

News



The Society of Plastics Engineers

ENGINEERING PROPERTIES
& STRUCTURE DIVISION

April 2011

Chairperson's Report

CONGRATULATIONS to Dick Bopp and Kalyan Sehanobish!



Dear EPSDIV Members,

We're all set for ANTEC 2011. My sincere appreciation goes to **Hoang Pham** and **Luyi Sun** who have spearheaded our Technical Program. Since the next Chairman's report is expected to be written by Chair-Elect **Frank Cangelosi**, I don't want to miss this opportunity to give all our sponsors, moderators and volunteers acknowledgement for their essential contributions to this year's ANTEC program. Also, as our Division has done in previous years, we will be keeping an eye out for this year's "Best Paper" candidate, measured by the excellence of a paper's research and presentation. On Tuesday during the conference in Boston we will be hosting a Technical Program luncheon. Be sure and

join us to share your suggestions for ANTEC 2012 topics.

EPSDIV is looking to organize its second Student Webinar Series. This is a great way for students to network with fellow plastics researchers. To thank our presenters for their service, our Board of Directors recently voted to cover the cost of a 1-year SPE membership fee. If you would like to be among the presenters, or would like to nominate someone, e-mail either me at pierre.moulinie@bayer.com or David Zumbrunnen at zdavid@ces.clemson.edu.

EPSDIV is also fortunate to count recent SPE fellows **Dick Bopp** and **Kalyan Sehanobish** among its members. Congratulations to both of them! Please take time to read about their remarkable accomplishments devoted to the field of polymer science. Dick's accomplishments can be found on page 3 and Kalyan on page 4 of this newsletter.

Finally, I am pleased to share that our Division was awarded a **Silver Pinnacle Award** for 2010! This recognition exemplifies our members' outstanding contributions to SPE's drive for

excellence in technical programming and member value. Thanks to all who helped us put the application in! Your dedicated service and continued support to our Division is greatly valued... and I'll see you in Boston!

— Pierre Moulinié



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Engineering Properties and Structure Division BALLOT

Board of Directors Nominees

(Please Vote for Three of the Following Four Candidates)

EMAIL your choices for Board members **before ANTEC 2011 to either Pierre Moulinie at pierre.moulinie@bayer.com or Frank Cangelosi at FCangelosi@unimin.com**

☐ **Dr. Joshua Otaigbe**

Dr. Joshua Otaigbe is the Professor of Polymer Science & Engineering in the School of Polymers and High Performance Materials at University of Southern Mississippi (USM) and Leader of the Polymer Engineering and Composites Research Group at USM. Before joining USM, he worked as a professor for Iowa State University in Ames. Earlier, he held an industrial position as Project Leader at Corning, Inc in New York, as well as, academic positions at the University of Alberta, Canada, and University of Benin in Nigeria. Otaigbe earned his B.S. degree in industrial chemistry (1979) in Nigeria and the Ph.D. degree in polymer science and engineering (1984) from the University of Manchester Institute of Science and Technology, England. In addition to conducting fundamental research in the areas of polymer engineering and materials science, he is also actively involved in university-industry partnerships to solve industrially relevant problems. He has been a member of the EPSDIV Board of Directors since 2001.

☐ **Dr. Rajen M. Patel**

Rajen Patel obtained his B.S. in Chemical Engineering from the University of Bombay in 1984. He joined university of Tennessee, Knoxville, U.S.A. in September 1985 and obtained M.S. in December 1987 and Ph.D. in May, 1991, both in Polymer Science & Engineering. He joined Polyolefins research of the Dow chemical company in June 1991 in the material science group. He has worked on various projects involving polyolefins characterization (thermal & rheological), material science and product development, including oriented shrink films, sealants, cast stretch films, blown films, elastic films and fibers. He has researched extensively on materials science and applications development of single-site catalyzed Polyolefins. He has written a chapter on structure-properties and applications of Polyolefins produced by single-site catalyst technology in encyclopedia of chemical processing and design. He has co-authored 20 technical peer reviewed journal publications. He is also a co-inventor of over 25 granted US patents. In 2009, he was elected as Fellow of Society of Plastics Engineers (SPE). He is currently an associate fellow in the specialty packaging technical service and development group in the Dow Chemical Company.

☐ **Dr. Murali Rajagoplan**

Murali Rajagoplan is a recipient of SPE's Society's Research and Engineering Technology award in 2010 and he was elected to be a Fellow of Society of Plastic Engineers in 2006 and he has been with the EPSDOV from 1995 in various responsibilities. He is currently Director of Materials Research at Acushnet – Titleist's Golf Ball research and development and an Adjunct Professor at University of Massachusetts – Dartmouth's Materials Science department. He is either a solo or co-inventor of over 210 U.S. Patents in the area of golf ball materials, processing and use of vinyl alloys in HVAC, computer housing and medical devices. He is an active board member of National Textile Committee, Past Chair and a current board member of SPE' Engineering Properties and Structure Division and a was a past Chair for ACS's New England's Rubber & Plastics Group. Murali has served in various capacity for the EPSDIV such as a past chair, co-TPC chair for EPSDIV's Antec 2009, Society award committee's Chair, a member of membership and newsletter and a past treasurer etc. Murali was instrumental for the society to recognize at least 10 Fellows and 4 HSM's to date from his award committee's chair responsibilities.

☐ **Paul J. Rothweiler**

Paul Rothweiler is the Vice President of Sales and Marketing for Aspen Research Corporation. He also manages the health care, energy and specialty chemical markets for Aspen. In that capacity Paul works with Aspen's clients to develop new products and materials. Paul speaks frequently at conferences on product ideation, development and commercialization, in addition to sitting on several trade association and non-profit Board of Directors. Paul joined Aspen Research in November of 2000 to lead Aspen's Intellectual Asset Management effort. In 2001, the principles developed during this effort were converted into a program that now serves several of Aspen's clients. In 2004, Paul took on the role of Account Manager for one of Aspen's clients and helped them to become the market leader. He also developed Aspen's services for the Specialty Chemical Market to become the third largest market Aspen served. In the fall of 2004 Paul added the medical market to his portfolio and grew it to become the second largest market Aspen served. In February of 2011 Paul became the Vice President of Sales and Marketing. Prior to joining Aspen, Paul worked for H.B. Fuller Company as a Research Polymer Chemist, Global Chemical Control Regulatory Manager, Global Standards Manager and Intellectual Asset Manager. Paul's efforts to manage intellectual assets are documented in the book "Edison in the Boardroom" by Suzanne Harrison. Paul holds a Bachelor of Arts degree in Chemistry and Human Physiology from the University of Minnesota. Paul also attended the MBA program at St. Thomas College. Paul is active in Boy Scouts on the President's Cabinet and the Technology Committee for Northern Star Council.

ANTEC 2011 TPC Report

We have organized and scheduled one poster session (miscellaneous topics) and fourteen oral presentation sessions (including 4 joint sessions) on the following topics:

1. Copolymers
2. Polymer Analysis (joint session with Polymer Analysis Division)
3. Scratch Behavior of Polymers and Coatings
4. Composites and Nanocomposites I
5. Composites and Nanocomposites II
6. Composites and Nanocomposites III
7. Polymers for Energy Related Applications
8. Green Polymers
9. Nanostructured and Microstructured Polymeric Materials
10. Recent Advances In Bioplastics V: Bioplastics & Engineering Properties (joint session with Bioplastics Division)
11. Processing-Structure-Property Relationship
12. Modeling and Property Prediction
13. Flexible Packaging I (joint session with Flexible Packaging Division)
14. Flexible Packaging II (joint session with Flexible Packaging Division)



EPSDIV ANTEC 2011 TPCs
Luyi Sun and Hoang Pham

EPSDIV Keynote Speakers – ANTEC 2011

Eleven invited Keynote speakers from industry and academia have committed:

- Prof. Frank Bates – University of Minnesota (Copolymers)
- Dr. Rob Cotton – Frito-Lay (Plastics Packaging)
- Prof. Satish Kumar – Georgia Institute of Technology (Nano-Structured Materials in Energy Related Applications)
- Prof. Robert Langer – MIT (Polymers for Biomedical Applications)
- Prof. Yuezhong Meng – Zhongshan University, China (Degradable Polymers from Carbon Dioxide)
- Prof. Hung-Jue Sue – Texas A&M University (Scratch Behavior of Polymers)
- Prof. Luyi Sun – Texas State University-San Marcos (Polymer Nanocomposites)
- Prof. Brian L. Wardle – MIT (Polymer Nanocomposites)
- Prof. Josh Wong – University of Akron (Adhesion of Polymer Nanofibers)
- Prof. Eugene Joseph – Virginia Tech (Microfibers to Nanofibers)
- Dr. Andy Lew – Nanocyl (Polymer/Carbon Nanotube Nanocomposites)

EPSDIV Conference Meeting

Board Meeting: May 1st (Sunday); 4:00-7:30 pm, Marriott Copley Hotel, Provincetown Room
TPC Meeting: May 3rd (Tuesday); 12:30-1:30 pm, Hynes Convention Center, Room 207
Business Meeting & Reception: May 3rd (Tuesday); 5:00-7:00 pm, Hynes Convention Center, Room 207

Councilor's Report



SPE Forecast: Only Partly “Cloudy”

I was sharing lunch with a colleague last month, and he asked me a question which I knew the answer to, but nevertheless found difficult to put into words. The question was, “What is the “Cloud”, and what is “Cloud Computing”? As I thought about a way to frame an answer, I was struck by the thought that the discussions we were having over lunch really represented the antithesis of “the Cloud”. We were having transparent, direct personal interaction. Whereas the Cloud, well.....

Cloud computing is the next stage in the Internet's evolution, providing the means through which everything from computing power, applications, processes and even collaborations can be delivered to a user as a service wherever and whenever they need. The user does not need to have any knowledge of the physical location and configuration of the system that delivers these services.

One can liken this concept to the more familiar electricity grid where users consume power without any required understanding of the devices in the grid used to provide the power. It is only important that the “grid” is efficient, reliable, and well managed (to ensure current product quality, accessibility and capacity for future growth).

The description of the “Cloud” over a personal lunch captures the essence of what SPE is for me. We frequently need access to tools and information wherever we happen to be. Do you know that we can access an extensive technical library, journals, up to the minute technical briefs, supplier promotions, contact information, materials sourcing, applications, training materials, and even technical consultation to address our specific questions or needs! The “cloud” of SPE is always managed to insure that it is current, accurate, accessible, and reliable.

The antithesis of the “cloud” is the personal contact. SPE offers us a variety of venues to increase both our professional and personal networks. These include international, regional, and technical conferences, industry tours, local sectional meetings, social gatherings (i.e., dinners, golf outings, the arts and sports events), even entrepreneurial mixers! Each of these activities are powered by the individual interactions that we enjoy –

by planning, leading, or participating in these events.

We need each of you to spread the word. Let others know what membership in SPE can bring to them and also how SPE can benefit from their experience and talents. The wealth of information that is available to help them in their careers and pursuits is incredible. The people that they will meet, interact with, and befriend will, more importantly, enrich both their careers and personal lives. The forecast for SPE is – only partly cloudy – with a significant chance of fun!

- Brian Landes



ANTEC 2011

**May 1-5
Hynes Convention
Center and Boston
Marriott Copley
Center Hotel
Boston, Massachusetts,
USA**

EPSDIV Members to Receive Fellow Award



Dr. Richard (Dick) Bopp's Top Achievements

1. Development of PLA Thermoforming: The Led technical program for the development of a patented process to produce heat resistant, semi-crystalline, thermoformed PLA articles capable of withstanding temperatures above the glass transition temperature and in excess of 100 °C by crystallizing amorphous nucleated, low-D Ingeo™ PLA sheet prior to forming on conventional single stage forming equipment. This CPLA technology is finding increasing commercial use in Europe, North America and Asia in the manufacturing of heat resistant Ingeo polylactide food serveware.

2. Crystallization of PLA: Led a technical team to develop and implement a robust, new crystallization process for polylactide production capable of crystallizing a broad range of D, L stereoisomeric PLA copolymers. This technology has been in operation at the NatureWorks 300MM lbs/year Ingeo polylactide (PLA) production facility in Blair, NE since 2009.

3. Development of GE Plastics 1st post-consumer recycle (PCR)-based engineering resin: The flame retarded, PX Noryl® resin which contained >50% post-consumer computer components recovered from Digital Research Corporation was marketed as a prime Noryl grade with certified post-consumer content for injection molded roofing panels manufactured by Nailite. As part of this work, Dick helped develop a proprietary source identification/separation process with Digital and RST Recycling to eliminate cross contamination from other polymers. He instituted a rigorous statistics-based QC program to insure product quality and process safety with post-consumer Noryl granulate having exceptionally high purity (reported at ANTEC 1997). His work was the center piece of GE's 1991 NPE exhibit which featured a full scale, real life demonstration and the actual re-roofing of a McDonald's Restaurant in Southside Chicago using PCR Noryl-containing Nailite panels. As Noryl Recycle Business leader, he developed an entirely new recycle business model for post-industrial and post-consumer recycle-containing products wherein recycled materials were managed as a high value alternate raw material with stringent quality specifications to insure maximum quality and performance. As a result recycled Noryl resins were used to produce standard prime grades and specially developed recycled products having prime performance. This model was quickly adopted by GEP globally to grow the Lexan® polycarbonate business in a period of severe capacity constraint using post-industrial and post-consumer recycled PC bottles and compact discs.

4. Removal of Malodors: Led team at GE Plastics to identify and remove major odor components in polyphenylene ether and Noryl resins which led to the use of PPO® and Noryl resins in food contact applications where taste/odor is an issue. Coincidentally, "low odor" PPO had enhanced market in other non-food contact applications where odor was an issue, e.g., injection and foam molded applications in automotive interiors.

5. Stabilization of Noryl Resins: Developed a patented UV-stabilization technology for Noryl resins to improve color stability under indoor (office) conditions. As part of this effort Dick became a leading expert on indoor UV stability and accelerated UV testing. He participated in the ASTM D20.60 subcommittees on the IBM (ASTM D4459) and HPUV (ASTM D4674-89) indoor UV tests and co-authored the final HPUV test method while serving as the subcommittee chair. Key to this work was his extensive experience in UV testing a wide variety of engineered materials and his influence in fundamentally changing the way UV test results were evaluated, i.e., away from measuring color shift after a prescribed arbitrary exposure to one where failure is defined by the UV actinic exposure (dose) to a pre-defined, visually perceptible color shift, e.g., $\Delta E = 2$, a concept exemplified in several patents and adopted in the ASTM HPUV test.

EPSDIV Members to Receive Fellow Award (Cont.)

Dr. Kalyan Sehanobish Top Achievements



1. Life Time Prediction Modeling of Polymer Parts. Kalyan a key role in developing lifetime prediction of polymer parts under use conditions with close collaboration with Prof. Chudnovsky. It was built in various stages over many years starting with phenomenological observations of slow crack growth transitioning to catastrophic failure in many types of polymeric materials and composites. Thermodynamics of irreversible processes formed the foundation of these models. In the second stage, the phenomenological constants of the model were actually derived from true material properties. Teaching from this work has been absorbed into multiple accelerated testing of polymers and composites used in laboratories across the world. For an application like plastic pipes, one can even use these models to quantitatively predict pressure rating and lifetime of pipes in specific environment.

2. All Plastic Door Panels. In 1987, Dr. Sehanobish worked as a Lead Materials Scientist for the development of all plastic door panels for GM Saturn division. This project also developed some unique polymer blend formulations. These were the first all-plastic door panels of the industry. Today, PC/ABS blends have stood the test of time in several automotive interior applications such as IP skins. Saturn continued to build their door panels from plastics for almost 20 years. These efforts lead to the development of two fundamental works in the thermoplastics field (i) effects of part geometry on toughness of Polycarbonate (PC) and (ii) prediction of critical defect size. Several publications were contributed to the open literature on "Fracture Mechanism maps" to help guide engineering design with certain thermoplastics.

3. TPOs for Auto Bumper Fascia. In the 1990s metallocene based homogeneous catalysis resulted in a new polymer family to advance the frontiers of the largest volume polymer family of polyethylene. Kalyan developed polymer materials science fundamentals as well as applications from this family of polymers. The most notable is the ethylene- α -olefin based elastomers. He pioneered modified elastomers (TPOs) and still holds some of the early patents in this field. Today formulated TPOs are a major plastic in automotive applications (>2 billion lbs). Some of the early work was documented in a two volume book publication in honor of Dr. Walter Kaminsky, (father of metallocene catalyst) highlighting the advances of these plastics.

4. PE Based Hot Water Pipes. Another application of understanding in durability was the PE based hot water pipes. DOWLEX™ brand name is usually associated with films and packaging. But today we have the DOWLEX™ hot water pipe products in Europe and some parts of North America. This is one of the highest quality flexible PE based pipes for some segments in the water heating industry. This was a clear advancement over our original small volume business in DOWLEX™ pipes using heterogeneous catalyst. The more advanced hot water pipes under the brand name ELITE™ were developed using the dual reactor concept with metallocene catalyst in one of the reactors. These pipes were well characterized and designed using the principles learnt in the field of life time prediction of plastics. Such pipes are expected to perform for over 50 years and so far 15 years of service is on record.

5. Energy Absorbing Foams. Polyurethane foams are well placed in most areas of automotive use but thermoplastic foams are not as prevalent. Dr. Sehanobish's team was responsible for developing crash energy absorbing and sound energy absorbing foams for reducing noise in modern cars. The safety foam products were awarded R&D 100 award as well as the prestigious PACE award. The sound absorbing foams had the best in class performance. This series of work was not simply a development of a foam product, but several publications were written around the unique structure of the energy absorbing foam explaining their crash performance through structure-property models.

Financial Report from July 1, 2010 to March 4, 2011



BALANCE as of July 1, 2010 \$ 36175.23
(cash, checking, savings, investments)

INCOME	ACTUAL
Interest	\$ 407.39
SPE Rebate	723.68

ANTEC Sponsorships	4473.00
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TOTAL INCOME	\$ 5604.07
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EXPENSES	
Education	93.00
Newsletter Production	1056.00
Awards	253.00
Councilor Travel	981.49

TOTAL EXPENSES	\$ 2383.49
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CASH FLOW	\$ 3220.58
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ENDING BALANCE as of March 4, 2011 \$ 39395.81
-Submitted by Emmett Crawford, EPSDIV Treasurer 2010-2011

Drs Raj Krishnaswamy, Sadhan Jana and Murali Rajagopalan Awarded



Raj Krishnaswamy



Sadhan Jana



Murali Rajagopalan

Dr. Raj Krishnaswamy will be recognized with the 2011 Research/Technology Society Award at the SPE Banquet Award Celebration starting at 6 PM in Salon F of the Boston Marriott Copley Place Hotel.

In Addition, there will be a special SPE Awards Session (M36) organized by Prof. Bob Weiss on Monday afternoon from 1:30 until 4:00 pm to recognize both 2010 and 2011 society award winners. Dr. Sadhan Jana (2010 Education Award winner and Dr. Murali Rajagopalan (2010 Research/Technology Award) will be recognized with some presentations.

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