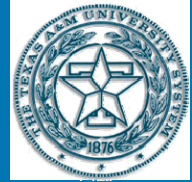




POLYMER TECHNOLOGY CENTER

Winter 2007 Edition



PTC Newsletter

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MARK YOUR CALENDAR FOR PTC's NEXT CONFERENCES!

April 26th - SCRATCH
@ Texas A & M University

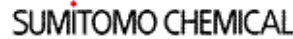
April 27th - PTIC
@ Texas A & M University

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PTC is happy to announce that Sumitomo Chemical has joined the PTIC consortium. Sumitomo Chemical has also participated as a member of the Scratch Behavior on Polymers Consortium. Help us in welcoming Sumitomo Chemical to the PTIC Consortium.



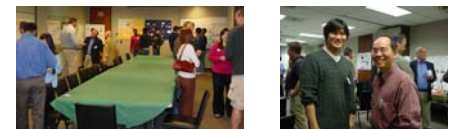
The Scratch Behavior in Polymers meeting was held at Auburn Hills, Michigan on October 12. We are excited to announce the companies present:

- *Advanced Composites, Inc.*
- *Cadillac Products Packaging Co.*
- *Ciba Specialty Chemical Ins.*
- *Daimler Chrysler*
- *Dow Chemical Company*
- *General Motors*
- *Honda*
- *Japan Polypropylene Corp.*
- *Kaneka Texas Corporation*
- *Kyoto Institute of Technology and Shibata of Kato Industry*
- *Masco Corporation R&D*
- *MyTexPolymers*
- *Nissan*
- *Phillips Sumika, PSPC*
- *Rio Tinto Minerals*
- *Solvay Engineered Polymers*
- *Sumitomo Chemical America*
- *Toyota*
- *Visteon*



The Polymer Technology Industrial Consortium (PTIC) meeting was held on November 2nd & 3rd at Texas A&M University. The companies in attendance were:

- *BASF Catalysts*
- *Clean Tech*
- *Consulting Services*
- *Dow Chemical Company*
- *Huntsman Advanced Materials*
- *Kraton Polymers*
- *MASCO Corp*
- *PolyLab LLC*
- *Solvay Engineered Polymers*
- *South Texas Section of the SPE*
- *Specialty Minerals Inc.*
- *Sumitomo Chemical*
- *Sunoco Inc. Co.*
- *Tokai Rubber*



PTC Faculty Member, Dr. Ozden Ochoa, MEEN

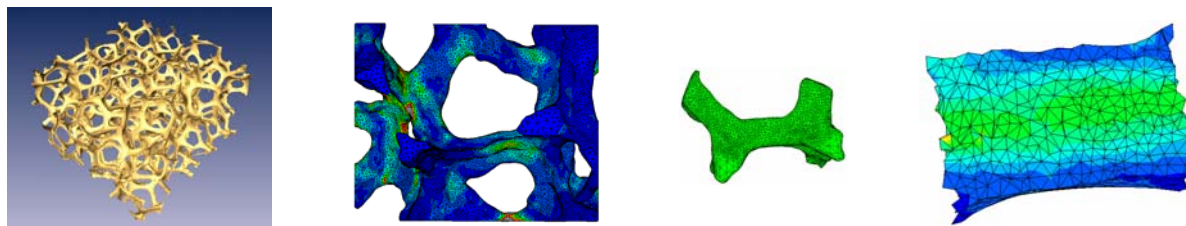
Dr. Ozden Ochoa, professor of mechanical engineering and associate dean of graduate studies at Texas A&M University, just returned to campus September 2006 after three years with the US Air Force Research Laboratories. Since July 2005, she served as the IPA director of Aerospace Sciences and Materials Directorate at Air Force Office of Scientific Research in Arlington, Va. Prior to her leadership at AFOSR, Dr. Ochoa conducted research, identified and established focus areas in composites as the senior technologist at the Materials and Manufacturing Technical Directorate at Wright Patterson AFB in Ohio from 2003 to 2005.

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PTC Faculty Member, Dr. Ozden Ochoa, Mechanical Engineering

Dr. Ochoa’s contributions in the past twenty-five years span a broad range of mechanics of composite materials and structures with applications in the aerospace, offshore, automotive and construction industries. Her research focus is on integrating computational and experimental mechanics to address material and structural characterization of fiber-reinforced polymer and ceramic matrix composites and, recently, with high-temperature carbon foams in thermal management and biomedical applications. *Her present passion is to bring visualization techniques to capture architecture of heterogeneous, anisotropic media in computational models to understand damage modes that are critical in identifying design limits at multiple scales.*



Imaging to Modeling examples with carbon foam architecture at multiple scales

A synopsis of on-going research projects are Multi-functional Hybrid Carbon Foams for Thermal Management, Bioresorbable Polymer Infiltrated Carbon Foams for Orthopedic Devices, Composite Repair of Offshore Steel Pipes, and Design and Life Cycle Response of Composite Risers.

Dr. Ochoa is a Fellow of the American Society of Mechanical Engineers and the American Society for Composites. Among her many honors are the 2005 ASC Award in Composites recognizing her as a “distinguished member of the composites community who has made a significant impact on the development of composite materials through applied research, practice, education, service, advocacy or leadership.” Dr. Ochoa generously contributes to professional and educational organizations and enjoys working with her colleagues to assure that the future of science, technology, and the arts form the foundation of our education. At present, she serves on the Board of Governors of ASME (www.asme.org). She started as the president of the American Society for Composites in (www.asc-composites.org) and is a member of National Museum of the Women in the Arts-Texas State Committee www.nmwa.org.



“Grunlan Research Group: Developing New Biomaterials with Polymers”

Dr. Melissa A. Grunlan, an assistant professor in the Department of Biomedical Engineering (BMEN) at Texas A&M University (TAMU). Her group designs, synthesizes, and characterizes novel polymer-based biomaterials. Dr. Grunlan joined BMEN following her post-doc in the Chemistry Department at TAMU with David Bergbreiter. She received her B.S. in Chemistry and M.S. in Polymers and Coatings from North Dakota State University (Fargo, ND). Her Ph.D. in Chemistry was obtained at the University of Southern California (Los Angeles, CA) in 2004. Prior to beginning her doctoral studies, she was a senior chemist with the H.B. Fuller Company (St. Paul, MN) for 4 years.

A major research interest of Dr. Grunlan and her group is the preparation of novel anti-fouling or “self-cleaning” polymer surfaces which resist or remove biofoulers to improve performance of in-dwelling medical devices as well as marine and industrial equipment. One approach studied is constructing polymer surfaces with enhanced “molecular mobility” as was recently accomplished by attaching poly(ethylene oxide) (PEO) segments to a bulk silicone coating via flexible polydimethylsiloxane (PDMS) tethers (Fig. 1). In addition, the use of thermoresponsive hydrogel networks prepared from poly(*N*-isopropylacrylamide) (PNIPAAm) and embedded polysiloxane nanoparticles is also being studied for temperature-regulated “self-cleaning” surfaces (Fig. 2). Dr. Grunlan’s group is also interested in preparing novel polymeric hydrogels, which may serve as scaffolds for tissue engineering (TE). These studies are focused on the preparation of libraries of stable and biodegradable inorganic-organic polymer hydrogels with tunable material properties such as swelling behavior, morphology, and mechanical strength (Fig. 3). For more information, please contact Melissa Grunlan at (979) 845-2406 or mgrunlan@tamu.edu or visit her research webpage at <http://biomed.tamu.edu/biomaterials/index.html>.

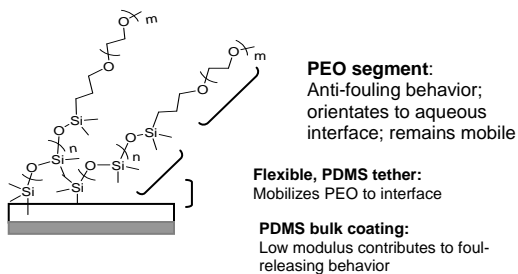


Fig. 1. A Molecularily Mobile Surface for Anti-Fouling Behavior. Heterogeneous surface consists of hydrophobic (PDMS) and hydrophilic (PEO) “nanodomains” which remain in a mobile or dynamic state

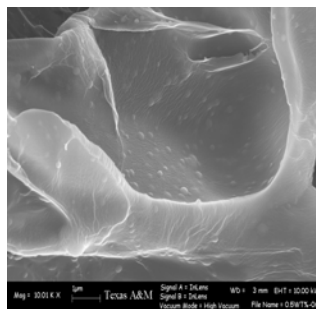


Fig. 2. SEM image of PNIPAAm hydrogel containing PDMS nanoparticles.

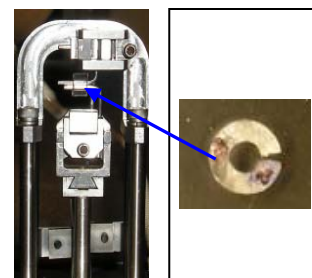
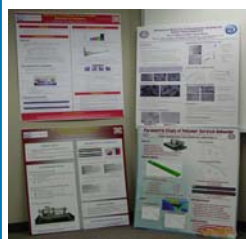
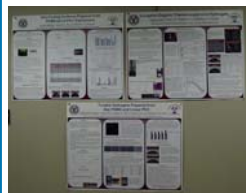
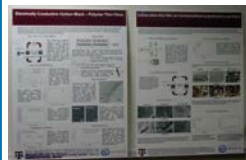
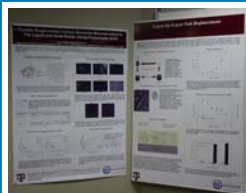


Fig. 3. Mechanical testing of hydrogel “rings”.

PTIC STUDENT POSTER SESSION

The poster session turned out to be the best PTIC has had; posters & participants were:



- **Electrical Conductive Carbon Black-Polymer Thin Films**
C. Jason Jan, Matthew Walton, Ethan P. McConnell, Woo-Sik Jang, Yeon-Seok Kim, and **Jaime C. Grunlan-PI**, Dept. of Mech. Eng.
- **Layer-by-Layer Foil Replacement**
Woo-Sik Jang, Ian M. Rawson, **Jaime C. Grunlan-PI**, Dept. of Mech. Eng.
- **Conductive thin film on functionalized polyethylene particles**
Yeon-Seok Kim, Kang-Shyang Liao, C. Jason Jan, Woong-Jae Boo, David E. Bergbreiter and **Jaime C. Grunlan-PI**, Dept. of Chemistry, Dept. of Mech. Eng.
- **Tunable Single-walled Carbon Nanotube Microstructure in the liquid and solid state using Poly(acrylic acid)**
Lei Liu and **Jaime C. Grunlan-PI**, Dept. of Mech. Eng.
- **Tunable Hydrogels and prepared from star PDMS and Linear PEO**
Katherine R. Regan, Yaping Hou, Mariah S. Hahn, Huimin Liao & **Melissa A. Grunlan-PI**, Dept. of BioMedical Eng., Dept. of Chemistry, Dept. of Chemical Eng.
- **Inorganic-Organic Thermoresponsive Hydrogels**
Yaping Hou, Andrew R. Matthews, **Melissa A. Grunlan-PI**, Dept. of BioMedical Eng.
- **Non-Fouling Surfaces Prepared from PDMS-block-PEO Copolymers**
Rajini Murthy, Casey D. Cox, **Melissa A. Grunlan-PI**, Dept. of BioMedical Eng.
- **Time-Stress-Temperature Behaviors of Multi-layered FRP Composites**
Shannon Wagner, Dept. of Physics and Pre-Eng., Delaware State University, Aravind Nair, **Anastasia Muliana-PI**, Dept of Mech. Eng.
- **Nonlinear Viscoelastic Model of Adhesive Polymers**
Kamran A. Klan, **Anastasia Muliana-PI**, Dept. Of Mech. Eng.
- **Developing Multifunctional Polymer Composites by Aligning NanoInclusions**
Sumanth Banda, Atheer Almasri, Sujay Deshmuth, Zoubeida Ounaies-PI, Dept. of Aerospace Eng.
- **Active Nanocomposites: Energy Harvesting and Stress Generation Media for future Multifunctional Aerospace structures**
Zoubeida Ounates-PI, Dept. of Aerospace Eng.; Ramanan Krishnamoorti, Chemical Eng. University of Houston; Richard Vaia, Materials & Manufacturing Directorate, AFRL/MLBP
- **On the processing of Poled PVDF mats using electro spinning techniques**
Ihab Abdelsayed, Kristin Powlowski, **Zoubeida Ounaies-PI**, Dept. of Aerospace Eng.
- **Mechanical Behavior of Nonoplatelet-Reinforced Epoxy Nanocomposites**
Woong Jae Boo, Luyi Sun, Ehsan Mogbelli, J. Daniel Liu, A. Clearfield, Hung-Jue Sue-PI, Dept. of Chemistry, Dept. of Mech. Eng.
- **Parametric Study of Polymer Scratch Behavior**
H. Jiang, G.T. Lim, R.L. Browning, J.D. Whitcomb, **Hung-Jue Sue-PI**, Dept. of Aerospace Eng., and Dept. of Mech. Eng.
- **Scratch Behavior of Anisotropic Polypropylene Surfaces**
Robert. L. Browning, Allan Moyse, **Hung-Jue Sue-PI**, Dept. of Mech. Eng.
- **Identification of a Standard Acceptance Test Method for Polymeric Films in Military Food Packaging Applications**
Allan Moyse, Ehsan Morbelli, **Hung-Jue Sue-PI**, Dept. of Mech. Eng.
- **α -Zirconium, Phosphate-Epoxy Nanocomposites: Preparation and characterization**
Woong Jae Boo, N. Spurr, A. Clearfield, Hung-Jue Sue-PI, Depts. of Chemistry, Depts. of Mech. Eng.
- **Preparation of Polystyrene/carbon nanofiber conductive composite films**
Chi-wei Tien, Luyi Sun, Israel Serna, **Hung-Jue Sue-PI**, Dept. of Mech. Eng., Dept. of Chemistry
- **Development of Nano-and Micro-Composite Reinforced Polymeric Materials for Retort Rack Applications**
Hung-Jue Sue-PI, M. Wong, G.T. Lim, J. Weon, Dept. of Mech. Eng., BP Chemical, Luzenac America
- **Double-Notch four-Point Bending Technique for Toughening Mechanism Studies on Polyolefins**
J. Daniel Liu, W-J. Boo, **Hung-Jue Sue-PI**, Dept. of Mech. Eng.
- **Mechanical Behaviors and Toughening Mechanisms of Talc-and CaCO₃-Reinforced Polypropylene Composites**
J. Daniel Liu, W.J. Boo, J.I. Weon, **Hung-Jue Sue-PI**, Dept. of Mech. Eng.
- **Influence of Additives on the Scratch Behavior of Polymers**
B. Browning, G.T. Lim, A. Moyse, Luyi Sun, **Hung-Jue Sue-PI**, Dept. of Mech. Eng.

PTC would like to thank all the Polymer students that took part in the poster session.

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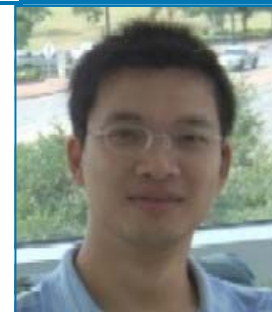
The following is the name list of SPE student officers for year 2007.

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Han Jiang

For any SPE related questions, please don't hesitate to contact anyone of these students.

PTC SEMINAR

Dr. P. Steve Chum
The Dow Chemical Company
Evolution of Polyolefin Technology in the Last 50 Years:
From Ziegler-Natta to Metallocene to Post-Metallocene Systems
Monday, October 2, 2006 @ 10:00-11:00am ENPH 301



BIG THANKS



PTC would like to acknowledge and thank the Solvay Engineered Polymers Company for hosting the Scratch Behavior in Polymers Consortium meeting on October 12th in Auburn Hills, Michigan. This event was a record breaker in attendance, and we appreciate all your assistance in making this such a great success. We especially want to thank and acknowledge the following personnel for all their assistance: **Mr. Edmund Lau, Ms. Kelly Polus, Ms. Lesley Signorello, and Ms. Edie Weir**

PTC Newsletter prepared by: Isabel Cantu
Edited by: William Neil Everett & Jonathan O'Reilly