POLYMER TECHNOLOGY CENTER

Winter 2006 Edition

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MARK YOUR CALENDAR FOR PTC's NEXT CONFERENCES!

April 20th - SCRATCH
@ Texas A & M University

April 21st - PTIC
@ Texas A & M University

ADVERTISE IN THE PTC NEWSLETTER!

If you are interested in placing an ad in the PTC quarterly newsletter, please contact Isabel Cantu. Revenue will be used for PTC Student activities.

Related links:
http://thelook100.tamu.edu
http://www.tamu.edu/vision2020

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,
Program Coordinator
(979) 458-0918
icantu@tamu.edu or
ptctamu@gmail.com

Scratch

The Scratch Meeting was held in Detroit, MI on October 13th. The Companies represented were:

- **Advanced Composites**
- **Cadillac Products Packaging Co.**
- **Ciba Specialty Chemical Inc.**
- **Daimler Chrysler**
- **Dow Chemical Co.**
- **ExxonMobile**
- **Ford Motor Company**
- **GM**
- **Japan Polypropylene Corp.**
- **Kaneka Texas Corporation**
- **Luzenac America**
- **MyTex**
- **Nissan-USA**
- **Phillips Sumika Polypropylene Company (PSPC)**
- **Solvay Engineered Polymers**
- **Sumitomo Chemical America, Inc.**
- **Toyota Technical Center**
- **Visteon**





PTIC

On October 28th the PTIC Meeting was held. The meeting was very successful with the following companies being represented.

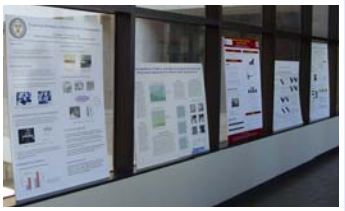
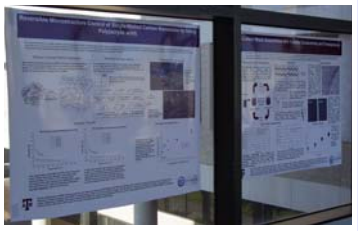
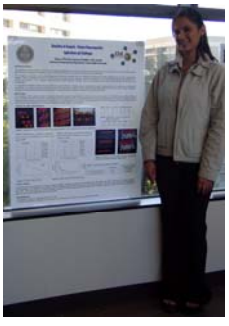
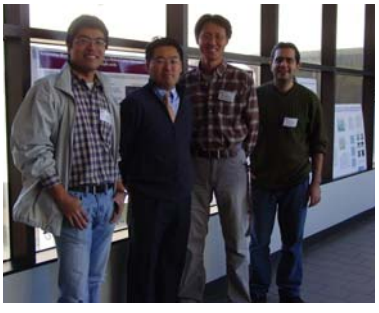
- Alamo Suppply Co., Ltd.
- Dow Chemical Co.
- Engelhard Corporation
- Escuela Superior Politecnia del Litoral (ESPOL)
- GE Advanced Materials
- Kaneka Texas Corp.
- Luzenac America
- NanoComposites Inc.
- Polylab LLC
- SPE
- Specialty Minerals
- SUNOCO
- Total Petrochemicals Inc.
- U.S. Army Natick Research
- Viscotek



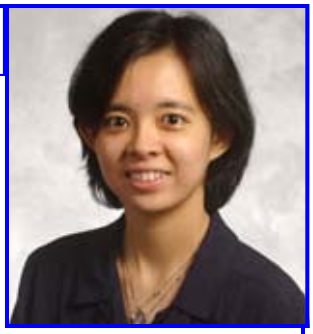



PTIC Polymer Student Poster Session

The goal of the PTC is to support the enrichment of the education received by the TAMU Polymer Students. The PTIC Polymer Student Poster Session provides an opportunity for the Polymer Students to interact with the Polymer Industry. This event encourages the exchange of research findings and ideas, and it also provides an opportunity for recruiting. The Polymer Students are always excited to showcase their research findings to the Polymer Industry.


NSF CAREER Award Winner



The proposed CAREER plan aims to develop a method for linking the evolution of composite constituent (fiber-matrix-interphase) to the overall viscoelastic and damage behaviors of fiber reinforced polymer (FRP) structures. The research plan consists of:

An analytical/computational phase to develop a multi-scale material and structural modeling framework. The framework is based on a synthesis of three major components: numerical algorithms of time-dependent constitutive models with hygrothermal, stress, and damage effects at the constituent (matrix-interphase) levels, hierarchical micromechanical constitutive models for several composite reinforcements, and layered structural elements that incorporate through-thickness material variability.

Experimental phase to characterize in-situ microstructural properties and verify the proposed multi-scale framework. Macro scale testing includes axial and shear creep tests on FRP specimens. Micro scale testing includes creep indentation and scratch tests on fiber, matrix and interphase regions.

The outcome of this research will enhance understanding of microstructural behaviors of heterogeneous materials that strongly influence the global responses of composite structures. The research and education plans are integrated so that the education initiatives draw upon the research results. The educational plan focuses on developing graduate course in computational mechanics, involving undergraduate and graduate students and school teachers with the research project, and integrating the experimental techniques with modeling and computer simulations.

PTC congratulates Dr. Anastasia Muliana on being awarded the NSF Career Award, a great achievement.

Powder X-ray diffractometer

X-Ray Diffraction is a high-tech, non-destructive technique for analyzing a wide range of materials, including fluids, metals, minerals, polymers, catalysts, pharmaceuticals, thin-film coatings, ceramics, and semiconductors. Throughout industry and research institutions, XRD has become an indispensable method for materials investigation, characterization, and quality control.

Both small angle X-ray scattering (SAXS) instruments and wide angle X-ray diffractometers (XRD) are available in the X-ray lab of the Chemistry Department at Texas A&M University and they are open to all users within Texas A&M University system.

What shown in the figure are two Bruker D8 powder X-ray diffractometers. Their applications includes: (1) structure solution; (2) phase identification; (3) lattice parameter determination; (4) residual stress measurements. The right one with short arm is used for regular powder samples. It uses Cu Kα radiation and is fitted with a diffracted beam monochromator (to remove the Kβ component and lessen fluorescence radiation) and a scintillation counter. The instrument is calibrated employing a quartz standard. Usually a flat top-load sample mount was filled with the powder and placed on the diffractometer at room temperature.

The left one with long arm is fitted with an incident beam Ge-monochromator and a position sensitive detector. The instrument was calibrated employing a quartz standard. Other than testing regular powder samples in a flat top-load sample mount, this long arm diffractometer can also test samples loaded in a capillary.

POLYMER TECHNOLOGY CENTER

Polymer Specialty Certificate Program

Polyolefins production in Texas represents 70 percents of the U.S. market, 18 percent of the world market, and is a $26 billion per year industry. Currently there are no schools in the State of Texas that offer a formal polymer curriculum, despite the significant role the polymer industry plays in the state's economy. Many of the engineers graduating from Texas A&M University will find themselves working with polymers in one form or another. Companies specializing in polymer synthesis and manufacturing (e.g., Dow Chemical, ExxonMobil, Innovene, Engelhard, Solvay, etc.) strongly desire engineers with a strong polymer background. The polymer certificate program will provide this knowledge, which will reduce training time required to turn Texas A&M students into productive members of the industrial workforce in Texas. This emphasis in polymers will give our students a significant edge over those from other universities who have no documented polymer knowledge. TAMU students will be able to fill jobs in Texas that often go to students from out of state schools with established polymer curricula (e.g., Southern Mississippi, University of Akron, UMass, etc.). Ultimately this certificate program will serve to keep native Texans in Texas by better preparing them for the state's job market.

It is because of the great demand in Polymer understanding that the Faculty of the Polymer Technology Center (PTC) of Texas A&M University (TAMU) is proposing a Polymer Specialty Certificate Program. This program will be the first of its kind offered in the State of Texas. Students will be able to structure an individualized program from a selection of courses to meet their career objectives.

Description

The proposed undergraduate Polymer Specialty Certificate Program will consist of (4) three-hour courses for a total of 12 credit hours. Two of the courses will be core curriculum which will count for 6 credits toward the student's departmental degree. Core courses will include MEEN 458 (Processing & Characterization of Polymers) and CHEM 466 Polymer Chemistry. An additional six hours will be comprised of (2) three-hour science or engineering electives. Completion of 12 semester credit hours of the following courses earn a Polymer Certificate and the specialty is recorded on the student's permanent University record.

1. Core Curriculum - 6 semester credit hours

Course Code	Course Title	Instructor	When Offered	Frequency Offered	Credit Hours
MEEN 458	Processing & Characterization of Polymers	Jaime Grunlan	Spring 2006	Annually/Spring	3
CHEM 466	Polymer Chemistry	Stephen A. Miller	Spring 2006	Annually/Spring	3

2. Elective Curriculum – 6 or more semester credit hours from the polymer courses listed below. Up to 3 hours of coursework can be substituted with research emphasizing polymers (provided polymer coursework has been initiated – research must receive prior approval)

Course Code	Course Title	Instructor	When Offered	Frequency Offered	Credit Hours
CHEN 451	Intro to Polymer Engineering	Michael Bevan	Fall 2005	Annually/Fall	3
MEEN 455	Engineering with Plastics	Hung-Jue Sue	Fall 2006	Annually/Fall	3
MEEN 489	Elements of Composite Materials	Terry S. Creasy	Spring 2006	TBA	3
AERO 489	Polymer and Composites	Zoubeida Ounaies	Spring 2007	TBA	3
MEEN 489	Viscoelastic Solids	Anastasia Muliana	Fall 2005	TBA	3
MEEN/CHEN/ AERO/CHEM 485	Individual Research	PTC Faculty	Spring 2006	Every Semester	3
BMEN 689	Polymeric Biomaterials	Melissa A. Grunlan	Spring 2006	TBA	3
CHEN 689	Colloidal & Interfacial	Michael Bevan	Spring 2006	Even years/ Spring	3

A grade of C or above is required in all of the above courses.

PTC Faculty

Name	E-mail Address	Office #
Dr. NK Anand	nkanand@tamu.edu	979-845-5633
Dr. Perla Balbuena	Balbuena@tamu.edu	979-845-3375
Dr. Dave Bergbreiter	bergbreiter@tamu.edu	979-845-3437
Dr. Michael Bevan	mabevan@tamu.edu	979-847-8766
Dr. Tahir Cagin	cagin@che.tamu.edu	979-862-1449
Dr. Abraham Clearfield	a-clearfield@tamu.edu	979-845-2936
Dr. Terry Creasy	tcreasy@tamu.edu	979-458-0118
Dr. David Ford	david-m-ford@tamu.edu	979-862-4850
Dr. Jaime Grunlan	jgrunland@tamu.edu	979-845-3027
Dr. Melissa A. Grunlan	mgrunlan@tamu.edu	979-845-2406
Dr. Wayne Hung	hung@tamu.edu	979-845-4989
Dr. Helen Liang	hliang@tamu.edu	979-862-2623
Dr. Ed Marotta	emarotta@tamu.edu	979-458-3580
Dr. Stephen A. Miller	samiller@tamu.edu	979-845-2543
Dr. Roger Morgan	roger-j-morgan@tamu.edu	979-845-1292
Dr. Anastasia Muliana	amuliana@tamu.edu	979-458-3579
Dr. Ozden Ochoa	oochoa@tamu.edu	979-845-2022
Dr. Zoubeida Ounaies	zounaies@tamu.edu	979-458-1330
Dr. K.R. Rajagopal	krajagopal@tamu.edu	979-862-4552
Dr. J.N. Reddy	jnreddy@tamu.edu	979-862-2417
Dr. Dan Shantz	shantz@tamu.edu	979-845-3492
Dr. Erik Simanek	simanek@tamu.edu	979-845-4242
Dr. Hung-Jue Sue	hjsue@tamu.edu	979-845-5024
Dr. Steve Suh	ssuh@tamu.edu	979-845-1417
Dr. Jyhwen Wang	jwang@tamu.edu	979-845-4903
Dr. John Whitcomb	whit@aero.tamu.edu	979-845-4006

SPE, Student Chapter Officers

Eric Frantz, SPE President

Meet the new Officers for the SPE Student Chapter at Texas A&M University,

- Eric Frantz, President (efrantz@mail.chem.tamu.edu)
- Arnab Chakrabarty, treasurer, (arnab@tamu.edu)
- Han Jiang, co-secretary, (jianghantamu@gmail.com)
- Ehsan Moghbeli, co-secretary, (moghbelli@yahoo.com)

If there are any questions, concerns, or suggestions, please don't hesitate to contact any one of these officers.

Thank You

PTC would like to acknowledge and thank The Dow Chemical Company (Steve Hahn, Terry Hermel-Davidock, Chevelle Simpson) for Hosting and helping out with the arrangements of the Scratch Behavior on Polymers Consortium Meeting at Detroit, Michigan on October 13, 2005. The meeting was a big success.

Living. Improved daily.

With over 20 years of polymer characterization experience, Viscotek has become the leading provider of comprehensive GPC/SEC detectors, software and systems for characterization of natural and synthetic polymers, copolymers and proteins. In a single experiment, our unique and patented static light scattering and dynamic light scattering, viscometer, triple and tetra detector technologies allow you to obtain absolute molecular weight, molecular size, polydispersity, intrinsic viscosity, conformation, structure, branching, aggregation and copolymer composition. In recent years, Viscotek has established a strong partnership with faculty members at Texas A&M University. We are very proud to be associated with Polymer Technology Center and looking forward to possible collaboration with all the members.

PTC would like to express our gratitude to Viscotek (Ali Soleymannezhad and Shawn Welch) for their contribution in providing the PTIC lunch, during the PTIC meeting on October 28th.

Thank You