The Society of Plastics Engineers

News

ENGINEERING PROPERTIES & STRUCTURE DIVISION

December 2011

Chairperson's Report

Dear EPSDIV Members,

Now that ANTEC is upon us it is time to turn the page and begin a new SPE year. Among other things this means it is time for me to turn over the leadership of EPSDIV to our new Chairman, Josh Wong. I want to thank my fellow board members, the entire membership and SPE society for a successful and productive 2011-2012 year. I also want to welcome our newest board members as well as our re-elected board members. Thank them all for volunteering their efforts on behalf of our mutual benefit. Specifically in the former category, we welcome **Dr. Sreekumar Pisharath**, a research fellow at the Nanyang Technological University in the Republic of Singapore, and **Dr. Duane L. Simonson,** who is presently working at the Naval Research Laboratory in Washington D.C.

Welcome to Our New & Returning Board Members

In the latter category we welcome back **Dr. Shriram Bagrodia, Dr. Richard C. Bopp, Dr. Hoang T. Pham, and Dr. John S. Trent.**

Returning to the subject of ANTEC, I want to especially thank our Technical Programming Committee, particularly Sedat Gunes and Brian Grady, for another outstanding effort. Some eye opening statistics for this year's EPSDIV sessions include: 92 papers in 15 technical sessions, 23 invited papers in 4 special sessions, and 9 invited keynote speakers. Leading topics include "Progress in Nanocomposites", Sustainable Materials and Technologies", "Progress in Composites", and "New Film/Sheet Technologies". On behalf of the TPC I hope you both enjoy and find this comprehensive program professionally beneficial.

Our ANTEC sessions include contributions from 12 countries spanning the Americas, Europe and Asia. Continuing with this international theme, our TPC was actively involved in the recent, successful EUROTEC in Barcelona, Spain. EPSDIV sponsored seven sessions at this event, contributing almost 50 papers representing 25% of the full program. The committee is now working in support of the technical programs at ANTEC Mumbai (December 2012), and the 2013 EUROTEC in Lyon, France.

Last year EPSDIV commemorated a significant milestone in its support of plastics education, the twenty fifth anniversary of the John O'Toole Award sponsored by Honeywell. In recognition of this event EPSDIV has enhanced this award by offering a full year's SPE student

Continued on Page 3

ANTEC 2012

NPE2012

Orange County Convention Center (OCCC) in Orlando, FL,

INSIDE THIS ISSUE

ANTEC 2012 TPC Report

I. Sedat Gunes and Brian Grady

ANTEC 2012 EPSDIV
Technical Program Summary

Our final paper number is finalized as **94** (~17% of whole ANTEC)

Here are the details:

- Regular papers submitted to EPSDIV (unsolicited): 38
- Invited papers: 23
- Keynote papers: 9
- Papers from co-sponsoring divisions (PMAD and VINYL): 24

We welcome Jason Randall, Milan Ivosevic and Murali Rajagopalan as our Technical Program Co-Chairs for ANTEC 2013.

CONGRATULATIONS to SPE Fellows - Professor Brian Grady and Dr. Hoang Pham and Dr. Krishna Venkatswamy - SPE's 2012 Research and Engineering Technology Award

The EPSDIV Board and division members would like to congratulate Dr. Brian Grady (left), Professor at University of Oklahoma and Dr. Hoang Pham (middle) of Avery Dennison who will be inducted at the ANTEC 2012 awards ceremony as Fellows of the Society – one of the prestigious society awards.

Dr. Krishna Venkatswamy (right & Past Chair EPSDIV) will be a recipient of SPE's 2012 Research and Engineering Technology Award and there will be a special symposium honoring him on Tuesday at 1:30 pm (Location S330F).

(See accomplishments on page 7)

ANTEC Plenary Speakers →

Monday, April 2 | 11:15 a.m. - 12:15 p.m.
(immediately following SPE Annual Business Meeting)

Polymer Composites for Aerospace Applications – Past, Present and Future

Frank Doerner
Vice President, Materials, Processes & Structures Technologies
Boeing Research & Technology

Tuesday, April 3 | 11:15 a.m. - 12:15 p.m.

Competitive Advantages through Efficient Production
Reducing Unit Costs – A Holistic/Global View

Helmut Heinson
Managing Director Sales, ARBURG GmbH + Co KG

Wednesday, April 4 | 11:15 a.m. - 12:15 p.m.

The Path to Successful Commercialization of New Materials

Christopher Musso
Partner, McKinsey's Chemicals and Product Development

EPSDIV to Receive 2012 Pinnacle Silver Award

Dear Board and Colleagues,

I am pleased to convey that the Engineering Properties and Structures Division and the board have been selected by SPE to receive the **2012 Pinnacle Silver** Award!!

Congratulations to all!

Shing-Chung "Josh" Wong (Chair Elect)

Financial Report
from July 1, 2011 to February 28, 2012

BALANCE as of July 1, 2011 (cash, checking, savings, investments)	**$**	**37,944.56**
INCOME		**ACTUAL**
Interest	$	251.89
SPE Rebate		735.86
ANTEC Sponsorships		5631.10
TOTAL INCOME	$	6618.85
EXPENSES		
Newsletter Production		1056.00
Awards		1500.00
ANTEC		133.00
Councilor Travel		2894.34
TOTAL EXPENSES	$	5583.34
CASH FLOW	$	1035.51
ENDING BALANCE as of February 28, 2012	**$**	**38,980.07**

Submitted by Emmett Crawford, EPSDIV Treasurer 2011-2012

Important ANTEC 2012 Meeting Times

Board Meeting:	Sunday 4-6pm
TPC Meeting:	Tuesday, 12.30 - 1.30pm
Reception:	Tuesday 6-7.30pm

Chairperson's Report

(Continued from Page 1)

membership to all undergraduate authors of finalist papers. I am also happy to report that once again Honeywell has graciously offered their support for this award in 2012. Additionally, I want to thank all of the sponsors of EPSDIV's ANTEC program. Their support allows us to continue with our many plastics education initiatives and helps our TPC to enhance our conference programs.

I look forward to seeing you all very soon in Orlando!

Frank Cangelosi

TUESDAY, APRIL 3 • PROFESSIONAL POSTERS • 4:00-6:00 PM
ORLANDO CONVENTION CENTER, SOUTH HALL

INT5 Engineering Properties and Structure D26

Environmental Aging of Coated Fabrics Composites
1259803 | James Sloan, US Army Research Lab

Mechanical Properties of Sulfonated Block Copolymers
1259826 | James Sloan, US Army Research Lab

Synthesis of Polyhedral Oligomeric Silsequinoxane (POSS) Funtionalized Carbon Nanotubes
1260155 | Xiaonan Kou, University of Southern Mississippi

Analysis of the Properties as Content of End-group for Polycarbonate (PC) in Melt Polymerization Process
1258434 | Sang-Hyun Park, HONAM Petrochemical Corp

Evaluation of Fracture Characteristics of Polyethylene Blown Films Using the Essential Work of Fracture (EWF) with Variable Film Orientations
1259554 | Ilhyun Kim, Korea University

Effect of Plasticizer on the Physical Properties of Tri-Acetyl Cellulose Film
1259585 | Ho-Jong Kang, Dankook University

The Thermal Conductivity of Polymer Nanocomposites and the Dependency on Clay Structure
1259796 | Stephan Laske, Montanuniversitaet Leoben

Alkyd Resin Coating Synthesized from Post-consumer PET Bottles for Wood-plastic Composite
126177 | Sawinee Klinrod, Silpakorn University, Materials Science and Engineering

Surface Energy Effects of PC/SAN/MWCNT Blends with the Addition of a Reactive Component
1258990 | Cherie Fletcher, CYNY Bronx Community College - Chemistry

EPSDIV Technical Program Sessions for ANTEC 2012

MONDAY MORNING • APRIL 2

M6 Engineering Properties and Structure D26

Location: S330F

Amit Naskar and Hoang Pham | Nanofibers

8:00 **Keynote: Mukerrem Cakmak, University of Akron**
1260975 | Real-time Tracking of Birefringence, Weight and Thickness During Drying/ Curing of Solution Cast Polymer Coatings and Films

8:30 **Optimization of Template Parameters in Template-Directed Electrospinning of Nanofibers**
1258965 | Ali Ashtar, EMD Millipore

9:00 **Study on Structure Formation of PVA Nanofibers Spun by Free Surface Electrospinning**
1259195 | Masaya Kotaki, Kyoto Institute of Technology

9:30 **Investigation of Air Filtration Efficiency for Nanofiber Based Filters in Ultrafine Particle Size Range**
1259721 | Martin Zatloukal, Tomas Bata University in Zlin

10:00 **Producing Nano and Micro Fibers by Using Jets of Gas**
1261682 | Rafael Benavides, The University of Akron

MONDAY MORNING • APRIL 2

M7 Engineering Properties and Structure D26

Location: S330G

Sedat Gunes and Baris Yalcin | Special Symposium in Memory of Professor Kyonsuku Min

8:00 **Invited Speaker: Yusuf Menceloglu, Sabanci University**
1260166 | Particle Size and Concentration Effects on Mechanical Properties of Polyether-based TPU/Silica Nanocomposites

8:30 **Invited Speaker: Robert Weiss, University of Akron**
1224088 | Viscoelastic Behavior of Hydrophobically Modified Hydrogels

9:00 **Invited Speaker: Sadhan Jana, University of Akron**
1257582 | Exploiting Chaos: Should Polymerization Reactors Be Chaotic?

9:30 **Invited Speaker: Avraam Isayev, University of Akron**
1260287 | Kinetic Model of Glass Fiber Breakup in a Co-rotating Twin Screw Extruder

10:00 **Invited Speaker: Ica Manas-Zloczower, Case Western Reserve University**
1257772 | Selecting Dispersing Agents for Thermoset/Carbon Nanotube Masterbatches

10:30 **Invited Speaker: Baris Yalcin, 3M Company**
1259629 | Polymer Composites with Hollow Glass Microspheres: Processing, Properties and Applications

MONDAY AFTERNOON • APRIL 2

M22 Engineering Properties and Structure D26

Location: S330F

Sedat Gunes | Special Symposium in Memory of James Harrington

1:30 **Keynote: John Wagner, Crescent Associates Inc**
1259811 | Journal of Plastic Film and Sheeting – How it Came to Be; and Technology Overview

2:00 **Invited Speaker: Evan Mitsoulis, NTUA**
1249115 | Some Issues Arising in Finding the Detachment Point in Calendering of Plastic Sheets

2:30 **Invited Speaker: Abdellah Ajji, Ecole Polytechnique de Montreal**
1258926 | Functionality in Multilayer Films for Packaging

3:00 **Invited Speaker: Mukerrem Cakmak, University of Akron**
1260794 | Precision Control of Morphology, Orientation and Function with Field Assisted Alignment Techniques on Novel Roll to Roll Manufacturing Platforms

3:30 **Invited Speaker: Douglas Hirt, Clemson University**
1259434 | Additive Migration in Polymer Films

4:00 **Invited Speaker: Hung-Jue Sue, Texas A&M University**
1260292 | Fracture Toughness and Scratch Behavior of Polymeric Thin Films

M23 Engineering Properties and Structure D26 and Polymer Modifiers and Additives D28

Location: S330H

John Trent and Ali Ashter | Sustainable Materials & Technologies

1:30 **Keynote: Amit Naskar, ORNL**
1260404 | Development of Lignin-based Thermoplastics for Composite Applications

2:00 **Effects of Annealing Time and Temperature on the Crystallinity and Dynamic Mechanical Behavior of Injection Molded Polylactic Acid (PLA)**
1259452 | Yottha Srithep, University of Wisconsin-Madison

2:30 **Nitrile Rubber-Based Nanocomposites Prepared by Latex Compounding of POSS Modified Clay**
1260099 | Elana Lewis, University of Southern Mississippi

3:00 **Crystallization of Acetaminophen/ Poly(ethylene oxide) Mixtures**
1257548 | Min Yang, New Jersey Institute of Technology

3:30 **Recycle Technology of Used Plastics Materials**
1259657 | Hiroyuki Nishimura, Kyoto Institute of Technology

4:00 C **Chain Extension of Recycled Polyamides: How to Increase the Amount of Recycled PA in the Automotive Industry**
1253055 | Laura Shekleton, Cray Valley USA

4:30 **Highly Gas Permeable UV Cured, Perfluorinated Acrylate Modified Thiol-ene Networks with Tunable Transport Properties**
1259513 | James Goetz, University of Southern Mississippi

5:00 **The Synergistic Effect of SiO2 on the Flammability Properties of Intumescent Flame Retarded Poly(Ehtene-Co-Octene) Elastomer (POE)/ Polypropylene(PP) Blends**
1279128 | Zhanghuan Wu, South China University of Technology

TUESDAY MORNING • APRIL 3

T5 Engineering Properties and Structure D26 and Polymer Analysis D33

Location: S330F

2012 SPE International Award Symposium Honoring Dr. Lloyd M. Robeson: Advances in Polymer Blends and Polymeric Membranes
Organized by James E. McGrath, NAE University Distinguished Professor of Chemistry, Virginia Tech

8:00-8:10 **Introduction**
James E. McGrath, NAE, Organizer
University Distinguished Professor Chemistry, Virginia Tech

8:10-8:40 **Ordering Kinetics of Block Copolymers in Solution During Solvent Extraction Using Dynamic Oscillatory Measurements and SAXS**
Donald G. Baird, Alexander Giacco Professor of Chemical Engineering, Virginia Tech

8:45-9:15 **Multiphase Design and Morphology Control of Proton Exchange Membranes**
Robert A. Weiss, Hezzleton E. Simmons Professor of Polymer Engineering, Dept. of Polymer Engineering, The University of Akron

9:20-9:50 **Lloyd Robeson's Impact on Gas Separation Membranes**
Benny D. Freeman, Kenneth A. Kobe Professor in Chemical Engineering, University of Texas

9:55-10:25 **Miscible and Compatible Blends of Ethylene Copolymers or Engineering Thermoplastics**
James E. McGrath, University Distinguished Professor Chemistry, Virginia Tech

10:25-11:15 **Polymer Science and Engineering: A Career in Industrial Research and Development**
Lloyd M. Robeson, NAE, Awardee
Union Carbide, retired
Air Products, retired
Lehigh University, Adjunct Professor, Department of Materials Science and Engineering

T13 Engineering Properties and Structure D26 and Polymer Modifiers and Additives D38

Location: S330G

Luyi Sun and Ali Ashter | Polymerization

8:00 **Keynote: Sarah Morgan, University of Southern Mississippi**
1260764 | Polyhedral Oligomeric Silsesquioxane Surface Modification and Nanodispersion

8:30 C **Case Studies of New Application Development Using Electron Beam Irradiation**
1260133 | Daniel Yasenchak, E-BEAM Services Inc

9:00 **Supramolecular Ionic Block Copolymers**
1259438 | Nicole Brostowitz, University of Akron

9:30 C **Economic Benefits of Crosslinkable Polyamides – A Look at Electron Beam Irradiated Molded Parts**
1260150 | William Person, TechnoCompound GmbH

10:00 **Solventless Polymeric Particle Coating in a Fluidized Bed via UV LED Initiated Polymerization**
1248827 | Huiju Liu, New Jersey Institute of Technology

10:30 **Preparation of Intercalated Organic/Inorganic Hybrids via In-Situ Synthesis**
1258245 | Luyi Sun, Texas State University-San Marcos

TUESDAY **AFTERNOON** • APRIL 3

T21 Engineering Properties and Structure D26

Location: S330F

Brian Grady and Murali Rajagopalan
2012 SPE Research/Engineering Technology Award Symposium Honoring Dr. Krishna Venkataswamy: Advances in Thermoplastic Elastomers

1:30-1:40 **Introduction**
Presenter

1:40-2:10 **Thermoplastic Elastomers - Innovative Specialty Materials**
Dr. Krishna Venkataswamy, GLS Thermoplastic Elastomers, PolyOne Corporation

2:10-2:40 **Santoprene® Rubber, Technical Breakthroughs for Commercial Success**
Dr. Sabet Abdou-Sabet, Advanced Elastomer Systems LP

2:40-3:10 **The Development of Styrenic Block Copolymers**
Dr. Dale L. Handlin, Jr, Handlin Polymer Consulting LLC

3:10-3:40 **Nanocomposites of Rubbery Polymers: An Engineer's View**
Dr. Sadhan Jana, The University of Akron

3:40-4:10 **Polyurethane Thermoplastic Elastomers**
Dr. Stuart L. Cooper, The Ohio State University

4:10-4:40 **Specialty Thermoplastic Elastomers with Barrier Performance**
Dr. Sehyun Kim, Thermoplastic Elastomers, PolyOne Corporation

4:40-5:10 **Elastic Materials Based on Polyolefins**
Dr. Maria D. Ellul, ExxonMobil Chemical Co

6:00 **EPS Div Reception**
Location: S330F

T22 Engineering Properties and Structure D26 and Polymer Modifiers and Additives D38

Location: S330G

Daniel Liu and Maria Auad | Progress in Nanocomposites

1:30 **Keynote: Abdellah Ajji, Ecole Polytechnique of Montreal**
1259901 | Structure and Performance of Multilayer Nanocomposite Films

2:00 **Effect of Nanotube Characteristics on Multiwalled Carbon Nanotube/Polyamide 6,6 Composites Prepared by Melt-Mixing**
1258862 | Brian Grady, University of Oklahoma

2:30 **Mechanical and Electrical Properties of Multi-Walled Carbon Nanotubes/Syndiotactic Polystyrene Composite Aerogels**
1258985 | Xiao Wang, University of Akron

3:00 **A Method for the Evaluation of Respirators in a Nanorich Environment**
1260200 | Avraam Isayev, University of Akron

3:30 **Mechanical Properties of Cycloaliphatic Terephthalate Co-polyester Clay Nanocomposites**
1260234 | Daniel Schmidt, UMASS-Lowell

4:00 **A Reaction-Diffusion Model Describing Antioxidant Depletion in PE-Clay Nanocomposites Under Thermal Aging**
1250265 | Iftekhar Ahmad, Drexel University

4:30 **Mechanical Properties and Interaction of Individual Nanotubes and Nanoplatelets in Epoxy**
1260294 | Kevin White, Texas A&M University

5:00 **Elongational Viscosity, Mechanical Properties and Interlayer Distance of Polypropylene Nanocomposites Filled with Layered Silicates**
1259806 | Hannelore Mattausch, Montanuniversitaet Leoben

WEDNESDAY **MORNING** • APRIL 4

W5 Engineering Properties and Structure D26 and Polymer Modifiers and Additives D38

Location: S330G

Himanshu Asthana and Brian Grady | Structure-1

8:00 **Keynote: Guilermo Jimenez, National University**
1260171 | Polymer Science and Engineering in Costa Rica

8:30 **Ester Functionalization and Structural Modification of Polypropylene via Solid-State Shear Pulverization**
1260300 | Jeanette Diop, Northwestern University

9:00 **Molecular Network Connectivity in Epoxy-amine Thermosets**
1260127 | Sarah Morgan, University of Southern Mississippi

9:30 **Polyethylene Blends Containing Polymeric Microspheres for Military Packaging Applications**
1260004 | Sarah Schirmer Cheney, US Army NSRDEC

10:00 **Observation and Analysis of Deformation and Failure Mechanisms of Oriented Polymeric Foam Materials**
1259940 | Byoung-Ho Choi, Korea University

10:30 **The Effect of Feeding Profile in the Distribution of Chains Composition and Mechanical Performance of Styrene/Butyl Acrylate Emulsion Copolymers**
1259621 | Carlos Federico Jasso, Universidad de Guadalajara

W6 Engineering Properties and Structure D26 and Polymer Analysis D33

Location: S330F

Jason Lyhons and Gopal Krishnan | Structure-2

8:00 **Keynote: Maria Auad, Auburn University**
1259947 | Interpenetrating Polymer Networks (IPNs)

8:30 **Evaluation of non-crosslinked polyethylene pipes for heating**
1259031 | Hideo Hirabayashi, Kyoto Institute of Technology

9:00 **Melt Mixed PCL - MWCNT Nanocomposites Prepared At Different Mixing Speeds**
1259181 | Petra Pötschke, Leibniz Institute of Polymer Research Dresden (IPF)

9:30 **Study on Environmental Stress Cracking Behavior of Injection Molded Polycarbonate Parts Under Different Processing Conditions**
1260241 | Jian Jan, Zhengzhou University

10:00 **FEM Modeling of Surface Friction Effect on Scratch-induced Deformation in Polymers**
1259553 | Mohammad Hossain, Texas A&M University

10:30 **Relationship Between Residual Stress and Flame Resistance of Polycarbonate**
1260291 | Himanshu Asthana, SABIC Innovative Plastics

WEDNESDAY **AFTERNOON** • APRIL 4

W19 Engineering Properties and Structure D26 and Polymer Modifiers and Additives D38

Location: S330F

Sinan Yordem and Rishi Kumar | Progress in Composites

1:30 **Keynote: Yusuf Menceloglu, Sabanci University**
1260138 | Polymer Particle Interactions In Nanocolloids

2:00 **Development of a method for the life-time dimensioning of short fiber reinforced plastics**
1257177 | Hendrik Kramer, Institute of Plastics Processing

2:30 **Crystallization Behavior of Post-Industrial Waste Nylon Composites**
1258939 | Phillip Bates, RMC

3:00 **Stress-Strain Behavior of Expanded Polymer Composites at Elevated Temperatures**
1259793 | Krishnamurthy Jayaraman, Michigan State University

3:30 **Calcium Sulfate Whiskers(CSW) Reinforcement of Polymers — A Review**
1258305 | George Hawley, Supermin Enterprises

4:00 **In Situ Generated Bicontinuous Reinforcements**
1276593 | O. Sinan Yordem, UMASS-Amherst

4:30 **Analysis of Ternary Non-Covalent Filler/Matrix/UV Stabilizer Interactions in Carbon Nanofiber/PMMA Composites via Time-Resolved Fluorescence Emission Spectroscopy**
1259774 | I. Sedat Gunes, University of Akron

Sunday | April 1

6 p.m. - 8 p.m.
Rosen Shingle Creek Hotel

Opening Gala

Join us at the Opening Gala and Plastics Academy Hall of Fame Ceremony, where SPE's most prestigious awards will also be presented. The SPE Annual Awards program recognizes excellence in plastics by individuals who have made outstanding contributions or lifetime achievements in the plastics industry.

Being honored this year are

- **International Award**
  Dr. Lloyd M. Robeson, Adjunct Professor, Lehigh University (ret. Air Products)
- **Business Management Award**
  Steve Maguire, President, Maguire Products Inc.
- **Education Award**
  Gerard McNally, Director of the Polymer Processing Research Center, Queen's University Belfast, Northern Ireland
- **Research/Engineering Technology Award**
  Dr. Krishna Venkataswamy, Sr. Global Technology Director, GLS Thermoplastic Elastomers, PolyOne Corporation

Tickets for this event are available on the NPE registration website

Goin' Global

Globalization: It's been a buzz word used in nearly every organization for the last ten years. A global organization is an organization with an international membership, scope, or presence. Globalization encompasses integration and interdependence in the professional, social, economic, technological, cultural, political, and ecological spheres. Sounds a lot like SPE! If you take a look at this year's ANTEC program we have sessions and presentations focusing on biomaterials, new technology, education, marketing, sustainability, and regulatory issues. However, the subject matter isn't the only thing global in nature. The broad base of topics is being presented by professionals from around the world.

With international boundaries slowly breaking down, communication becoming more efficient, and people and places being brought closer than ever via improved transportation and the Internet, it is essential that we become exposed to new information and knowledge beyond the boundaries of our neighborhoods, and our country.

In fact, organizations today are more dependent on each other for survival as country's economies slowly become interdependent. We are no different at SPE, and specifically in EPSDIV. We are dependent on each other for the unique opportunities available in professional growth, networking, business, and knowledge that an international organization like ours brings. In order to benefit from this, we must be connected. Communication is king in the international marketplace. Every time you have a close encounter with someone from another part of the world, be pro-active: ask a question, share a resource, or offer an introduction. As a vital member of EPSDIV, that is exactly what we need from you. EPSDIV can provide the framework – you produce the connection.

In November of 2011, SPE held its first Eurotec Conference in Barcelona, Spain. EPSDIV members contributed nearly 25% of the technical papers in the conference. This year in Orlando, we are on track to contribute ~17% of the technical papers to ANTEC (see TPC Report on page 2). Clearly we have a lot to say, and many are excited to listen. What more can we do? Plenty! As we look ahead there is ASIATEC in Mumbai, India (December 2012) and EUROTEC in Lyon, France (July 2013). Some of you will be able to contribute papers and attend these conferences. For those who can't attend, propose topics, organize sessions, recruit speakers, or review papers from your spot on the globe. You could, simply reach out to make a phone call, write a personal e-mail, share your expertise and reveal the benefits of an international SPE with your colleagues.

You will be enriched by the international interactions, relationships, and friendships developed while furthering the quality and diversity of our professional society. The end result is that at some point… somewhere, something is going to happen globally. It all starts with your effort that WILL have an impact on people and SPE. See you somewhere – because I'm Goin' Global. Won't you join me!

- Brian Landes

Encourage Others to Join EPSDIV, By visiting:
www.4spe.org/membership

Top Two Research Accomplishments of Awardees

Professor Brian Grady

1. **Nanotubes Nucleate Crystallinity:** Simultaneously with one other group, Dr. Grady was the first to publish that nanotubes could nucleate crystallinity. This publication is highly cited. Nucleation of crystallinity has important ramifications for the production of fibers containing nanotubes. Most commercial products containing nanotubes are crystalline and the understanding of the behavior of these materials with nanotubes requires consideration of the nucleating effect of nanotubes. This work explains why crystallinity can often increase in nanotube composites.

2. **Ionomers Research:** Dr Grady's work of ionomers with x-ray absorption spectroscopy, have greatly advanced the understanding of the underlying morphology of these materials. Ionomers are a class of polymers with less than 10 mole percent of ionic groups along the polymer backbone. Sales are on the order of a few hundred million pounds per year. Detailed studies have shown that planar arrangements of atoms will be favored for neutralizing transition metals, allowing for larger aggregates without trapping polymer chains. The sensitivity of a particular ionomer to water absorption can be explained via consideration of the bond strengths/aggregate structure.

Dr. Hoang Pham

1. **Morphology-Property-Processing Relationship of Polymer Blends**: For many years, Polycarbonate Acrylonitrile Butadiene Styrene blends (PC/ABS) have been a common thermoplastic blend used in automotive applications. However, having high viscosity, the PC/ABS blends presented challenges in thin-wall applications and injection molded parts with long flow lengths. For these applications, high flow materials are desired. The technology for high flow PC/ABS became necessary to improve productivity and to enable the design of thin walled intricate structural parts. At the time of this technical gap, he was the lead of a development team at Dow charged with innovating a new product to meet the market need for high flow PC/ABS blends.

2. **Impact Modification of Polypropylene**: Inter-material substitution is an essential part of a product cycle. Environmentally safe materials such as olefins have been sought after to replace polystyrene and other structural materials such as polycarbonate and PC/ABS, which are viewed as environmentally unsafe, especially for direct food contact. For such applications, new polypropylene and its impact modified version design were needed to fulfill application requirements. He led a team and played a key role in developing the structure/property relationship of polypropylene and impact modification of polypropylene. The developed model became the basis for designing several impact modified PP (or TPO) grades from the reactor to the final performance. Built in several stages, the full model consisted of a fracture mechanism map to define the key materials parameters affecting the failure mechanisms, the model for polypropylene homopolymers and copolymers, also an extended model for elastomers. In conjunction with the toughness model prediction, a modulus model prediction was also established to provide an integrated model to predict stiffness-toughness of PP and its impact modified version. All these models were used to design several new INSPIRE polypropylenes for applications in rigid food packaging. This

series of models was also leveraged by many other researchers to develop new products, such as thermoplastic polyolefins (TPOs) for automotive applications.

Dr. Krishna Venkatswamy

1. **Developed a novel thermoplastic technology of thermoplastic elastomers (TPEs)** for automotive solid weatherseals which was commercialized by Santoprene Speciality Products of Exxon-Mobil (AES). The difficulty of developing a thermoplastic material with elastic recovery requirements or very low compression set closer to thermoset ethylene propylene diene rubber (EPDM - 13% for 22 hrs at 70^{o}C), and at the same time having good thermoplastic extrudability, had been an unresolved problem for many years. Increasing the cure state of the dispersed rubber phase in the continuous polypropylene (PP) phase was essential for this invention. Prior work always resulted in poor extrudate of thermoplastic elastomers when the cure state of the dispersed rubber phase was increased. The invention and development led to TPV materials with compression set which is a measure of elastic behavior (16 % compared to conventional Thermoplastic Vulcanizate (TPV) with 28% for 22 hrs at 70 ^{o}C) closer to thermoset EPDM compression set. These thermoplastic vulcanizates of EPDM in PP are extrudable using conventional thermoplastic equipment to form solid weatherseals and belt line seals for automobiles**.** Technical breakthrough of a slip coating compound to lower surface COF was essential for the success of the system. Two major Japanese automakers have converted to these TPEs by AES for weatherseals and beltline seals worldwide. The weatherseals for automobiles which were predominantly dominated by thermoset rubber have been converted to thermoplastics since this development. The TPE penetration in the market is 5% of the total market, to the tune of $125 Million. Developed a significantly novel class of thermoplastics which are TPEs based on polyamides and polyesters with dynamically vulcanized and dispersed acrylate or ethylene acrylic rubbers. Pioneered this technology in the world of thermoplastic elastomers with various rubber blend combinations that are dynamically vulcanized in engineering thermoplastics.

2. **New Thermoplastic Elastomers:** Most PP & EPDM thermoplastic elastomers have a continuous service temperature of 125^{o}C that spikes to 135^{o}C. Developed new class of thermoplastic elastomers that have performance of 175 ^{o}C continuous use with excursions up to 200 ^{o}C, making them suitable for use for automobile under the hood applications. This technology was licensed by Zeon Chemicals from AES and has been commercialized under the trade name “Zeotherm”. The gaskets, seals and boots which were primarily in thermoset rubber are being converted to thermoplastics. The commercialization of Zeotherm is award winning material ; (1.) SPE Automotive Award; material category and (2.) SPI Design award with these materials. This technology has been a basis for several doctoral studies around the world.

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