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

2nd
National Awards for

# TECHNOLOGY INNOVATION

in

Petrochemicals & Downstream Plastics Processing Industry 2011-12

Thursday, 26th April 2012

Manekshaw Centre, New Delhi.

**Shri M.K. Alagiri**

Shri M.K. Alagiri
Hon'ble Union Minister for Chemicals & Fertilizers
Ministry of Chemicals & Fertilizers
Shastri Bhavan
New Delhi – 110 115.

Synthetic Polymers offer immense opportunities for development of new products. Innovation is essential to sustain the growth and remain globally competitive. To promote innovation the Department of Chemicals & Petrochemicals, Govt. of India announced the Scheme for National Awards on Technology Innovation in Petrochemicals & Downstream Plastics Processing Industry.

I am happy to note that the second National Awards function on Technology Innovation is being organized on 26th April, 2012 at New Delhi. The response from the industry is very encouraging and it has been a source of further motivation to my Department.

I congratulate the awardees who have been selected for innovation in the respective fields.

I take this opportunity to complement and thank the Department of Chemicals & Petrochemicals, Central Institute of Plastic Engineering and Technology (CIPET) and the Expert Committee members for playing a leading role in selecting the awardees.

24/4/12

*(M.K. Alagiri)*

Shri Srikant Kumar Jena
Minister of State (Independent Charge)
Statistics & Programme Implementation &
Minister of State for Chemicals & Fertilizers
Government of India
New Delhi – 110 115.

Shri Srikant Kumar Jena

It is a matter of great pleasure that the Department of Chemicals & Petrochemicals, Govt. of India is presenting the Second National Awards for Technology Innovation on 26th April 2012. The role of technology innovation in sustaining the growth of Chemical & Petrochemical sector has always been recognized.

The Department has taken several tangible steps to achieve the vision set out in the National Policy on Petrochemicals. I am glad that the National Awards are playing a vital role in recognizing the efforts of the industry and have resulted in increased participation of the industry in the scheme.

I take this opportunity to congratulate the awardees of the Second National Awards and wish that they will continue their quest for innovation in future and also set example for others to follow.

*(Srikant Kumar Jena)*

**Shri K. Jose Cyriac**

Shri K. Jose Cyriac, I.A.S.
Secretary to the Govt. of India
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers
Shastri Bhavan
New Delhi – 110 115.

Department of Chemicals & Petrochemicals formulated the scheme of National awards for Technology Innovation in order to promote Research & Development, in Petrochemicals and Downstream Plastics Processing Industry. It is encouraging to note that the scheme received tremendous response from the industry, institutions and Individuals in the second year of its implementation.

Petrochemicals Industry is likely to witness around 10% growth rate during the period 2013-17. Technological innovation is important not only for facing global challenges and remains competitive but also for addressing public apprehensions about the adverse impact of plastics on environment and health. I am happy to note that the Second National Awards function on Technology Innovation is being organized on 26th April, 2012 at New Delhi.

I wish to compliment the awardees for their meritorious innovations. I also congratulate the team members from the Department, Central Institute of Plastics Engineering and Technology and the Expert panel who played significant role in the selection process.

*(K. Jose Cyriac)*

Smt. Neelkamal Darbari, I.A.S.
Joint Secretary (Petrochemicals)
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers
Shastri Bhavan
New Delhi – 110 115.

**Smt. Neelkamal Darbari**

The first award function - National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry 2010-11 was organized by Department of Chemicals & Petrochemicals, Govt. of India on 28th November, 2011 and it witnessed a very encouraging response from the plastic industry.

The programme for incentivizing innovation has accordingly been continued and the process for selection of National Awards once again witnessed very encouraging response from the industry. CIPET & the Expert Committee have done an exemplary job in completing the process of selection of top Innovators for the Second National Awards for 2011-12 in record time.

The Department of Chemicals & Petrochemicals takes this opportunity to complement the Winners of the Second National Awards, as also CIPET and Members of Expert Committee for their efforts in making this event a successful one. It is our belief that innovation is one of the key factors to attain a competitive edge and achieve success in business.

I hope that collaborative efforts, such as National Awards, between the industry and Department of Chemicals & Petrochemicals will go a long way in the development of petrochemicals and downstream plastics industries in India.

*(Neelkamal Darbari)*

# Awardees





**Birla Institute of Technology (BIT), Mesra**
Ranchi – 835 215
Jharkhand.

**Defense Materials and Stores Research and Development and Establishment (DMSRDE)**
Kanpur -208 013, India

Dr. Akhil Kumar Sen

Shri Sandeep Kumar

**Birla Institute of Technology (BIT), Mesra,** is established in 1955 by Mr. B.M. Birla, a Philanthropist and Industrialist. The Institute attains the status of Deemed University under the UGC Act of the Government of India in 1986. BIT Mesra has several extension centers in India and abroad. It offers undergraduate, post graduate and Doctoral programs in different section of Engineering, Technology and Science.

**Dr. Akhil Kumar Sen** is an Associate Professor in the Department of Chemical and Polymer Engineering at BIT Mesra. He received his Ph.D. degree in Chemical Engineering from IIT Bombay. He has also done M. Tech. in Materials Science & M.Sc. in Chemistry from IIT Kharagpur. He has worked four years in Industrial R&D and Quality Control. Presently he is teaching and providing research guidance for undergraduate, post graduate and Doctoral students.

**Shri Sandeep Kumar** is a Polymer Engineering graduate (Gold medalist) from BIT Mesra Ranchi. He has done M.Tech in Polymer Engineering from IIT Delhi and presently working as a Scientist in Defense Materials and Stores Research and Development and Establishment, Kanpur. He has teaching experience of one and half years in Department of Polymer Engineering at BIT Mesra. He has eight years research experience in the area of polymeric materials.

# INNOVATION IN POLYMERIC MATERIALS

## "Coir Fiber Based Fire Retardant Micro Filler"

*Dr. Akhil Kumar Sen & Shri Sandeep Kumar*

Modern life can't think without the use of polymeric materials. It invades every sphere of life. Polymeric materials are inherently flammable. Statistical analysis shows that 80% fire fatalities are due to smoke and toxic gas generation during fire.

Epoxy resin is a versatile material and is used in many applications e.g. building construction, transport, recreation, electronic industries (PCB) etc. The serious drawback of this material is its flammability and smoke generation during fire. Reactive flame retardant which is used in epoxy resin are toxic in nature and the efficiency is poor.

Coir fiber a cheap lingo-cellulosic material is modified and used as fire retardant filler for epoxy resin. This substantially reduces the smoke density and increases the LOI (Limiting Oxygen Index) value of epoxy resin. This coir fiber based fire retardant filler is non-toxic, non-hazardous, environ friendly and cheap. First time in the world it has been shown experimentally that an agricultural waste (by product) can be modified to value added fire retardant filler.

**Team - Dr. Akhil Kumar Sen & Shri Sandeep Kumar is the Winner of National Awards 2011-12 under the Category of "INNOVATION IN POLYMERIC MATERIALS"**





**M/s. Gharda Chemicals Limited**
Gharda House
48 Hill Road, Bandra (West)
Mumbai – 400 050.

Dr. Keki Gharda

M/s. Gharda Chemicals Limited is a ₹ 1000 crore annual sales turnover Indian origin chemical company with Advanced Polymers, Specialty Pigments and Agrochemicals in its product portfolio. Dr. Keki Gharda is the Chairman-cum-Managing Director of M/s. Gharda Chemicals Ltd.

In-house R&D and innovations has marked the rise of M/s. Gharda Chemicals Ltd. (GCL) from a small unit in 1964 to a successful and reputed company. A strong and vibrant R&D program and expertise in process development coupled with a team of outstanding scientists headed by Dr. Gharda has enabled the company to capitalize on superior technology generated in-house. This has led to the production of vital import substitute and cost-effective products on a large scale, affordable to even marginal consumers at the national level. In addition GCL has a string competitive international presence with 60% of its earning coming from exports.

# INNOVATION IN POLYMERIC MATERIALS

## "An Economical and Environmentally Friendly Process for making Polyether Ketone (PEK)"

***M/s. Gharda Chemicals Limited, Mumbai***

GCL has developed the process technology for the manufacture of monomer and polymer of POLYETHER KETONE (PEK) since 2009 using indigenous in-house technology. PEK is available as Neat Resin in powder or granular forms and also in its many Compounded versions with Glass Fiber, Carbon Fiber, PTFE and Mineral Fillers and is sold worldwide under the trade name of G-PAEKTM. It is also available as Blend or Alloy with other Engineering Plastics.

The indigenous technology development has resulted in an investment of more than Rs 25-30 crores for the manufacturing plants at Maharashtra & Gujarat for the Monomer, PEK Resin & its Compounds. The design and installed capacities are over 100 MT/ year for PEK, over 120 MT/ year for the Monomer and over 200 MT for the compounds.

PEK is a high performance engineering thermoplastic with outstanding thermal stability, among highest of all Thermoplastics. Its Glass Transition Temperature Tg is 153 Deg.C, and its Melting Temperature is 370 Deg.C, being the highest among thermoplastics. These high temperature properties yield Continuous Use Temperature (Relative Temperature Index) of 280 Deg.C for PEK, again highest among thermoplastics.

**M/s. Gharda Chemicals Limited is the Winner of National Awards 2011-12 under the Industry Category of "INNOVATION IN POLYMERIC MATERIALS"**





**B.S. Abdur Rahman University**
Vandalur, Chennai.

**Indian Institute of Technology (IIT) Madras,** Chennai.

**M/s. Adsensors India Pvt. Ltd.**
SIDCO Electronic Complex, Chennai.


Dr. R. Vasanthakumari


Shri S. Vikram


Dr. T.S.Natrajan


Ms. A. Aarthy


Shri Jayaraman

**Dr. R. Vasantha Kumari** is the Head of Polymer Nano Technology Center & Director-Sponsored Research and Industrial Consultancy of B.S.Abdur Rahman University and she is having 39 years academic and research experience in which 15 years in SRF Ltd. (Manufacturer of nylon fibre) and 24 years in academic institutions such as IIT- Madras, NAL- Bangalore, IISC – Bangalore, State University of Groningen – Holland, Crescent Engineering College & published more than 30 research publications. She won President's National Award for the Meritorious Invention of poly aramid by National Research Development Corporation, New Delhi in 1986 and Plasticon Silver Trophy Award from Plastindia Foundation for Public Awareness in 2012.

**Shri S. Vikram** is working as Senior Research Fellow (SRF) in Polymer Nano Technology Center of B.S.Abdur Rahman University for DIPAS-DRDO project and also registered for Ph.D in the University. Two years of research experience as Research Associate in FRP/GRP industries in private firm in Gujarat and carried out work on FRP/GRP products such as FRP Lighting Poles, Composites for Wind energy rotor blade and nose cone, FRP Rail Coach Interiors. Worked as Project engineer in Filament winding GRP storage tanks, pipes.

**Dr. T.S. Natrajan** is Sr. Professor at IIT Madras in the department of Physics having more than three decades of teaching and research experience. He traveled widely and published more than hundred research papers and publications in conferences and reputed journals and he is one of the 10 Most Popular Professors on YouTube . The program covers electronic devices, laws, theorems, and so much more in an understandable way.

**Ms. A. Aarthy** is a Project Associate at IIT Madras in the Department of Physics. She has been certified as an associate in networking by CISCO. Developed a project titled "Handheld wireless patient monitoring system", a generic real-time wireless communication system designed for short and long term remote patient-monitoring applying wireless protocol.

**Shri R. Jayaraman,** Executive, M/s. Adsensors India Pvt. Ltd., is a developer and manufacturer of a comprehensive range of analytical monitoring instruments. He has been providing quality test equipments for nearly two decades. Notable among his client lists include ABB, TVS group, Tanfac (Aditya Birla group), ITC, Defense, Nuclear power plants, TATA projects, manufacturers of Treatment plants and many others who trust on Adsensors as a one stop water quality monitoring solution provider.

# INNOVATION IN POLYMERIC PRODUCTS

## "Design and Development of Digitally Controlled Heating Gloves and Heating Pads for Soldiers in High Mountain Areas"

*Dr. R. Vasanthakumari, Shri S. Vikram, Dr. T S Natarajan, Ms. A. Aarthy & Shri R. Jayaraman*

Many of our soldiers at the border mountain areas have to live several months under extreme cold conditions corresponding to sub-zero temperatures. Though they have woolen clothing including hand gloves, etc., still they are very inadequate to grapple with the really extreme cold conditions in the range of (-30 to -40 Deg C) prevailing in the base camps and also heavy on the body. In our innovation, we have developed heating gloves and heating pads with a temperature controller and rechargeable batteries under the project sanctioned by DIPAS-DRDO. We have replaced metallic wire and used carbon fiber which is a super strong material and extremely light weight. It is five times as strong as steel, two times as stiff, yet weighs about two-thirds less.

An attempt has been made to incorporate Twisted Carbon fiber yarn into polypropylene cloth at different Stitching patterns to develop Heating Gloves and Heating pads. Heating is provided with current supplied by the batteries and to conserve battery life suitable electronics control circuitry is employed to conserve minimum power that is just and sufficient to keep the palm and fingers warm. Temperature control is achieved using the controller which is programmed at certain temperatures called Set Temperatures.

If the current and set temperatures are equal or if the current temperature is more than the set temperature, then the current supply to the heating element is stopped .The carbon fiber heating element is extremely efficient as it transfers 98% of the electricity into heat by light particle conduction. The temperature control unit, located between the Gloves/ Pad and the electrical outlet, manages the level of electricity entering into the heat elements in the Gloves / Pad. The Heating element works on a low voltage and has a shutoff Mechanism to prevent the blanket from overheating. Research to use solar power as an alternative source for the heating element is planned for further Experiments.

The Trials were conducted in DIPAS lab, New Delhi in the presence of DIPAS-DRDO scientists to show the performance of the heating gloves and heating Pads. Also, the gloves and pads were tested in field in Leh (Jammu & Kashmir) by DIPAS scientist and the results were positive.

**Team - Dr. R. Vasanthakumari, Shri S. Vikram, Dr. T S Natrajan, Ms. A. Aarthy & Shri R. Jayaraman is the Winner of National Awards 2011-12 under the Category of "INNOVATION IN POLYMERIC PRODUCTS"**

**M/s. Mysore Polymers & Rubber Products Limited**
20P, K.R.S. Road, Metagalli
Mysore - 570 016
Karnataka, India.

Shri C. D. Nagarajan

Established in 1981, Mysore Polymers & Rubber Products Ltd. (MYPOL) is India's first butyl tube manufacturer. The company is preferred inner tube manufacturer to tyre companies like Goodyear, JK Tyres, CEAT, General Tyres among others. 'MYPOL' tubes have a strong presence in the replacement market. These are distributed across India & Sri Lanka through our 9 branches which cater to more than 1200 dealers. MYPOL is tightly integrated with its own Compound Mixing, Testing & Manufacturing facilities. This helps in product quality and dramatically shortens product development time. Shri C.D. Nagarajan is the Managing Director of MYPOL.

Its rubber product activity spans a number of solutions for critical applications in defense, space, medical & severe environments in cement, garment industries.

With its in-house expertise in rubber technology, product & process innovations, knowledge of manufacturing processes, ability to keep costs in control, MYPOL has been catering to critical rubber product requirements from across the world. Exports span more than 20 countries including United States, Germany and Holland among others. We are accredited with ISO 9001:2008, ISO/TS: 16949:2009 & ISO 14001:2004 (TUV NORD Germany) for design, development, manufacture and supply of automotive inner tubes & rubber products.

# INNOVATION IN POLYMERIC PRODUCTS

## "Toroidal Rubber Tube"

### *M/s. Mysore Polymers & Rubber Products Limited*

Vikram Sarabhai Space Center (VSSC) Thiruvanthapuram approached Mysore Polymers & Rubber Products Limited (MYPOL) for a toroidal tube for use as a water container to be used in spacecraft to cool rocket engine. This tube shaped like a pneumatic tyre inner tube however it differs in its extra constructional and operational features.

Generally development & manufacture of polymer products entail manufacture of expensive tooling (molds, dies, fixtures). One of the objectives was to keep costs (including initial investment, storage, transportation) down to minimum. Materials and process have been designed with this very important constraint in mind.

Development where criticality of application and function cannot be compromised with severe constraints of costs could be achieved by application of innovative ideas and application of more than half decade of experience in developing products for critical application in polymeric material.

MYPOL design & development team developed a polymer product to replace a heretofore used metallic product in space bound rockets. We at Mypol feel this innovation can open up opportunities for Indian space industry to offer technology to other countries. With support and expertise in polymers that is second to none, design & development, indigenization, polymer application development in new and critical areas can be explored with confidence for various private and government initiatives.

**M/s. Mysore Polymers & Rubber Products Limited is the Winner of National Awards 2011-12 under the Industry Category of "INNOVATION IN POLYMERIC PRODUCTS"**





**M/s. Flytech Engineering**
No. 1/10, Porur-Kundrathur Main Road
Periyapanichery
Gerugambakkam Post
Chennai – 600 122.

Shri G. Sekar

Shri G. Sekar is the Chief Operating Executive and Proprietor of M/s. Flytech Engineering. He born and brought up from Mannarcudi, Thiruvaarur Dist, Tamil Nadu, who is basically a Mechanical Engineer from Shanmuga Engineering College, Thanjavur, Tamil Nadu and also have experience and exposure with a leading Germen manufacturer of extruders in the early 1990's and his vision - design with manufacture and delivered to the customer with high quality with energy saving extrusion plants which are processing any polymers and also with any natural fillers like wood, rice husk and sisal fibre with low maintenance cost.

Flytech, first produced indigenous spares for imported machineries and then designed and manufactured segmented (both barrel and screw) single screw extruder plant and co-rotating twin screw intermeshing extruder plant with side feeder for Indian wood powder as a filler for compounding and also for coloring, recycling, film, profile extrusion like, sheet pipe and channels for RPVC , HDPE etc.

# INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS

## "Twin Screw Extruder (Co-Rotating) for Indian Wood Powder & Polymer (Virgin or Reprocessed) Processing"

*Shri G. Sekar*

Flytech twin screw co-rotating intermeshing extruder machine for polymer and with Indian wood powder process for quality output with international standard .The extruder machine construction which consist of three phase induction motor, helical geared thrust bearing gear box, segmented barrel assemble and two screw shaft. In our machine highly robust barrels assemble and screw shaft are specially made by segmentation for the venting feature we use two types of vent these vent features are atmospheric vent and another one is vacuum vent. To release the moisture from the molten material we are using external vacuum degassing system. We use Twin Screw Side Feeder for feeding Indian wood powder force into main screw line. The twin screw side feeder is controlled through AC inverter. We are using Volumetric Feeder to feed the material for throat side and for side feeder. The segmented co rotating twin screw extruders which makes the internal compression and pressure into the barrels. By the venting feature we can eliminate hundred percentage of the moisture from the processing material.

Segmented screw profile assemble consists of different zone assemble:

Modified polymer feeding zone ⟶ Melting zone ⟶ Dispersion by high shear kneading elements ⟶ Indian wood powder feeding and conveying zone ⟶ Melting zone ⟶ Dispersion by high shear kneading elements ⟶ Degassing and discharging zone ⟶ Metering zones ⟶ Wood polymer composite out from die.

Melt the modified polymer in homogeneous manner. Feeding of Indian wood by twin screw side feeder .Molten Polymer and wood powder are mixed and homogenized under the pressure and appropriate temperature. The continuous WPC homogenize strands automatically pulled in by the rotation of the screws. This machine is capable of taking inside nano clay so FR grade WPC can be processed.

Any ordinary Indian wood powder can be used along with virgin or reprocessed polymer. This will replace Aluminium and wood usage with big cost advantage and high new employment opportunity in polymer industry.

**Shri G. Sekar is the Winner of National Awards 2011-12 under the Individual Category of "INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS"**





**M/s. Lohia Starlinger Limited**
D-3/A, Panki Industrial Estate
Kanpur – 208 022.

LOHIA STARLINGER LIMITED

Shri Raj Kumar Lohia

**LOHIA STARLINGER LTD. (LSL),** a LOHIA GROUP COMPANY, incorporated in 1981, is a leading Machine Manufacturer for Plastic Woven Fabric Industry enjoying over 60% of market share in India and also emerged as the leading Global Machinery Manufacturer for Raffia Industry with strong presence in more than 60 countries. Technological innovation for improvement in quality & productivity of LSL machines has been the main mantra & vision for growth under the leadership of Group's Chairman - Shri Raj Kumar Lohia supported by a dedicated team of skilled engineers, technologists and committed 1500 strong workforce.

# INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS

## "Energy Efficient Heating System for Tapeline machines"

***M/s. Lohia Starlinger Limited, Kanpur***

With the rapid Industrialization, world over policy makers are insisting on developing Technologies which are aimed at Energy saving & help in reducing carbon emission. In Plastics Manufacturing Sector, the major Energy consumed is in heating up the barrel to melt the thermal insulating Plastics material for converting them into different useful products. Taking up as a challenge, LSL team of Engineers started working on the mission mode project to develop Energy Efficient Heaters for Tape Plant, which is a variant of Plastics Extrusion Process.

The innovative ideas of LSL team evolved from understanding of important aspects such as to minimize Heat loss during Heating Cycle, optimum cooling cycle & to attain uniformity of Heat over Barrel, ultimately translated into a new design and development of Band Heaters with great potential for energy saving as well as reduction of carbon emission. On the basis of field trials of these innovative Band Heaters of LSL in the Tape line Industry, it has been found that on an average 74880 KWh per Annum energy can be saved in one machine complimented with carbon reduction of 39 tons per machine. These heaters can also be used for any Plastics Extrusion process.

**M/s. Lohia Starlinger Limited is the Winner of National Awards 2011-12 under the Industry Category of "INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS"**





**M/s. Harita NTI Limited**
A3, Ist Main Road
Ambattur Industrial Estate
Chennai – 600 053.

Shri N. Sriram

Harita NTI Limited is a Joint Venture between Harita (a TVS Group Associate) and Northern Technologies International Corporation (NTIC), USA. Their core business is providing VCI based anti-corrosive packaging solutions. They are also actively working on two emerging technologies; namely a) Biodegradable/Biobased materials, and b) Polymer Energy (Conversion of Plastic waste back into crude oil). Shri N. Sriram is the President of M/s. Harita NTI Limited.

A brief write-up on their technologies is given below:

**Zerust®** Anti-corrosive packaging solutions: This is the business of helping customers deploy effective and manageable corrosion prevention systems to control corrosion concerns across their production facilities and supply chains. This is done through a combination of products, services and consulting. These systems have been deployed by almost all major automotive companies and automotive component manufacturers.

**Polymer Energy:** The Polymer Energy Technology is an ecological waste processing technology and an Environmental Green Project, thanks to which artificial waste materials are converted to liquid fuel for electrical power. The final product is similar in composition to crude oil. The installation transforms in a de-polymerization process, uncrushed sand, glass or metal polluted base comprising of polyolefin waste, polyethylene and polypropylene.

**Natur-Tec®:** Their Natur-Tec range of biodegradable/biobased products comprises of biodegradable/biobased films, biodegradable polymer coated paper, starch based foams, biobased/biodegradable injection molded products etc. with superior performance properties such as strength, elongation, impact, cushioning etc. All their products are completely safe - to the benefit of both the environment and our clients. They are fully biodegradable, become readily available nutrient/food source for microorganisms and eventually form part of the microbial food chain, when disposed of in soil or under composting operations.

# INNOVATION IN POLYMER WASTE MANAGEMENT & RECYCLING TECHNOLOGY

## "Polymer Waste Management & Recycling Technology"

***M/s. Harita NTI Limited, Chennai***

Polymer Energy Technology addresses the last degree of plastics typically municipal waste where no other recycle options are economical or stable. Waste plastics with up to 10% of non plastic content such as sand, dust, moisture etc gets converted into useful hydrocarbon combustible and transportable fuel, Co-products such as non condensable gasses which are reused by the plant for its own operations.

**Significance:**

a. Oil synthesized is similar to furnace oil in terms of physical and chemical properties thereby replacing furnace oil
b. Regardless of variations feed plastic mass (within the PE, PP, PS classification) the oil produced is nearly the same
c. The gas generated is sent back to the reactor so that no hydrocarbon is wasted during the process
d. The sludge formed (composing the fillers and the colors from the plastic fed) are self cleaned without physical cleaning operations
e. The plant capacity can be increased to great levels in the form of addition of identical modules in multiples to manage the growing waste management requirement

**Advantages:**

a. Commercial scale true End-Of-Life technology for plastics.
b. PE Oil has its applications wide across segments (external combustion) with easy transportation and storage.
c. Complete utilization of calorific value of the crude oil mined (after its life cycle as plastic) unlike certain other technologies like dumping / road building where huge amount of calorific value is lost.
d. Cleans-up municipal wastes junks thereby improving sanitation conditions.
e. Improves Foreign Exchange position for country like India where oil is imported.

**M/s. Harita NTI Limited is the Winner of National Awards 2011-12 under the Industry Category of "INNOVATION IN POLYMER WASTE MANAGEMENT & RECYCLING TECHNOLOGY"**



**M/s. The South India Textile Research Association**
13/37 – Avanashi Road
P.B.No. 3205
Aerodrome Post
Coimbatore – 641 014.


Dr.K.P Chellamani


Shri S.Palanivelayutham


Shri G.Panneerselvam

**The South India Textile Research Association (SITRA)** is a link in the chain of National laboratories in the country, Sponsored by the Textile industry and supported by the Ministry of Textile, Government of India. The foundation stone of SITRA was laid by the then prime minister Pandit Jawarhalal Nehru on 25th December 1955. SITRA's own building was declared open by the then vice president of India Dr.S.Radhakrishnan on 13th October 1958. Shri.Kasthuri Sreenivasan, Founder Director of SITRA receiving Padma Bhushan Award from Dr.Zakir Hussain the then president of India in 1969. SITRA's Silver Jubilee celebrations were inaugurated by the then president of India Shri. N.Sanjeeva Reddy on 8th April 1981. SITRA's Golden Jubilee celebrations were inaugurated by the then president of India Dr. A.P.J. Abdul Kalam on 24th February 2007. NRDC Award has been received in 6 times for SITRA's research works. A Centre of Excellence for Medical Textiles has been established at SITRA under Mini Mission I of Technology Mission of Technical Textiles promoted by Ministry of Textiles, Government of India .

**Dr. K.P. Chellamani** obtained his M.Tech (Textile Technology) Degree from Anna University, Chennai in the year 1981 and Ph.D from Bharathiar University, Coimbatore in the year 2001. He joined SITRA in the year 1981 soon after graduation and at present he is the General Manager - Projects. He has to his credit over 275 research and review papers in Indian and International textile journals and he is also a co-author of 15 monographs published by SITRA and he has been awarded the F.T.A. by The Textile Association, (India), Mumbai in the year 1991 and F.I.E. by the Institution of Engineers (India), Kolkata in the year 2003. He is a Qualified Lead Assessor for auditing ISO 9000 Quality Systems and is a recipient of 20 National Awards in recognition of his research work in different areas of spinning & Technical textiles. The awards include NRDC independence Day award, WIPO Gold Medal Award, Best Technical Book award, C.D.Foundation Trust award, Outstanding Fellow Corporate Member Award etc. He is a recognized Ph.D. Supervisor of Anna University, Chennai and Bharathiar University, Coimbatore

**Shri S. Palanivelayutham** obtained his LTM in Textile Technology from PACR college in the year 1967. He has 45 years experience in Textile fields. He is a Lifetime member of Textile Association of India (TAI). He has been worked in various mills in around Tamilnadu as General Manager. He joined in SITRA as special officer in the year 2008. He has published many research articles in leading textile journals.

**Shri G.Panneerselvam** obtained his Diploma in Textile Technology from S.S.M. Institute of Technology in the year 1987 and also obtained his M.B.A in Marketing Management from IGNOU in the year 2010. He is a first class rank holder. He joined in SITRA, Coimbatore in the year 1990. He has published around 10 research papers in various leading journals. He has also published 2 SITRA monographs. Currently he is working as an incharge of SITRA Power loom Service Centre at Komarapalayam.

# INNOVATION IN GREEN POLYMERIC MATERIALS & PRODUCTS

## "Manufacture of different Jute Blended Yarn Fabrics for Home Textiles and other Jute Diversified Products"

*Dr. K.P. Chellamani, Shri S. Palanivelayutham & Shri G. Panneerselvam*



At present, jute yarns are produced ( by jute mills in Kolkata, Andhra Pradesh etc ) in the linear density range of 6 lbs and Coarser. Blended yarn production using jute in blends with man - made fibres is not in vogue at present in India.

SITRA, for the first time has spun jute blended yarns in the linear density range of 3 lbs, 4 lbs etc. This is accomplished by blending jute with popular man – made fibres like polyester, Acrylic, Viscose etc. Using jute blended products a large number of home textiles were produced, most of them for the first time in India. The home textiles made using jute blended yarns include

- Curtain fabrics
- Bedsheets
- Carpets
- Made - ups
- Shawls
- Braided cordsand
- Niwar Tapes.

Techno – economic Analysis has shown that the manufacturing cost of various home textiles made using jute blended yarns is lower by 10 to 20 % as compared to that made at present using either 100 % cotton yarns or 100 % acrylic yarns etc.

There is ample scope for the jute industry for product diversification based on SITRA's technology and product manufacture.

**Team - Dr. K.P. Chellamani, Shri S. Palanivelayutham & Shri G. Panneerselvam is the Joint Winner of National Awards 2011-12 under the Category of "INNOVATION IN GREEN POLYMERIC MATERIALS & PRODUCTS"**



**Central Salt & Marine Chemical Research Institute (CSIR-CSMCRI)**
G.B. Marg., Bhavnagar – 364 002
Gujarat.

Dr. Sandhya Mishra, Dr. Pushpito K. Ghosh, Shri Mahesh R. Gandhi, Smt. Anupama Shrivastav & Dr. Sanjiv Kumar Mishra

A National Laboratory under the Council of Scientific & Industrial Research, New Delhi, the Mission of the Institute and its people is to: work in partnership with visionary sponsors and collaborators to generate the knowledge and innovations required for efficient utilization of our coastal wasteland, seawater, marine algae, solar power and silicates. The Institute also harnesses its capabilities in Bioscience, Chemical Transformation, Process Engineering, Environmental Monitoring, Separation Science and Analytical Science to address focused needs of industries and organizations in the region and beyond in addition to fulfilling the important role of human resource development

Plastics are affordable materials which offer enormous convenience to the common man. These have numerous specialty applications too. Being lightweight, these contribute valuably to energy efficiency. From the perspective of sustainable development, a key concern is their non-biodegradability. Development of affordable materials which have the useful attributes of plastics – and can be made to biodegrade on demand – is therefore of paramount importance.

# INNOVATION IN GREEN POLYMERIC MATERIALS & PRODUCTS

## "Microbial Synthesis of Green Plastic - Polyhydroxyalkanoates (PHA) using Jatropha Biodiesel Waste Residues"

*Dr. Sandhya Mishra, Dr. Pushpito K. Ghosh, Shri Mahesh R. Gandhi, Smt. Anupama Shrivastav & Dr. Sanjiv Kumar Mishra.*

Polyhydroxyalkanoates (PHAs) are a class of polymers having great utility, the first commercial product being Biopol which was introduced by ICI PLC in the early nineties. Recognizing that cost is a key deterrent in the large scale promotion of green plastics, we hit upon the idea of using the crude glycerol stream from Jatropha biodiesel production as a low cost carbon source. It was further recognized that other useful nutrients required in the fermentation process can also be met from the above crude stream and other by-product streams such as deoiled cake. The idea was taken to fruition with the support provided by Daimler Corporation, Germany and DEG as part of a phase II project on Jatropha biodiesel with backward and forward integration. Critical to the success of the concept was the discovery of a potent marine bacteria, Halomonas hydrothermalis (Accession No. MTCC 5345), which converts the carbon in the feed into PHA with 18-20% carbon conversion efficiency and with PHA content of 70-75% with respect to cell dry weight. Analytical measurements conducted in the Institute as also by CIPET, Ahmedabad and Solvay Advanced Polymers indicated similar properties to that of standard PHA (Sigma). Further, biodegradability in moist soil was evident after 50 days. The next challenge is to scale up the process from gram scale to kilogram scale and to further conduct extensive studies on the properties of the polymer and techno-economics of the process.

Patents and Publications

1. Indian Patent Application No. 1838/DEL/2009; International patent Publication No WO/2011/027353 (all claims cleared for National phase filing in different countries).
2. International Journal of Biological Macromolecules, 2010, 47:283–287; World Journal of Microbiology and Biotechnology, 2011, 27, 1531-1541.

**Team - Dr. Sandhya Mishra, Dr. Pushpito K. Ghosh, Shri Mahesh R. Gandhi, Smt. Anupama Shrivastav & Dr. Sanjiv Kumar Mishra is the Joint Winner of National Awards 2011-12 under the Category of "INNOVATION IN GREEN POLYMERIC MATERIALS & PRODUCTS"**





**Gauhati Unviersity**
Jalukbari – 781 014
Assam, India.

**Dr. Nirmala Devi**

Dr. Nirmala Devi is currently working as a UGC-Dr. D.S.Kothari Post-Doctoral Fellow in the Department of Chemistry, Gauhati University, Assam, India. Her constant endeavour towards development of natural biodegradable polymeric controlled release system for pesticide by continuous research and development activities make her promising innovator in this field. She has several international and national publications in reputed journals to her credit. Her research in the development of neem seed oil microencapsulated natural polymeric controlled release pesticide holds great potential to be used as eco-friendly future generation pesticide.

She carried out her doctoral research in Tezpur University, Napaam (a Central University) in the field of polymer science. She was graduated with specialization in Chemistry and her post-graduation was in Polymer Science. She is continuing her research in the field of Polymer Science for the development of new innovative and improved products for future generation.

# POLYMERS IN AGRICULTURE AND WATER CONSERVATION

## "Development of Neem Seed Oil Microencapsulated Natural Polymeric Controlled Release Pesticide"

*Dr. Nirmala Devi*

Neem Seed Oil is a potent biopesticide. But application of it to the soil is limited due to its liquid nature. Microencapsulation gives it a solid form. Controlled release by polymers enhances its efficiency. Natural polymers, due to their biodegradability and eco-friendly nature, cost effectiveness, free availability and most important - their biodegradability nature, are undoubtedly the best choice for soil applications. Thus, the polymers of natural origin were used for microencapsulation of the biopesticide neem seed oil.

The pesticide delivery micro/nano particles were prepared with the use of green solvents only. Water and food grade sunflower oil were used as medium. Attempts have been made to develop the whole system fully biocompatible and eco-friendly with the retaining of its required properties. These natural biodegradable pesticide delivery vehicles possess great potential to deliver pesticides at controlled rate for a long time. These neem seed oil microencapsulated natural polymeric controlled release pesticide possess the potential to reduce environmental pollution and to be used in the future.

**Dr. Nirmala Devi is the Winner of National Awards 2011-12 under the Individual Category of "POLYMERS IN AGRICULTURE AND WATER CONSERVATION"**

**M/s. Jain Irrigation Systems Limited**
Jain Plastic Park, P. O. Box 72
N. H. 06, Bambhori
Jalgaon – 425 001.

Shri Ajit B. Jain

Jain Irrigation Systems Ltd. is a diversified entity with turnover in excess of `4500 crores. We have a Pan-India & Global Presence with 26 manufacturing bases spread over 4 continents. Our products are supplied to over 116 countries with able assistance from more than 6700 Dealers and Distributors worldwide. Shri Ajit B. Jain is the Joint Managing Director of M/s. Jain Irrigation Systems Ltd.

They are the largest Micro Irrigation Company in the world. The Micro-irrigation Division manufactures the full range of precision-irrigation products; provides services from soil survey, engineering design to agronomic support; nurtures a sprawling 2000 acre Hi-Tech Agri Institute; a Farm Resource R&D, Demo, Training & Extension Centre and undertakes turnkey projects for agricultural and irrigation development in totality. Over 1500 Agri and irrigation Scientists, Engineers, Technologists and Technicians are engaged in offering consultancy for a complete or partial project planning and implementation E.g Watershed Development through Wasteland Transformation, including crop selection and rotation. Our businesses include complete range of Micro Irrigation Systems and Components, PVC and PE Piping Systems, PVC and Polycarbonate Sheets, Solar Water Heaters and Solar Lighting, Processed Fruit & Vegetable, Tissue-Culture, Green Houses etc.

They have the distinction of being the largest processor of Thermoplastic Piping in India and annually process over 300,000 MT of various polymers. They extrude and injection mold PVC, PE, PP along with other engineering polymers like Polycarbonate, Polyamide, PBT, ABS etc. in our ISO 9001, ISO 14001 & BS OHSAS 18001 certified manufacturing facilities. Have an enviable track record as a 'Total Solution Provider' for various Piping Systems for Water, Sewerage, Drainage, Sub-Soil Drainage, SWR, HSC, Lift / Drip/ Sprinkler Irrigation, Effluents, Chemicals, Ash / Slurry, Offshore / Marine Outfall, Gas & Cable Ducting etc.

Their unending efforts in the pursuit of excellence with ongoing Research and Development have earned the Company the highest R & D awards of the country apart from numerous other awards and recognition for our performance in Exports, Fair Business Practices, Quality, Excellence, Innovation, Environment, Product development etc.

Lifetime commitments to introduce sustainable, modern yet affordable and viable technologies in all their product offerings have compelled them to be creative and innovative. They take pride in processing plastic so much, so far and so well under one roof.

# POLYMERS IN AGRICULTURE AND WATER CONSERVATION

## "Quick Connect Plus Joint - A Novel PE Pipe Joint used in Shiftable Sprinkler Irrigation Systems"

***M/s. Jain Irrigation Systems Limited***

Sprinkler Irrigation is a method of applying water which is similar to rain fall. Water is distributed through pipe systems, sprayed in air and irrigated entire soil surface through spray heads. Sprinklers provide efficient coverage for small to large areas and adaptable to all irrigation soils. Jain Quick connects plus joint is a novel PE pipe joint used in Shiftable Sprinkler Irrigation Systems. In this innovation, polyethylene pipe is first extruded using standard extrusion process. At the end of the extrusion line it is taken for an automatic operation where the pipe ends are heated, male and female sockets are formed on either ends, cooled down using anti shrinkage technology where the latent memory of polyethylene is removed. A Metal ring is used to hold this joint under pressure.

The joint is formed by inserting male spigot of one pipe into the female socket of another pipe. An elastomeric sealing is also used to prevent fluid leakage and the holding clamp prevents the axial movement of the pipe due to fluid pressure.

Commercially sprinkler Irrigation System requires welding PE pipes with male and female molded fittings. With this innovation, need for injection molded male / female fittings, coupler grooving post operation activities, butt welding process and specially skilled man power for butt welding process are all eliminated. Waste generation due to grooving is also avoided. Joint is leak proof and can be easily dismantled and installed in field. To irrigate the entire field, farmers shift the system from one part to another within their available land since they normally cannot afford a system for the entire land due to cost element. In the present innovation there is no weld joint, there will be zero failure due to absence of butt welding process. With the elimination of molded fittings requirement and also the waste generation due to grooving operation this innovation enables environmental sustainability in the product.

All these advantages, superior quality combined with low cost will enable farmer community to afford Sprinkler Irrigation System which is the need of the hour.

**M/s. Jain Irrigation Systems Limited is the Winner of National Awards 2011-12 under the Industry Category of "POLYMERS IN AGRICULTURE AND WATER CONSERVATION"**

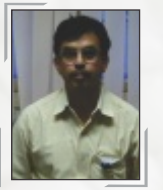
**Advanced Research School for Technology and Product Simulation (ARSTPS)**
CIPET, Guindy, Chennai – 600 032.
e-mail: arstpscipet@gmail.com
Web: www.cipet.gov.in

**Indira Gandhi Centre for Atomic Research (IGCAR)**
Department of Atomic Energy
Kalpakkam – 603 102.


Shri S.Ilangovan


Shri R. Joseph Bensingh


Shri K.Meigandan


Dr.K. Gireesan


Dr.T.S. Radhakrishnan

**Advanced Research School for Technology and Product Simulation (ARSTPS),** R&D wing of CIPET is the manifestation of qualitative research in the emerging areas of Plastics product development and life cycle analysis. The R & D centre is equipped with state of art infrastructure facilities to undertake various developmental activities in focussed areas namely:

• *Product Design* • *Product Development* • *Analysis & Simulation*

ARSTPS team work on various projects related to different domain areas such as Automotive, consumer products, Health care, telecom and aerospace to solve most challenging technical issues.

**Indira Gandhi Centre for Atomic Research (IGCAR)** under the Department of Atomic Energy is engaged in broad based multidisciplinary programme of scientific research and advanced engineering directed towards the development of Fast Breeder Reactor Technology. The successful establishment of a Fast Breeder Test Reactor has lead to the design of 500 MWe Prototype Fast Breeder Reactor and its construction is in progress. An active area of R&D is Superconductivity, SQUID sensors and applications. Magnetoencephalography and Magnetocardiography are first time developments in India in the domain of healthcare and have been sponsored by the Department of Science & Technology through a project.

**Shri S. Ilangovan,** Chief Manager (Technical) is presently heading the R&D Wings of CIPET and has 22 years of experience in the Plastics Product / Mold development. He did his M.Tech. in stress and vibration Analysis and as a team leader / member, he had executed several R&D projects.

**Shri R. Joseph Bensingh** is a Scientist, ARSTPS-CIPET. He is a M.E (Mechanical), with specialization in product design and development. He has 16 years of experience in the design and development of products and tools using CAD/CAE and CNC.

**Shri K. Meigandan** holds a Post Diploma in Plastics Mould Design and has over 5 years of experience in CAD/CAE.

**Dr. K. Gireesan** is a Ph.D (Physics) and has specialization in the areas of cryogenics and superconductivity. He is a Scientific Officer (F) at the Indira Gandhi Centre for Atomic Research. He has many publications in national and international journals.

**Dr. T.S. Radhakrishnan** is a Ph.D (Physics) and is an acknowledged expert in the areas of Materials Science, Cryogenics and Superconductivity with four decades of R&D experience. He superannuated from IGCAR as Head, Materials Science Division and is currently a DST supported Scientist at IGCAR. He has over 100 publications in national and international journals and is on the International Advisory Board of 'Cryogenics' (Elsevier).

# POLYMERS IN PUBLIC HEALTH CARE

## "Design and Development of Sensor Array Helmet"

*Shri S. Ilangovan, Shri R. Joseph Bensingh, Shri K. Meigandan, Dr. K. Gireesan & Dr. T.S. Radhakrishnan*

Magnetoencephalography (MEG) is an advanced functional brain imaging technique recording the magnetic fields of the neuronal activity and is used for the non invasive localization of cortical activity in neuroscience and for clinical diagnostics (epileptogenic foci, cognitive impairment etc.). The Helmet is used to hold the array of about 90 magnetic field sensors (SQUIDs -superconducting quantum interference devices) at predetermined positions distributed over the whole head. MEG signals are a billion times smaller than environmental disturbances; also the SQUIDs work only at low temperatures (4 K).

Meeting the requirements and constraints, CIPET designed and developed the Helmet with high positional accuracy for the sensor location and with a profile matching that of an existing liquid helium Dewar vessel.

'Additive Manufacturing' was used that produces parts by successive melting of layers of material rather than removing material as is the case with conventional machining. Each layer is melted to the geometry defined by a 3D CAD model.

The material is polycarbonate (PC) that is consistent with the process and is different from the Fibreglass (G 10) that is usually processed through casting and was chosen guided by the specialization and prior experience of using materials at low temperatures and the geometry of the application that did not allow thermal stresses to develop at low temperatures. Besides the small thickness (2 to 3 mm) of the shell of the helmet and the presence of a number of holes for locating the sensors ensured stress free configuration. This development involving complementary skills is expected to pave way for the development of other value added sub- systems of plastics, for aesthetics and for non magnetic requirement.

**Team - Shri S. Ilangovan, Shri R. Joseph Bensingh, Shri K. Meigandan, Dr. K. Gireesan, & Dr. T.S. Radhakrishnan is the Winner of National Awards 2011-12 under the Category of "POLYMERS IN PUBLIC HEALTH CARE"**

**M/s. Premier Industrial Plastics,**
C-10, Razak Garden Road, MMDA Colony
Arumbakkam
Chennai – 600 106.

**M/s. SIDD Life Sciences Pvt. Ltd.**
Plot. 4, MMDA Industrial Estate
Maraimalainagar – 603 209.


Shri B. Subramanian


Shri H. Vijayakumar

**Premier Industrial Plastics (PIP)** located in Chennai was established since 1988 to develop engineering plastic components of import substitution in automotive sector. Later PIP entered into the Parts of development of Medical devices in association with SIDD from concept level to the working model. Parts for medical devices demands highest precision and unconventional approaches too. What works in prototype many a time springs surprises at production level. Hence the task is more knowledge partnering and not just process vendoring. PIP stands committed throughout such a K path.

**SIDD Life Sciences Private Ltd.** in Maraimalainagar near Chennai services Cardiac Surgery, Airway Management & Transfusion Therapy with products pioneered in India. The ultimate aim is to shape Medical Devices Technology Centre for Cost effective delivery capabilities & platform for indigenous research. Brand is Spictra ®. Promoter is Shri Ashwin C Muthiah.

**Shri B Subramanian,** Promoter of PIP born 1960 is a first generation entrepreneur Mechanical Engineering background and Post Diploma in mould design from CIPET Chennai (1980). Machining metals to shape housings for solid to liquid to solid phase changes with an eye on application engineering is his multi disciplinary core expertise. Under his leadership PIP has many awards and recognitions to its credit.

**Shri H. Vijayakumar,** Chief executive of SIDD born 1954, holds B.E., M.S., PGDBA. Exposure 25 years with S&T Institutions and International JVs extends to Extra-corporeal Oxygenation, Defibrillation, Cadio Pulmonary bypass & Auto transfusion. Honoured with National Invention award from Min of S & T, India, Merit certificate from SCT Institute, National award from Biomaterials Society, etc.

# POLYMERS IN PUBLIC HEALTH CARE

## "Polystyrene in Blood Contact Application in Cardio Pulmonary Support"

***M/s. Premier Industrial Plastics & M/s. SIDD Life Sciences Pvt. Ltd.***

Cost effective technology for high end medical therapy is a challenge. Cardiac surgery's tech-needs are under 100% import due to high entry barrier. Cardioplegia delivery is one such segment wherein surgeon needs technology tools to access and control myocardium temperature, ionic balance & oxygenation. This innovation meets clinical needs through "Counter current – elliptical - down flow" design. The mechanical strength to house access ports & metal parts, ability to withstand low-high temperature all hitherto met through Polycarbonate as the material of choice by prior art got replaced with cost effective Polystyrene. Innovations of Device designer & Manufacturer were complimented with competent design of mould. Replacing PC to PS was challenge as device and mould design both got back to drawing boards several times to arrive at combination of rings, sand witch plates, shock absorbing media, etc. The product enjoys high user acceptance.

**M/s. Premier Industrial Plastics & M/s. SIDD Life Sciences Pvt. Ltd. is the Winner of National Awards 2011-12 under the Industry Category of "POLYMERS IN PUBLIC HEALTH CARE"**



**Indian Institute of Science Education and Research (IISER)**
Dr. Homi Bhabha Road
Pune, Maharashtra - 411008.

Dr. M. Jayakannan

The Government of India, through the Ministry of Human Resource Development (MHRD), has established five Indian Institutes of Science Education and Research (IISER). These institutes are located in Bhopal, Mohali, Pune, Kolkata and Thiruvananthapuram.

The IISERs represent a unique initiative in India where teaching and education are totally integrated with state-of-the-art research nurturing both curiosity and creativity in an intellectually vibrant atmosphere of research. Each IISER is an autonomous institution awarding its own Master and Doctoral degrees.

IISER Pune has initiated 5 year Integrated Masters programme, Integrated Ph.D. and Ph.D. programme in basic sciences in an intellectually vibrant atmosphere of research and teaching. Apart from classroom instruction, IISER builds student skills in areas such as scientific inquiry, problem solving, communication skills, computational sciences, electronics and instrumentation and workshop practices.

IISER is developing advanced teaching and research laboratories where students will have the opportunity to pursue research under the mentorship of world-class faculty. In the last five years, IISER-Pune has grown very fast and currently has 75 faculty members and 800 students in its new residential campus.

**Dr. M. Jayakannan** did his B.Sc. & M.Sc. degrees at Madurai Kamaraj University, Madurai, TamilNadu from 1990-1995. Subsequently, he joined at Indian institute of Science, Bangalore for Ph.D. programme and completed his thesis in the area of synthetic polymer chemistry in 2000. He carried out his post doctoral work at Eindhoven University of Technology, The Netherlands. In 2002, he returned to India and work as polymer scientist at GE Plastics, Bangalore for a year. Later, he joined NIIST-Trivandrum (constituent of CSIR laboratories) and worked as scientist from 2003- 2007 in the chemical sciences technology division. His academic interest moved him to newly started IISER-Pune and he is continuing there as Associate Professor in the department of chemistry.

# RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY

## "Development of New Polymers"

***Dr. M. Jayakannan***

Discovery of new chemical approaches is an important area of research for cleaner and eco-friendly industrial development of polymeric materials. Dr. Jayakannan's research led to the development of green approach – ***a novel melt transurethane chemical process*** for the production of polyurethane thermoplastics under non-toxic and environmental friendly conditions. This new invention opens up new platform of research activities for cleaner polyurethane industry.

Besides, his research group is actively engaged in developing new luminescent and electrically conducting polymer nano materials for applications in plastic solar cells. Research work is also done in his group on developing polymer based drug delivery approach for cancer related diseases.

He has published more than 50 original research papers in reputed high impact international journals and has 5 US patents. Five students have been awarded Ph.D. degree under his guidance and currently 10 students are engaged in polymer research.

He is the recipient of National Academy of Sciences (NASI) Platinum Jubilee Young Scientist award (2006) and CSIR Young Scientist Award (2007) in the area of chemical sciences for his original research contribution from India. Recently, he was selected as TWAS Young Affiliates by The Academy of Sciences for Third World (TWAS), Trieste, Italy (2010).

**Dr. M. Jayakannan is the JointWinner of National Awards 2011-12 under the Individual Category of "RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY"**





**Tezpur University**
Napaam
Tezpur
Assam - 784 028

Prof. Swapan Kumar Dolui

Dr. Isha R. Kamrupi

**Prof. Swapan Kumar Dolui** completed Ph.D in 1987 from Materials Science Centre, IIT, Kharagpur. He has served Jubilant Organosys, New Delhi as Research Executive, Central Building Research Institute, Roorkee as Scientist. Currently he is working at Tezpur University as Professor. He served the university as Head of Dept. of Chemical Sciences (1997-2002) and as Dean, School of Science and Technology (2002-2008). He has published 80 papers in Journal, 7 patents and guided (16+7) Ph.D students. He is the Asst.Editor of Journal of Polymer Materials. He is also associated with Prof. Sukumar Maiti Polymer Award Foundation for the popularization of polymer education and research. His main area of research includes olefinic polymerization, polymerization in supercritical fluid and electroactive polymer (PLED, photovoltaic, actuators, supercapacitors)

**Dr. Isha R. Kamrupi** completed Ph.D in 2012 from Tezpur University under the guidance of Prof. S.K. Dolui. He has published 12 papers in journal. Currently, he is the Marie Curie post-doctoral fellow at University of Brighton, U.K. His area of research includes polymerization in supercritical fluids and composites materials.

## "Technology for Polymerization and Preparation of the Polymer Nano Composites in Supercritical Fluid (sc-$CO_2$)"

*Prof. Swapan Kumar Dolui & Dr. Isha R. Kamrupi*

Super critical carbon dioxide (sc-$CO_2$) has been attracting interest as a polymerization and processing media, primarily driven by the need to replace the conventional solvents with more environmentally benign and economically viable systems. It is an attractive substitute for organic non-polar solvents for a variety of reactions. It possess many advantages like non-flammability, high diffusivity, low cost, low viscosity, compressibility nature, etc. Moreover, the product can easily be separated by depressuring $CO_2$. DeSimone *ET. Al.* pioneered the dispersion polymerization of methyl methacrylate in sc-$CO_2$.

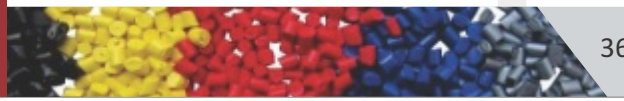
We have utilized sc-$CO_2$ as polymerization medium to prepare polymer/metal nanocomposites. Polymer/metal nanocomposites are receiving great scientific interest for their effectiveness in catalysis and antimicrobial activity. The antimicrobial potential of metal nanocomposites (Ag, Cu, etc.) allures the global scientific community to use this property for the welfare of human being.

We have successfully prepared polymer/metal nanocomposites in which distribution of the metal nano particles into polymer matrix are uniform. One of the major problems in the preparation of nanocomposite is the distribution of the nano particles which could be easily handled by in-situ polymerization in sc-$CO_2$. The average particle size of metal nanoparticles is n the range of 8-10 nm. The inclusion of metal precursor has no influence on polymerization process. Moreover, the method developed has potential advantages as it is environmentally benign and solvent can be recycled. This nanocomposite particle shows antibacterial activity and catalytic activity. These are suitable for purification of water, catalytic reactions and controlling fouling. The present method is more versatile and can be extended for carrying out other chemical reactions.

**Team - Prof. Swapan Kumar Dolui & Dr. Isha R. Kamrupi is the Joint-Winner of National Awards 2011-12 under the Category of "RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY"**

# Say yes to Plastics!

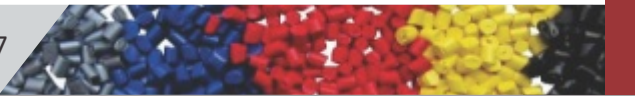
yes to pla
es to plastics



# Runner-up







**M/s. Kemrock Industries & Exports Limited**
Village: Asoj, Vadodara-Halol Express Way
Taluk: Waghodia
District: Vadodara-391510
Gujarat (India).

KEMROCK
Industries and Exports Limited

Shri Kalpesh M. Patel

M/s. Kemrock Industries & Exports Limited is an ISO 9001:2008, 14001 & OHSAS 18001 certified company. KIEL is India's leading manufacturer of composite product such as Filament winding pipes, gratings, pultruded profiles, wind turbine blades, cable trays, carbon fiber, etc. KIEL also manufacturer of thermosetting resins such as Unsaturated polyesters, Vinyl Esters, Epoxy and phenolics. KIEL is fully equipped with all composite manufacturing techniques. KIEL has global strategic alliances with Ston Cor / Fiber grate, USA, Georgia Pacific resins, USA. , DSM, Netherlands etc.

The Chairman & Managing Director of this company - Shri Kalpesh M Patel is a qualified Electrical Engineer & has deep insight of composite industry, depth knowledge of composite manufacturing & usage from well over 20 years. The Vice President- Technical of the company Dr. D. Satyanarayana is a Doctorate of Philosophy with specialization in Polymer Chemistry and having 18 years of experience in thermoset resins & composites. The Deputy Manager ( R & D) of the company, Dr. Sunil Mavani is also a Doctorate of Philosophy with specialization in Polymer Chemistry having 5 years of experience in Customize thermoset resins & their composites applications.

# INNOVATION IN POLYMERIC MATERIALS

## "High Performance Vinyl Ester for Composite Applications"

***M/s. Kemrock Industries & Exports Limited***

Vinyl ester resins were born at the beginning of the 70s. Although they use a different chemistry, the backbone of the molecule was still the same base chemical (Bisphenol A). Conventional Vinyl ester resin is used to fabricate storage tanks, scrubbers, FRP / GRP pipes with moderate mechanical, thermal & chemical resistant properties.

M/s. Kemrock Industries & Exports Limited has indigenously designed & developed High performance vinyl ester resin, which can be used for all the composite applications. The new technology of this resin provides outstanding thermal mechanical properties retaining same chemical resistance like normal vinyl ester resin. This can be used to manufacture FRP/GRP pipes, bridge decking, reinforcing rods, cooling tower profiles, gratings, tread stiffeners, corrosion resistant structural profiles, etc..

**The features of High performance vinyl ester resin are as follows:**

a) **Urethane modification:** It provides tough & impact resistant laminates with excellent corrosion & temperature resistance.

b) **Excellent fiber wet out:** Which provides 40-45% higher mechanical properties & corrosion resistance as compared conventional resin system.

c) **Low viscosity:** Which allows high filler loading capability.

d) **Chemical Resistance:** It provides excellent resistance to moisture, oils, fuels, both low & high PH environments.

e) **High Crosslink Density:** It provides higher HDT, fatigue resistance for dynamic loads, retention of mechanical properties after heat ageing.

**M/s. Kemrock Industries & Exports Limited is the Runner-up of National Awards 2011-12 under the Industry Category of "INNOVATION IN POLYMERIC MATERIALS"**

**M/s. The South India Textile Research Association**
13/37 – Avanashi Road, P.B.No. 3205
Aerodrome Post
Coimbatore – 641 014.


Dr.K.P.Chellamani


Shri M.K.Vittopa


Shri J.Sathish

**The South India Textile Research Association (SITRA)** is a link in the chain of National laboratories in the country, Sponsored by the Textile industry and supported by the Ministry of Textile, Government of India. The foundation stone of SITRA was laid by the then prime minister Pandit Jawarhalal Nehru on 25th December 1955. SITRA's own building was declared open by the then vice president of India Dr.S.Radhakrishnan on 13th October 1958. Shri.Kasthuri Sreenivasan, Founder Director of SITRA receiving Padma Bhushan Award from Dr.Zakir Hussain the then president of India in 1969. SITRA's Silver Jubilee celebrations were inaugurated by the then president of India Shri. N.Sanjeeva Reddy on 8th April 1981. SITRA's Golden Jubilee celebrations were inaugurated by the then president of India Dr. A.P.J. Abdul Kalam on 24th February 2007. NRDC Award has been received in 6 times for SITRA's research works. A Centre of Excellence for Medical Textiles has been established at SITRA under Mini Mission I of Technology Mission of Technical Textiles promoted by Ministry of Textiles, Government of India .

**Dr. K.P. Chellamani** obtained his M.Tech (Textile Technology) Degree from Anna University, Chennai in the year 1981 and Ph.D from Bharathiar University, Coimbatore in the year 2001. He joined The South India Textile Research Association (SITRA) in the year 1981 soon after graduation and at present he is the General Manager - Projects. He has to his credit over 275 research and review papers in Indian and International textile journals and he is also a co-author of 15 monographs published by SITRA. He has been awarded the F.T.A. by The Textile Association, (India), Mumbai in the year 1991 and F.I.E. by the Institution of Engineers (India), Kolkata in the year 2003. He is a Qualified Lead Assessor for auditing ISO 9000 Quality Systems and is a recipient of 20 National Awards in recognition of his research work in different areas of spinning & Technical textiles. The awards include NRDC independence Day award, WIPO Gold Medal Award, Best Technical Book award, C.D.Foundation Trust award, Outstanding Fellow Corporate Member Award etc. He is a recognized Supervisor for guiding Ph.D. scholars of Anna University, Chennai and Bharathiar University, Coimbatore

**Shri M.K. Vittopa** obtained his M.Tech (Master of Technology in Textiles) from PSG College of Technology, Coimbatore. He is proficiency rank holder from PSG College of Technology. He joined in The South India Textile Research Association (SITRA), Coimbatore in the year 1997. He has published around 40 research papers in leading textile journals. Mr. Vittopa has been elected as A.M.I.E. by the Institution of Engineers (India), Kolkata in the year 2007. He is the recipient of Kanaiyalal Motilal Award from ATIRA, Ahmedabad for his research paper.

**Shri J. Sathish** obtained his D.T.T (Diploma in Textile Technology) from RVS College in the year of 2008. He is a rank holder in this college. He joined in The South India Textile Research Association (SITRA), Coimbatore in the year 2009. He has published various research reports & research articles in SITRA as well as leading textile journals. At present he is working in medical textile product development sector.

# INNOVATION IN POLYMERIC PRODUCTS

## "Development of Various Organic High Performance Polymer Narrow Width Fabrics and Polymer Braided Cables for Reinforcement in Sonar Cable Applications"

*Dr. K.P. Chellamani, Shri M.K. Vittopa & Shri J.Sathish*

Underwater Opto-Electronic sensor array uses high strength p-aramid fibers as the load bearing member in oceanographic applications. The narrow fabrics which are used at present as the load bearing member by Naval Physical & Oceanographic Laboratory (NPOL), Kochi are made out of kevlar and has a load bearing capacity of around 2000kgf. SITRA has developed another narrow fabric using ultra high molecular weight poly ethylene (UHMWPE) filament yarns. These fabrics were laminated using Poly Urethane (PU) for improving the abrasion and friction properties. The narrow fabric developed by SITRA has a load bearing capacity of around 4000kgf.

Abrasion resistance of SITRA developed narrow fabrics is high at about 50,000 abrasion cycles. This is about 8 times higher as compared to that normally found for kevlar fabrics. Fabric deformation due to dynamic loading is found to be almost zero for SITRA developed narrow fabrics. Low level of permanent set is an advantageous feature for fabrics to be used as reinforcement in opto-electronic systems under the sea. Even after 200 hrs of UV exposure, SITRA developed fabric samples retain their original strength in full. The extent of strength reduction after 1000hrs of UV exposure is less than 8% for SITRA developed narrow fabrics and the same is around 20 -30 % for kevlar narrow fabrics.

**Team - Dr. K.P. Chellamani, Shri M.K. Vittopa & Shri J.Sathish is the Runner-up of National Awards 2011-12 under the Category of "INNOVATION IN POLYMERIC PRODUCTS"**

**M/s. Skanray Technologies Pvt. Ltd.**
15-17, Hebbal Industrial Area
Mysore – 570 016.

Shri K. Balasubramanian

Skanray is a company founded in 2007 by a team of reputed engineering and business professionals with decades of experience in Industrial and medical devices sector and having global exposure. The company moved into to its state-of–the-art manufacturing facility in Hebbal, Mysore and commenced commercial business in 2011. Within a short span, Skanray has built a reputation of being one of the few companies around the world with CE, UL, FDA approvals in the X-Ray devices segment and has just launched a wide range of products in Diagnostic X-Ray, Critical care and remote health management devices. Skanray has already commenced exports to US and Europe apart from being an OEM to one of the leading Global Healthcare Company. Today Skanray has strength of over 100 members with more than 50% in R & D and new product engineering.

Shri K. Balasubramanian is the Director & CTO of M/s. Skanray Technologies Pvt. Ltd.

# INNOVATION IN POLYMERIC PRODUCTS

## "Use of Engineering Plastics in Diagnostic X Ray Equipment"

### *M/s. Skanray Technologies Pvt. Ltd.*

**Advantages of Engineering Plastics in Compact High Voltage X-ray**

High frequency X-ray system are light weight, very compact and safer compared to conventional system. Skanray has used engineering plastics effectively for insulation and as an enclosure for the HV system. The use of engineering plastic has helped in weight reduction, high consistent quality of insulation, reduction of the insulation cost and HV stability over the entire life of the product.

**Working Principal**

The input line voltage is rectified, converted to DC and then again to high frequency AC (about 100 kHz). This voltage is boosted to 10 KV and increased to 70 KV using multiplier. Since the full unit is very compact, high voltage insulation is very important and at high frequency the challenge is to provide insulation without increasing the dielectric losses. The principal involved in this concept is to use suitable plastic to hold all the components. The plastic shell has specific contour and internal HV barrier walls that have sufficient creepage and clearance for high voltage. The bulk resistance and surface resistance are important to decide the shape of the internal barrier walls. In many places grounded metallic parts are brought very close to high voltage area for X-ray shielding increasing the high voltage field drastically. Plastic thickness and shape should be capable of handling this field.

**M/s. Skanray Technologies Pvt. Ltd., is the Runner-up of National Awards 2011-12 under the Industry Category of "INNOVATION IN POLYMERIC PRODUCTS"**

**M/s. Hem Techsys Pvt. Ltd.**
303, Helix, Sayajigunj
Vadodara – 390 005.

Shri Pratik Bankar

**HEM TECHSYS PRIVATE LIMITED** is a company dealing in Hi-tech Polymer, Packaging and Pipes Testing Instruments. We have different divisions for focused approach:

1. Imported Products Division: We represent renowned International companies in India as their Authorized Agents like, IPT – Germany, TME-USA, Extra solution -Italy, Admet – USA, Mesalabs – USA, JJTEST – China, GBTEST – China and many others.
2. Manufacturing Division : We also manufacture Hi-quality near Imported Quality instruments in India under the registered Trademark brand of ***Hemtech***

And also having a PC Software for Instruments under Trademark registered brand of WIZARD

We are a dynamic team of Mechanical, Electrical, Electronics, Instrumentation, Software Engineers and associates.

This helps us in providing the total solution for the customers we call it, Systemised Solutions 4 Testing

And helps us in achieving our Goal of "Total Customer Satisfaction"

**Shri Pratik Bankar** is the Director of Hem Techsys Pvt. Ltd., and he did Electronics Engineering with Instrumentation as Specialization from Faculty of Technology & Engineering, M. S. University of Vadodara in 1988.

He has worked with a renowned company in the field of Testing Instruments for 7.5 years and was in the field of Materials testing Instruments. In late 1995 he has ventured in the business. During the period of more than 23 years till now, he got long experience of working with world's best Instrument manufacturing companies. It helped in gaining expertise over various applications for different segments of Industries. He has worked very closely with Industries, Research Institutes and Educational Institutes.

# INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS

## "Development of Equipment for Testing of Strength of Seal for Packaging Film"

*Shri Pratik Bankar*

**The Challenge:**

This was Innovative because an imported specialized Instrument has to be retrofitted. The requirement was very critical because the original imported Instrument was high valued and very accurate. Hottack is very important parameter for films & laminate manufacturers in packaging Industry. The packaging film (multi layer or single layer) is designed based on the application which demands a particular range of Hottack value. More critical was to innovate the complete Hardware (Electronics), Firmware & Software (for PC) and algorithm by which it works intelligently. Being old DOS based system and limitation of Electronics available; we had to do all of it afresh.

**The Solution:**

We took the challenge and developed the system with in-house design of Electronics & Microcontroller development as well as Software development. We used Accurate ADC system and precise Drive to use the existing Load cell and Motors. We developed a very accurate sequence of operation and software algorithm for auto tuning of the Dwell-time. We also took care that the Operation for Operator is more or less in the same line as old equipment but with new features and convenience.

**The Benefit:**

This is a very high capital investment involved to buy a new Hottack. Hence, using the old Machine with Retrofit has straight saving of almost 85 % of the cost of the new Instrument. Thus it has helped the industry save on spending and country has saved that much of foreign exchange.

**Shri Pratik Bankar is the Runner-up of National Awards 2011-12 under the Individual Category of "INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS"**

**M/s. Rajoo Engineers Ltd.**
Rajoo Avenue, Survey No. 210
Plot No. 1, Industrial Area
Shapar-Veraval
Rajkot – 360 024
Gujarat.

RAJOO®
excellence in extrusion

Shri R.N. Doshi

M/s. Rajoo Engineers Ltd. with modest beginning in 1986 from a relatively unknown town of Manavadar (Junagadh) in Gujarat has witnessed the transformation to an expansive global footprint by its quality, price and extrusion technology.

Shri R. N. Doshi, Founder of the Rajoo Group, is responsible for the overall operations of the Group. He comes with over 2 decades of experience in plastic processing, machinery manufacturing and product developments.

As a technology partner for material suppliers, universities and processors, Rajoo has consistently followed impelling technological developments in plastics engineering with its own new developments. After supplying 5 different lab lines to World's polymer giants like Reliance Industries & IOCL, Rajoo now come up with a smallest lab line “Three Layer blown film Lab line”.

# INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS

## "LABEX-Three Layer Blown Film Lab Line"

***M/s. Rajoo Engineers Ltd.***

Labex- Nano-world's smallest 3 layer blown film line to used as a laboratory line for producing thermoplastic film in thicknesses from 8 to 40 microns, widths of 40 to 250mm and in continuous length rolls. It is used for a variety of key functions like:

1. Material selection
2. Recipe development
3. Quality assurance
4. Deciding process variables like temperature profile, output parameters, performance verification, trouble-shooting.
5. It also gives an opportunity to examine the various factors that can affect the application of the 3-layer blown film like durability, oxidative aggressiveness, temperature and pressure, tensile stress/strength, dart impact strength etc.

**M/s. Rajoo Engineers Ltd., is the Runner-up of National Awards 2011-12 under the Industry Category of "INNOVATION OF POLYMER PROCESSING MACHINERY & EQUIPMENTS"**





**M/s. Kart Corporation**
B/h. Aparajita Appt.
Bahadurpur Housing Colony
Kankarbagh, Patna – 20.

**M/s. Abhinav Polymers**
A-2/3909, GIDC Estate, Phase - 4
Vatva, Ahmedabad- 45.


Shri Abhinav B. Halani


Shri Kaushlendra


Shri Pravin Gupta

**Mr. Kaushlendra** is an MBA from India's most prestigious management college, Indian Institute of Management, Ahmedabad and is also an Agriculture Engineer from CAET, Junagadh, Gujarat. He is also a recipient of Ashoka Fellowship and Amazing Indian Awards for his contribution towards the upliftment of the persons involved in the unorganized sector of vegetables. M/s. KART CORPORATION was formed in the year 2010 and is a pioneer in the manufacture, supply and promotion of innovative and unique AC Mobile Vegetable Vending Carts.

**Mr. Abhinav B. Halani,** an MBA (Marketing & SCM) from IBS-Bangalore, is currently heading Strategic Business Development at ABHINAV POLYMERS, primarily engaged in mfg. of Plastic Rotomolded products. He also founded **ECO POLYMERS,** company engaged in mfg. & trading of Recycled Plastic Granules. **A.C. Mobile Vegetable Vending Kart** (a JV with Kart Corporation) is one the latest innovations carried out by the Abhinav Polymers. Having developed a strategically thought-out product design, product moulds with utmost precision and state-of-the-art infrastructure helped the product turn in to a sure-shot success. The company is also planning to introduce various models of Veg. Karts in order to give more edge to farmers and benefit to the end consumers!!!

**Mr. Pravin Gupta,** BE (Plastics Technology) & Post Graduate Diploma in Sales & Marketing has over 23 Yrs of Experience in Plastics Industries. He has worked with GSFC Ltd , GE Plastics (India) Ltd and has Handled Sales & Business Development of Engineering Plastics, successfully converted various applications from conventional material to Plastics. Currently he is working with RIL – Polymer Business Group.

# POLYMERS IN AGRICULTURE AND WATER CONSERVATION

## "Rotomoulded A.C. Vegetable Mobile Vending Cart"

*Shri Kaushlendra, Shri Abhinav Halani & Shri Pravin Gupta*

AC Mobile Vegetable Vending Carts is the next generation retail units for vegetable vending carts and they work on the principle of the latent heat exchange. Here the area surrounding to the vegetables are kept at the lower temperature through the use of special chemicals put in charged PCM (Phase Change Material) panel in the AC Carts. The PCM panel is refrigerated to solidification and this give the chamber a low temperature.

**Salient Features**

1. **Light weight** : The cart has been designed to its minimum weight increase the efficiency of the vendor.
2. **Larger carrying capacity:** The cart has been designed for the best utilization of space within.
3. **Low temperature:** We use rechargeable Phase change Material (PCM) technology to keep the vegetable fresh for longer period. Vegetables get chilling injury when keeps at temperature lower than the 4 degree Celsius. Our PCM cells can be charged in any normal refrigerators or deep freezer or at any ice-cream factory at very minimal power consumption. Charged PCM can keep temperature around it surface maintained for 4-10 hrs depending upon the ambient temperature.
4. **Maintenance free:** The design & technology used makes it almost maintenance free except for mechanical parts like nuts, bolts, tyres and others.
5. **Design:** We understand the vendor's requirement and have been customized to their satisfaction and need. Customers want to have a look at vegetables before they buy. They come to carts if they can see vegetables keeping on carts from a distance. Our futuristic and low energy design attracts customers.
6. **Economical:** The AC cart is economically priced and suits the poor pocket with government interventions.

**Team - Shri Kaushlendra, Shri Abhinav Halani & Shri Pravin Gupta is the Runner-up of National Awards 2011-12 under the Category of "POLYMERS IN AGRICULTURE AND WATER CONSERVATION"**

**M/s. NXT Medical Devices Pvt. Ltd.**
NEUECOTECHS
No- 19, 1st Street
Parthasarathy Nagar
Chennai – 600 088.


Dr. T.A Vijayan, MS


Shri Anandvishnu


Ms. Aparna

M/s. NXT Medical Devices Pvt. Ltd incorporated in 2010 is a private R&D center for creating future technologies in health, environment& small energy devices. With talented Engineers - Aparna T.A & Anandvishnu T.A leading multi-disciplinary research, they have filed patents in many fields.

Their environment division – NEUECOTECHS – creates global new technologies backed by patents. One of their inventions is ECO POTS that can revolutionise organic wastes problem of our cities. Eco-pots help better plant growth from organic wastes with no smell, no fertilizer in a 2 minutes/day use. Series of pots can compost all the organic wastes & root feed the plants. This lowers food budgets, creates healthy chemical free food at no cost. A waste to food is globally new slogan, vital for adding more oxygen to earth.

# POLYMERS IN AGRICULTURE AND WATER CONSERVATION

## "ECO Pots"

***M/s. NXT Medical Devices Pvt. Ltd.***

ECO POTS is a next generation solution for organic wastes from homes, offices. Wastes are now collected, transported, land filled or burnt with pollution. These cost governments in crores, none is happy and the technologies are polluting adding more $CO_2$.

Eco pots have a plant and two compost chambers. Plants send roots to compost chambers and grow well. There is no smell. 15 pots can serially compost all wastes in 30 compost chambers. Each pot can grow two or more plants. Plants give oxygen & food with carbon trapping. There is now segregation at home with no organic wastes- peels, left over's, food wastes, etc. These fertilise the soil, giving more plant growth & vegetables. There is no smell, no pollution.

Solid wastes Act 2000 favours composting and now our technology can eliminate these disease causing wastes from civic collection. Cities now grow more food, create more oxygen, and clean up the air. This reduces home food costs, adds to national food security & nutrition.

The Eco pots were displayed in Municipallika- 2012, Chennai and won an Innovation Excellence prize too. Soon we are launching this in Chennai (with Government help- Modify this).

This is a global new technology from India that can clean up all tropical cities too. This technology helps to reduce carbon dioxide in air, add more oxygen to air and grow more plants for our food. It is low cost, affordable & easy to use.

**M/s. NXT MED Devices Pvt. Ltd., is the Runner-up of National Awards 2011-12 under the Industry Category of "POLYMERS IN AGRICULTURE AND WATER CONSERVATION"**

**Dr T.A. Vijayan**
19, 1 Street, PS Nagar
Adambakam
Chennai - 600 088.

Dr. T.A Vijayan

A student of Chennai Medical College is a surgeon interested in solutions for health relevant to needs of India & other countries too. He is developing many new technologies for health. Inhalers now are inefficient with 10-15% lung deposit only and all the MNC & local inhalers need improvement. Ours is easy to use and more than 18% lung depositing. There is clean air inhalation too. Inhaler has Indian & PCT patents filed. WO2011070861.

INMAS, DRDO, ND has helped in their study. Medical technologies take years, before it hits the market. They are waiting Drug Controller's permission to launch this. This can reduce asthmatics symptoms & create more relief. His other research is on simple methods for obesity control, medical instruments and efficient devices in health care. These will be released in next few months.

# POLYMERS IN PUBLIC HEALTH CARE

## "New Asthma Inhaler"

*Dr. T. A. Vijayan, MS*

Asthma affects 30 million Indians of all ages and increasing with pollution. MDI inhalers has polluting fluorocarbon propellants and is 10-15% efficient with poor reliability. Dry powder inhalers have no propellants and use force of inhalation to create a spray. Existing DPI inhalers Indian & MNC are poor spray creators coat the mouth mostly and need water to swallow the drugs. These are 10-13% efficient.

The inhaler is healthier and has many advantages:

1. Deep, long inhaling - more lung depositing.
2. Has an air filter at the back – traps dust & germs-new& useful in India.
3. Venturi based spray - lesser mouth coating.
4. Easy learning by Illiterates, kids, women.

The inhaler has been tested in INMAS Hospital & found better with 18% deposits. The inhaler is in advanced trial stages and will be released soon.

This is an indigenous low cost R&D superior to western inhalers. Asthmatics can soon use & benefit from our invention. This inhaler is least polluting and low cost too.

**Dr. T. A. Vijayan is the Runner-up of National Awards 2011-12 under the Individual Category of "POLYMERS IN PUBLIC HEALTH CARE"**

**M/s. Custom Parts Online**
1, Citadel Building
1A, Cenotaph 2nd Lane
Teynampet
Chennai – 600 018.

CustomPartsOnline
your one-stop source for custom parts

Mr. J. Chandrasekaran

**Shri J. Chandrasekaran,** CEO and the founder of Custom Parts Online, comes from a middle class family, the last among 5 children, from the South Indian Temple City, Madurai. After his graduation in Chemistry, he did his Post Graduation in Plastics Testing and Conversion Technology, in CIPET, Chennai in 1989. A topper in his batch, he was always in pursuit of new products, innovations and product development. He was one of the instrumental persons in introducing Polycarbonate products like roof lights, sky lighting, bus shelters, in building industry, electrical HT hoods in Insulation and Switchgear Industry, covers in telecommunication industry.

He was instrumental in B2B success of a leading e-commerce company based in USA, to promote e-designing and manufacturing, making it the number one e-portal for custom manufacturing within a span of 5 years. Having travelled far and wide, he has great acumen in accessing the 5 Ms - Machine, Materials, Manpower, Money and Manufacturing.

He started this current venture Custom Parts Online to encourage innovators who dream a product, but wanted help in selecting the right material and process for the product. On launching the web site www.custompartsonline.com, the first order he made has got him this prestigious National award for inventing, designing and manufacturing the disposable feeding bottles for a US client.

He is now manufacturing the world's most economical Water filters based on Terafil technology under the license from CSIR (IMMT) with the support of DST and CIPET. He is developing few more interesting products like a plug-in nose filter, a more convenient cleaning bin for hospitals and a modular toilet for rural India which would be launched soon.

Apart from his technical pursuit, he is also actively involved in Heritage Conservation through an NGO, REACH FOUNDATION. He is a consultant to restore heritage temples and art and antiquity restorer. He is a dramatist, an artist and a whistler who had received the Limca Records certificate for being part of a whistling team who whistled “Sarey Jahan Se Achcha!”

# POLYMERS IN PUBLIC HEALTH CARE

## "Feeding Bottle for Foster Mothers, Caretakers, Fathers for Infants"

***M/s. Custom Parts Online***

The challenge was to replace the feeding bottles which are now made using Bisphenol a (BPA) based Polycarbonate, which has been proven to be carcinogenic. Our feeding bottle was done for the first time in the world of plastics using 100% virgin recyclable High Density Poly Ethylene (HDPE). HDPE as we know is used for making potable water bottles and also lids, caps for food and pharmacy industry. It is comparably economical than its counterparts in the Polyolefin family.

**Originality / Novelty of Innovation**

World over, replacements are sought and I made the feeding bottle first time in the world using HDPE, to help foster mothers, nannies, housekeeping fathers, travelling yet feeding mothers to feed an infant with a easy to use, dispose and clean – feeding bottle. Design wise, we were asked to simulate a mother's breast yet should not look vulgar. So we designed the bowl like a toy's face, from whose mouth the child sucks the milk. As far as the product is concerned, it is easy to clean or dispose against the conventional bottles made of Polycarbonate. They are also economically inexpensive and cheaper than conventional feeding bottles.

**Breaking the barriers of manufacturing**

We combined 6 processes of sheet calendaring, vacuum forming, injection moulding, clamshell steel rule die punching, hot sealing and trimming to make this one product! Patent has been applied for.

**M/s. Custom Parts Online is the Runner-up of National Awards 2011-12 under the Industry Category of "POLYMERS IN PUBLIC HEALTH CARE"**

**Laboratory for Advanced Research in Polymeric Materials (LARPM), CIPET**
B-25, CNI Complex,
Patia, Bhubaneswar – 751 024.
e-mail: larpmcipet@gmail.com
Web: www.cipet.gov.in


Dr. Smita Mohanty


Shri S. Anbudayanidhi


Prof. (Dr.) Sanjay K. Nayak

**Laboratory for Advanced Research in Polymeric Materials (LARPM),** R & D wing of CIPET is the manifestation of qualitative research in the emerging areas of polymeric Materials.

The laboratory is equipped with State-of-art Infrastructure & Instrumentation Facilities to undertake various Developmental Activities in the following focussed areas:

- Bio-polymers
- Composites and Nano composites
- Fuel Cells
- Hydrogels
- Recycling etc.

**Dr. Smita Mohanty** working as Scientist at Laboratory for Advanced Research in Polymeric Materials (LARPM) has 7 years experience in the emerging areas of advanced polymeric materials.

**Shri S. Anbudayanidhi** has been working at Laboratory for Advanced Research in Polymeric Materials (LARPM) and has 4 years of research experience in the field of Polymeric membranes & Hydrogels.

**Prof. (Dr.) Sanjay K. Nayak, Ph.D, D.Sc.,** is the Professor & Chair of Laboratory for Advanced Research in Polymeric Materials (LARPM), has been working in the advanced field of polymer science & engineering for last 25 years with rich expertise in academics and research.

# RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY

## "Removal of Metallic Elements from Waste Printed Circuit Board (PCB) using Acrylic Based Hydrogels"

*Dr. Smita Mohanty, Shri S. Anbudayanidhi, & Prof. (Dr.) Sanjay K. Nayak*



**Objective**

The proposed objective of the present work aims to develop a process which can recover metals from waste printed circuit board (PCB) with consideration on economic and environmental benefit.

**Significance**

Recovery of metal from PCB using pyrometallurgical processing and hydrometallurgical processing has already been reported in the literature. Conventional metal recovery process like pyrometallurgical, hydrometallurgical processes, cyanide, halide leaching require high energy and liberate toxic gases which is very harmful to the environment, particularly the cyanide and halide leaching. The novelty of our present work aims to develop an environmentally friendly technique for the recovery of precious and hazardous elements from waste PCB. The present invention utilizes the advantage of high swelling capacity of hydrogel in acidic medium as well as the metal complexation property of crown ether. The immobilized metallic cation can be desorbed in the presence of non polar solvents. The present invention does not require high energy and there is no hazard of toxic gases. The metallic cations can be recovered using environmentally friendly manner.

- Value added elements like gold, silver, palladium can be recovered and can save energy and cost.
- Hazardous elements like lead, Mercury, Cadmium can also be recovered in an environmentally friendly manner.

**Team - Dr. Smita Mohanty, Shri S. Anbudayanidhi & Prof. (Dr.) Sanjay K. Nayak is the Runner-up of National Awards 2011-12 under the Category of "RESEARCH IN THE FIELD OF POLYMER SCIENCE & TECHNOLOGY"**

# 2nd National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry - 2011-12

**by**

**Prof. (Dr.) Sanjay K. Nayak**

Director General - CIPET &

Chairman - 2nd National Awards Committee

Prof. (Dr.) Sanjay K. Nayak

The Plastic industries in India are consistently witnessing a double digit growth rate of about 12% - 14% mainly on account of widening of application spectrum in all the major areas of Indian economy viz. Automobile, Agriculture, Aerospace, Building & Constructions, Consumer Durables, FMCG, Defence, Healthcare, IT, Telecommunications, Medical etc.,

The necessity of development of new generation polymers, blends-alloys, nano-composites, bio-polymers etc, has been felt recently for promoting cost effective and eco-friendly products which can ensure sustainable development.

In the ever changing and challenging industrial environment, growth sustainability can be ensured only through promoting more & more cost effective solutions, indigenous development of imported components/products, and environment friendly processes, technologies and products. This demand developing innovative process technologies, efficient energy saving manufacturing practices, environmentally sound technologies, quality products at par with international standards etc.

India has a highly trained manpower base but without phase-wise increased input to R&D sectors, developing newer products through innovative approach could be difficult. Research & Development is the niche areas of polymer science & technology, needs to be focussed with special attention in order to achieve quality products at par with international standards without compromising on cost to performance balance and eco-friendliness.

The future Research & Development vision of the Petrochemical industry should be based on long term commitment to investment in R&D and strive for continuous innovation in terms of raw material usage, energy efficiency, process/operation improvement, technology forecasting and adoption of emerging technologies, in particular on recycling technologies and recovery of energy from plastics waste, etc.

It is also felt that innovative process technologies for high performance polymers (green processes etc.), would help in developing a new approach for bio-/nano sciences and advanced polymeric material which are the need of the hour. At the same time R&D thrust in development of moulds, dies and tools cannot be less emphasized. Collaborative investment through Public Private Partnership (PPP) mode in technology development by Government, academic Institutions and Industry could push the agenda for R&D in this sector, which will have a long term impact on the Industry.



*contd....*

# 2nd National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry - 2011-12



In order to promote & encourage the development of environmental friendly cost effective polymeric material, products & process / technologies in line with the guidelines of National Policy on Petrochemicals, Department of Chemicals & Petrochemicals (DCPC), Govt. of India, has announced a scheme – National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing industry, with the core philosophy of "Reward the innovation suitably with an Award".

Central Institute of Plastics Engineering & Technology (CIPET) – an extended arm of Deptt. of Chemicals & Petrochemicals, Govt. of India has been entrusted with the task of processing of the applications/nominations, scrutiny and evaluation of nominations through field experts tills the completion of organizing successfully the award function.

During 2010-11, 82 nominations were received and after the scrutinizing by the Expert Committee, 09 nominations were declared as winners. The winners of 1st National Award were awarded with shield, Citation & Cash award of ` 02.00 lacs by Hon'ble Minister of State (Independent Charge) Statistics & Programme Implementation & Minister of State for Chemicals & Fertilizers – Shri Shrikant Kumar Jena at Hall No. 5, Vigyan Bhawan, New Delhi on November 28, 2011.

Based on the feedback received during the 2010-11, the categories were reclassified as 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.

*contd....*



# 2nd National Awards for Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry - 2011-12

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.**

   • Newer technology in plastic waste utilization into products/energy recovery • Recycling Technology • Plastic waste collection, segregation techniques • Product design for improved recyclability.

5. **Innovation in Green Polymeric Materials & Products.**

   • Biopolymers • Biodegradable / Compostable Polymers • Time controlled degradation • Green material filled polymers • Biodegradability evaluation techniques.

6. **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.

7. **Polymers in Public Healthcare**

   • Affordable / cost effective implants, implements and devises • 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.

8. **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 proto type development & future industrial applications.

# IMPLEMENTATION FRAMEWORK & OPERATIONAL MODALITIES

429 numbers of applications/nominations received for awards were scrutinized and evaluated by the nominated field experts headed by the Director General, CIPET & Chairman of 2nd National Awards with the representatives from Administrative Ministry Government Institutions/Research Laboratories / Academic Institutions, National Level Industry Associations associated with petrochemical products and other representatives from Government of India. The recommendation of the Expert Committee was deliberated at the Prize Award Committee headed by the Joint Secretary of the Department of Chemicals & Petrochemicals. – 15 nominations were finally selected and rewarded as a Winners & 10 nominations were rewarded as a Runner-up with an award for the technology innovation in petrochemicals/downstream plastics processing industries.

The **Second edition of award function** – to encourage and to promote **Technology Innovation in Petrochemicals and Downstream Plastics Processing Industry - 2011-12** is being organized on 26th April, 2012 at Manekshaw Centre, New Delhi.

सेन्ट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी (सिपेट)
**CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TECHNOLOGY (CIPET)**
*(Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Government of India)*
Head Office: Guindy, Chennai 600 032
Tel: 044-22254780 Fax: 044-22254787 Email: nationalawardcipet@gmail.com

**Central Institute of Plastics Engineering & Technology (CIPET)** is a premier National Institution devoted to **Academic Programme and Technology & Research Support (ATR)** for the Plastics & Allied Industries, in India. Today CIPET operates a Hubs & Spokes model with 22 locations spread across the length and breadth of country, which includes 15 centres, 2 specialized centres, 2 R&D wings, 2 extended campuses and One Plastics Waste Management Centre (PWMC). All the CIPET Centres are having uniform infrastructural facilities in the areas of Design, CAD/CAM/CAE, Tooling, Plastics Processing, Testing and Quality Control to cater the needs of plastics & 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 Graduate Diploma, Post Diploma and Diploma) in order to provide qualified human Resources to plastics & allied industries. The **Technology Support Services (TSS)** to the industries and ingenious **Research** are the important product portfolios of CIPET.

CIPET renders **Technology Services** in **Design, Tooling, Plastics processing and Testing & Quality Assurance** in India & Abroad. CIPET's expertise as third party inspection agency for plastics products are recognized by various Central & State Govt. organizations for pre-despatch / delivery inspection of plastics & allied products.

CIPET has a R&D vision to be recognized as global R&D hub, in the area of Polymer Composites, Nanocomposites, Biopolymers, Functional Plastics, Carbon Nanotubes, Polymer Membranes, Conducting Polymers, Fuel Cells, E-waste recycling etc., & Innovative product concept development & commercialization by aid of CAD/CAM/CAE expertise. Accordingly, CIPET has established two exclusive R&D centres viz. Advanced Research School for Technology & Product Simulation (ARSTPS) at Chennai and Laboratory for Advanced Research in Polymeric Materials (LARPM) at Bhubaneswar.

CIPET had signed various memorandum of Understanding (MoUs) for joint collaboration in faculty & staff exchange, student exchange, cooperative research, exchange of academic materials etc., with leading international universities / organizations at USA, Canada, Australia, Germany, France, Korea, Poland, Mexico & China.

With strong Alumni base of about 40,000 professionals, CIPET has emerged as an apex plastics technology institution, not only in India but a unique institution of its kind in Asia.

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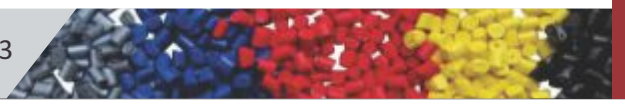

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