start-ups and entrepreneurs yearning to develop ingenuous know-hows.

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

The national policy on petrochemicals was envisaged with an objective of institutionalization of National Awards for Technology Innovation in various fields of Petrochemicals and Downstream Plastic Processing Industry.

The Policy caters to (i) Development of value added, quality petrochemical products at globally competitive prices using eco-friendly processes and technologies and (ii) Innovation of newer application and products with focus on sustainable development achieved through promotion of Research & Development and Human Resource Planning & Development.

Central Institute of Plastics Engineering & Technology (CIPET) - an autonomous body under the Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India was entrusted the responsibility of implementing the award scheme. Accordingly, the scheme on "National Awards for Technology Innovation in Petrochemicals & Downstream Plastics Processing Industry" was successfully implemented by CIPET for last 8 years. There has been an enthusiastic participation of awardees, stakeholders/petrochemical industries and associations.

The 9th National award has been designed for the following categories.

01. **Innovation in Polymeric Materials:**
New Polymers, Blends & Alloys, filled materials, fibers, Polymer, Composites and Nano composites, Smart Materials etc. New Additives, Compounds for newer & special applications in defence & space.

02. **Innovation in Polymeric Products:**
New / creative product design. Non conventional application / Replacement of conventional materials (eg. Metals, ceramics etc.). Modification of product design for performance improvements. Application in defence & space

03. **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 & design of moulds, dies and auxiliary equipments.

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

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

06. **Innovation in Packaging Techniques including creative Design:**
Emerging Packing Technologies, Smart Packaging, New compound for replacement of multi-layered packages, Packaging for defence

07. **Polymers in Agriculture and Water Conservation:**
Water transportation, mulching, canal lining, Drip irrigation, Sprinkler system Low Tunnels, Poly house etc. Controlled release system for fertilizer, pesticides, 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.

08. 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.

09. Innovation in Automotive & Transportation System:

Developments and Applications in Robotics & Automation in different polymer processing techniques, Development in material movement system, Improvements in moulding & post-moulding operations.

10. Innovation in Robotics & Automation in Polymer Processing:

Use of Polymers for Indigenization of products, creative product design, replacement of conventional material, performance optimization of products for automotive & transportation system, Developments in Logistics.

11. Research in the field of Polymer Science & Technology (for Research Students of Academic Institute / Research lab.)

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

IMPLEMENTATION FRAMEWORK & OPERATIONAL MODALITIES:

266 applications were received under the aforementioned eleven 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, 06 nominations were selected as Winners and 07 nominations were selected as Runners-Up. The 9th National Award Function has been scheduled to be organized on February 13, 2020 at Bengaluru to encourage and promote technology innovation in Petrochemicals sector. Hon'ble Minister for Chemicals & Fertilizers, Government of India - Shri D.V. Sadananda Gowda shall be presenting the National Awards to the awardees in the presence of Shri Mansukh Mandaviya, Hon'ble Minister of State (Independent Charge) for Shipping and Minister of State for Chemicals & Fertilizers.

CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TECHNOLOGY (CIPET)

(Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Government of India)
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Central Institute of Plastics Engineering & Technology (CIPET) is a premier National Institute devoted to Skill development, Technology support, Academic, Research and Development (STAR) for the Plastics & allied industries in India. CIPET operates at 37 locations spread across the length & breadth of the country, which includes 7 – Institute of Plastics Technology (IPT), 23 – Centre for Skilling and Technical Support (CSTS), and 3 – School for Advanced Research in Polymers (SARP). All the CIPET centers have state-of-art infrastructural facilities in the areas of Design, CAD/CAM/CAE, Tooling, Plastics Processing, and Testing & Quality Control.

CIPET offers a blend of various specialized Academic Programmes in the field of Plastics Engineering & Technology - Doctoral, Post Graduate, Undergraduate, Post Diploma or Diploma; in order to provide techno-skilled human resource to the plastics & allied industries.

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

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

The Institute has signed various Memorandum of Understanding (MoU) for collaborative research and developmental activities, faculty & student exchange programmes with leading international Universities / Organizations at USA, Canada, Australia, Germany, France, Korea, Poland, Mexico, China, South Africa, Russia, Brazil & Durban. With strong Alumni base of about 70,000 professionals, CIPET has emerged as an apex Plastics Technology Institution, not only in India but also an unique institution of its kind, in South East Asia.

CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TECHNOLOGY (CIPET)

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CIPET 's contribution, as a Quality Education and Technical service provider has been very well recognized by the professional bodies by bestowing many awards like Plast India Foundation, Plasticon Award 2005 and Greentech Environmental Excellence Silver Award 2002; Best Performance Award: 2015-16, Official Language Implementation, Dept. of Chemicals & Petrochemicals, Govt of India and Best Performance Award (Gold Category): 2018 for Best Skill Training Provider in India from Ministry of Social Justice & Empowerment, Govt. of India.

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

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

The institute has been the Best Skill Provider in the country empowering 3.13 lacs of skilled human resources in the last 05 years with an ambitious target to groom 5.00 lacs by 2024. Similarly, during the last 05 years, 3.26 lacs of Technology Support Assignments have been successfully completed by CIPET while targeting to complete 5.00 lacs assignments in the next 05 years.

Organized by :

सेन्ट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी

CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TECHNOLOGY (CIPET)

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