POLYMER TECHNOLOGY CENTER

Summer 2009 Edition

PTC Newsletter

Polymer Specialty Certificate Program

TAMU students can apply for this program. Please visit:
http://essap.tamu.edu/polymer.htm

MARK YOUR CALENDAR FOR PTC's NEXT CONFERENCES!

- **October 8th - SCRATCH** @ Detroit, Michigan
- **October 28-29** - *Short Course* -Scratch and Wear of Polymers and Composites @ TAMU
- **October 29-30 - PTIC** @ *Texas A & M University*

Polymer Technology Center
Texas A&M University
MS 3123
College Station, TX 77843-3123
Hung-Jue Sue, Director
(979) 845-5024
hjsue@tamu.edu
Isabel Cantu
(979) 458-0918
icantu@tamu.edu or
Website: http://ptc.tamu.edu

NEWEST SCRATCH MEMBER

PTC is pleased to announce our newest member in the Scratch Behavior of Polymers Consortium, ExxonMobil.

ExxonMobil Chemical

SCRATCH and PTIC

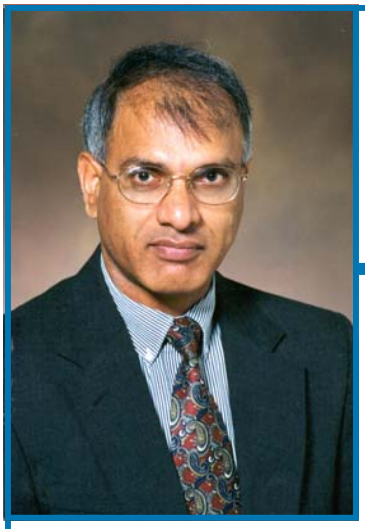
The Scratch Behavior of Polymers Consortium and the Polymer Technology Industrial Consortium held their semi-annual meetings on April 16-17, 2009 with the following companies in attendance:

Scratch Behavior of Polymers Consortium

- AXEL Plastics
- BRASKEM
- Consulting Firm
- Dow Chemical Company
- ExxonMobil Chemical Company
- Japan Polypropylene Corp.
- KANEKA Texas Corp.
- Milliken Chemical
- MyTex Polymers
- Phillips Sumika Polypropylene Corp.
- Rio Tinto Minerals

Polymer Technology Industrial Consortium (PTIC)

- AXEL Plastics
- BASF
- BRASKEM
- Cytec Industries
- Dow Chemical Company
- ExxonMobil Chemical Company
- Japan Polypropylene Corp.
- KANEKA
- Kuraray America - Evalbu
- MyTexPolymers
- Rio Tinto Minerals
- South Texas Section of the SPE
- Sumitomo Chemical America, Inc.
- Tokai Rubber Industries Ltd.
- Total Petrochemical
- Toyo Ink Mfg. America LLC.



Professor J. N. Reddy
Distinguished Professor and
Holder of Oscar S Wyatt Endowed Chair
Department of Mechanical Engineering
MULTISCALE ANALYSIS OF POLYMERIC NANOFIBERS AND SCAFFOLDS FOR TISSUE ENGINEERING APPLICATIONS

Polymer nanofibers are used in critical applications in the biomedical industry, and theoretical analysis of these polymeric nanofibers are an important step towards the design and development of novel biomedical applications. In this work, Professor J. N. Reddy and his coworkers developed multiscale mathematical theories by understanding the structure-property relations to estimate the mechanical properties of polymeric nanofibers. The fundamental basis of multiscale modeling begins with the analysis of atomistic formations, followed by the development of theoretical procedures at higher scales of interest. The capture of micro-structural features of the nanofibers (see Figure 1) was observed to be of paramount importance in predicting realistic macroscale material properties. The predicted macroscale mechanical properties showed excellent correlations with experimental studies (see Figure 2 and 3). Professor Reddy and his group is also focused on the application of these multiscale models for the optimization of bio-polymeric scaffolds based on bioreactors, which are important components for the incubation of stem cells. The multiscale theories are combined with transport phenomenon to determine ideal *in-situ* conditions for optimum nutrient transport in bioreactors.

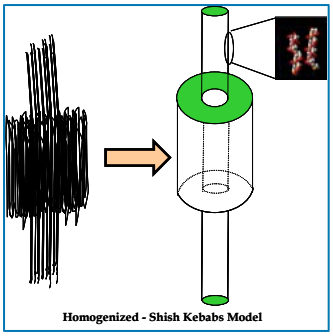


Figure 1

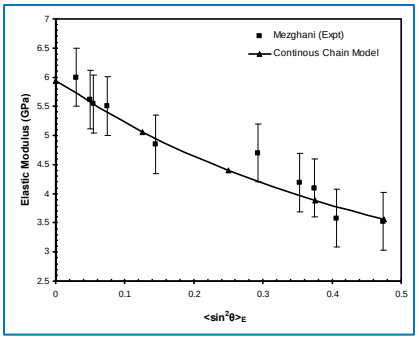


Figure 2

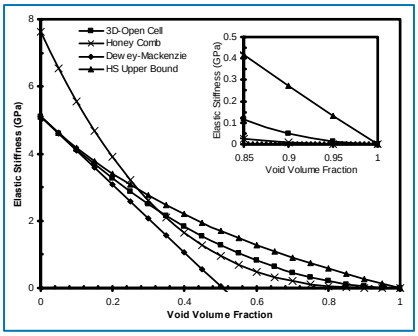
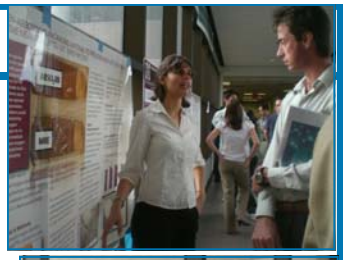


Figure 3

Awards for Future PTIC Student Poster Session Participants

PTC has been granted approval to present 3 awards (in form of 1st, 2nd and 3rd places) to students participating in the student poster sessions for the PTIC semi-annual meetings. The semi-annual meetings take place in the Spring and in the Fall each year. The PTIC members will serve as the committee to award the posters presented. The selection will be based on the following criteria: technical content (50%), presentation (30%), and relevance to the industry (20%). The selection process will consist of: 1st place to be awarded $500, 2nd place $300, and 3rd place $200. The award will go to the 1st author listed on the poster. PTC is expecting the student participation to double and possibly triple for the upcoming PTIC student poster session events.

PTIC-Student Poster Session on April 16-17, 2009



The student poster session is an event where students can display their research to the Polymer Industry. This event gives the students/Polymer Industry and Faculty time to share ideas, research, etc. Below is a listing of the posters, titles, and authors. PTC would like to thank everyone that took part in this event.

- ***"Polyisobutylene Supported Imidazolium Salt and N-Heterocyclic Carbene-Ligated Catalysts"***
  Haw-Lih Su, Chayanant Hongfa, Hassan S. Bazzi and **Dr. Dave Bergbreiter**

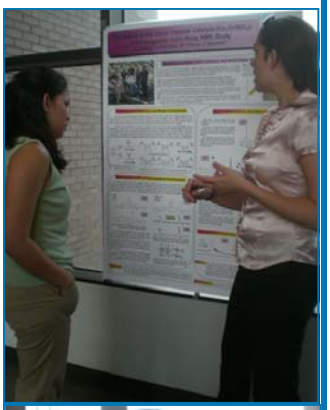
- ***"Covalent Layer-by-layer Assembled 'Chemically Smart' Surfaces"***
  Hui Fu, Kang-Shyang Liao, Albert Wan, James D. Battles & **Dr. Dave Bergbreiter**

- ***"The Nation of the Union Carbide Catalyst (Cp_2Cr/SiO_2): A Paramagnetic Solid-State NMR Sudy"***
  C. Hilliard, J. Guenther, M. Perera, and **Dr. J. Bluemel**

- ***"Mechanical Properties of Peptide based biomaterials from molecular dynamic simulations"***
  Jennifer Carvajal, **Dr. Tahir Cagin**

- ***"Molecular dynamic simulation of Thermo-mechanical properties of polyurea"***
  Jean Njoroge, **Dr. Tahir Cagin**

- **"Oxygen-absorbing packaging material to prolong shelf life of oxygen-sensitive meal-ready-to-eat (MRE) rations"**
  Carmen Gomes, Ezekiel Chimbombi, Dr. Elena M. Castell-Perez, Dazhi Sun, Daniel Liu, Dr. Hung-Jue Sue, Colin Meyer, Cadillac Products Packaging Company, Troy, MI; Patrick Dunne, Natick Soldier Center, Natick, MA; Alan O. Wright, Natick Soldier Center, Natick, MA



- ***"Mechanistic Studies of the Coupling Reaction of Oxetane and CO_2 to Afford Polycarbonates Catalyzed by Chromium Salen Complexes"***
  Adriana I. Moncada and **Dr. Donald J. Darensbourg**

- ***"Abrasion Resistance Measurement of Thermoplastic Olefins"***
  Bobby Browning, Han Jiang, **Dr. Hung-Jue Sue,** Motoko Ito, Mikihiko Fujiwara from Japan Polypropylene, and Anthony Gasbarro from Advanced Composites

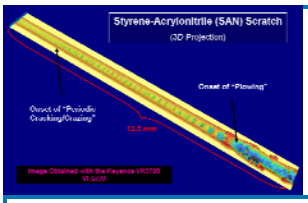
- ***"Damage Caterization and Evolution Map of Polymer Scratch"***
  Han Jiang, Robert Browning, Ehsan Moghbelli, Yishu Song and **Dr. Hung-Jue Sue**

- ***"Nanocomposites with tunable glass transition temperature"***
  Minhao Wong, Ryotaro Tsuji, and **Dr. Hung-Jue Sue**

- ***"Toughening Mechanisms in Polymeric Materials"***
  Jia (Daniel) Liu, Jong-Il Weon, Woong-Jae Boo, **Dr. Hung-Jue Sue**

PTC Faculty

Name	E-mail Address	Office #
Perla Balbuena	Balbuena@tamu.edu	979-845-3375
Dave Bergbreiter	bergbreiter@tamu.edu	979-845-3437
Janet Bluemel	bluemel@tamu.edu	979-845-7749
Tahir Cagin	cagin@che.tamu.edu	979-862-1449
Elena Castell-Perez	ecastell@tamu.edu	979-862-7645
Xing Cheng	chengx@ece.tamu.edu	979-845-5130
Zheng D Cheng	zcheng@tamu.edu	979-845-3413
Abraham Clearfield	a-clearfield@tamu.edu	979-845-2936
Terry Creasy	tcreasy@tamu.edu	979-458-0118
Donald Darensbourg	d-darensbourg@tamu.edu	979-845-5417
Jaime Grunlan	jgrunlan@tamu.edu	979-845-3027
Melissa A. Grunlan	mgrunlan@tamu.edu	979-845-2406
Wayne Hung	hung@tamu.edu	979-845-4989
Helen Liang	hliang@tamu.edu	979-862-2623
Anastasia Muliana	amuliana@tamu.edu	979-458-3579
Ozden Ochoa	oochoa@tamu.edu	979-845-2022
Zoubeida Ounaies	zounaies@tamu.edu	979-458-1330
K.R. Rajagopal	krajagopal@tamu.edu	979-862-4552
J.N. Reddy	jnreddy@tamu.edu	979-862-2417
Cris Schwartz	cschwartz@tamu.edu	979-845-9591
Dan Shantz	shantz@tamu.edu	979-845-3492
Erik Simanek	simanek@tamu.edu	979-845-4242
Hung-Jue Sue	hjsue@tamu.edu	979-845-5024
Steve Suh	ssuh@tamu.edu	979-845-1417
Jyhwen Wang	jwang@tamu.edu	979-845-4903
John Whitcomb	whit@aero.tamu.edu	979-845-4006



PTC Short Course: Scratch and Wear of Polymers and Composites
October 28-29, 2009
Texas A&M University

The course will cover a number of topics relevant to anyone working with polymers with an interest in surface issues. Such fields include final-form polymer manufacturing, solid lubrication, coatings, composite structures, polymer formulation, filler and reinforcement suppliers, product designers, and new product development. The course will present key theories behind scratch and wear, as well as illustrative examples.

Presenters are:

- *Klaus Friedrich, Dr. Ing. Dr. H. C. Institute for Composite Materials, University of Kaiserslautern*
- *Cris Schwartz, Ph.D., PE, Polymer Technology Center Dept. Of Mechanical Engineering, Texas A&M University*
- *H.-J. Sue, Ph.D., Polymer Technology Center, Dept. Of Mechanical Engineering, Texas A&M University*

To register, please visit:
http://engrevent.tamu.edu/event/100493
Reserve your spot as space is limited

SPE South Texas section

NSF Graduate Research Fellowship for Casie Hilliard (Bluemel group) Chemistry Department

Casie Hilliard, who is a first-year graduate student in the Chemistry Department and a TAMU SPE student chapter member, has been awarded a 2009 National Science Foundation (NSF) Graduate Research Fellowship (GRF).

Casie is working in the Bluemel group on a joint project with Dr. Gladysz. Her goal is to synthesize homogeneous single-site catalysts, which are encaged by long alkyl chains. These catalysts can be used in a homogeneous liquid phase, immobilized on silica surfaces, or embedded in polymer matrices. The latter versions should lead to catalysts that are not only shape selective but can also be recycled. Casie will focus on solid-state NMR as the analytical tool for investigating the structure and dynamics of the catalysts on the surface and in the polymer matrix.

The prestigious NSF Fellowship will fund Casie's research for three years, and the stipend rate is a generous $30,000 per year, which allows Casie to focus on her research. The fellowship also provides $1,000 per year for travelling to conferences, which gives Casie the opportunity to network outside of TAMU and to present her research, for example, at an ACS meeting.

PTC Newsletter prepared by: Isabel Cantu
Edited by: Nicole Farris, Adrienne O'Reilly, and Kevin White