POLYMER TECHNOLOGY CENTER

Fall 2009 Edition

PTC Newsletter

MARK YOUR CALENDAR FOR PTC's NEXT CONFERENCES!

- **October 7th - SCRATCH**
  @ Detroit, Michigan
- **October 29-30 - PTIC**
  @ *Texas A & M University*

- **April 6-7** - *Short Course*
  -Scratch and Wear of Polymers and Composites @ TAMU
- **April 8th - SCRATCH**
  @ *Texas A&M University*
- **April 8th-9th - 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

Polymer Specialty Certificate Program Expanded Due to Popular Demand

Due to the high popularity of the Polymer Certificate Program amongst both undergraduates and graduates alike from a vast variety of fields, PTC has made an expanded amendment to the program. After approval of the amendment, the program will include three additional undergraduate and four new graduate core courses as well as additional elective courses.

Scratch Behavior of Polymers Consortium

The scratch consortium will be held in Detroit, MI in hopes of attracting involvement of the automotive industry. PTC is excited to introduce cutting edge research findings. The agenda is below, contact Isabel Cantu at icantu@tamu.edu or call 979-458-0918 to reserve your spot.

POLYMER TECHNOLOGY CENTER

18th Scratch Behavior Consortium Mtg.
Texas A&M University
Final Meeting Agenda

Noon, October 7th, 2009 (Wednesday)
Best Western Sterling Inn
Sterling Heights (Detroit Suburbs), Michigan USA
The Isle Royale room (A&B) located on the 2nd floor of the conference facility (elevator access)

11:00 – 12:00pm	*Members and Guests Informal Exchange of Ideas*	Gathering and Reception
Noon – 12:40 pm	*Members and Member's Guests Only*	Lunch Reception (RSVP Required)
12:40 – 12:45 pm	*H-J. Sue*, TAMU	Welcome, Overview of Agenda, New Members
12:45 – 1:30 pm	*H-J. Sue and the Round-Robin Team*	Round Robin Scratch Testing and Evaluation
1:30 - 2:00 pm	*Han Jiang*	Origin of Scratch Visibility and Quantification Using a Scanner
2:00 – 2:30 pm	*Bobby Browning*	Mar Behavior of TPOs
2:30 – 2:40 pm	Break	
2:40 – 3:00 pm	*Noah Smith and Allan Moyse*	Scratch Machine and Software Updates
3:00 – 3:30 pm	*Bobby Browning*	Scratch Property Differences Between PVC and TPO
3:30 – 4:00 pm	*Han Jiang*	Modeling of Stick-slip Phenomena
4:00 – 4:10 pm	Break	
4:10 – 4:30 pm	*H-J. Sue*	Study of Coating Delamination Strength After Environmental Exposure
4:30 – 5:00 pm	*H-J. Sue and the Team*	Future Plan, Research Prioritization, Date of Next Meeting, etc.
5:00 pm	Adjourn	

Contact Isabel Cantu, PTC Program Coordinator, for further information:

Texas Engineering Experiment Station
Texas A&M University
College Station, TX 77843-3123

Tel: 979-458-0918
(or) 979-845-5024
Fax: 979-845-3081

http://ptc.tamu.edu
Scratch Behavior in Polymers Consortium
Email: icantu@tamu.edu

Polymer Technology Industrial Consortium

The PTIC meeting reveals cutting edge research presented by PTC faculty members. This is a place where the Polymer Industry, PTC faculty, and students come together to interact and present/share research information, ideas, etc. See agenda below, and reserve your spot contact Isabel Cantu at icantu@tamu.edu or call 979-458-0918.

POLYMER TECHNOLOGY CENTER

PTIC Consortium
Texas A&M University
Meeting Agenda
October 29-30, 2009
Room 301 Engineering/Physics Building

Thursday, October 29, 2009		
6:00-8:30	*Buffet dinner at TAMU, Engineering/Physics Building Room 301, Student Poster Session, Lab Tours, interaction between the Polymer Industry and TAMU/PTC Faculty and TAMU Polymer Students. We hope you take advantage of this awesome opportunity.*	
Friday, October 30, 2009		
8:30-9:00	Refreshments & Snacks	
9:00-9:10	Opening Remarks	Introduction and Overview
9:10-9:40	*Melissa Grunlan, BMEN*	"Shape Memory Polymers with Silicon-Containing Segments"
9:40-10:10	*Dave Bergbreiter, CHEM*	"Redox- and Solute-responsive Polymers"
10:10-10:40	*Anastasia Muliana, MEEN*	"Modeling Responses of Polymer Composites with Field Coupling and Time Effects"
10:40-10:50	*Short Break*	
10:50-11:20	*Tahir Cagin, CHEN*	"Improving energy harvesting efficiency by nanostructured materials"
11:20-11:50	*Cris Schwartz, MEEN*	"Development of metrics to quantify surface texturing for haptic applications"
11:50-12:45	lunch, Poster Session, & Tours	
12:45-1:15	*Klaus Friendrich, IVW*	"Wear Behavior of Polyolefin Materials"
1:15-1:45	*H. J. Sue, MEEN*	"Study of Coating Adhesive Strength Using an ASTM Scratch Testing Methodology"
1:45-2:15	PTIC Business	Education Matter, Industrial Needs, Short Courses, New Consortium, etc.
2:15	Adjourn	

Texas Engineering Experiment Station /
Texas A&M University
MS 3123
College Station, TX 77843-3123

Tel: 979-458-0918
(or) 979-845-5024
Fax: 979-845-3081
http://ptc.tamu.edu

Polymer Technology Industrial Consortium
Hung-Jue Sue, Director
Isabel Cantu, Program Coordinator
Email: icantu@tamu.edu

Students will Compete at the PTIC Student Poster Session

PTC plans to present three awards 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 awards will consist of first place $500, second place $300, and third place $200. The award will go to the first author of each awarded poster.

Dr. Chii-Der (Steve) Suh, Director of Innovation & Design in Engineering

PTC Faculty Member: Dr. Chii-Der (Steve) Suh
Mechanical Engineering Senior Design Program at Texas A&M University

For twenty years the Department of Mechanical Engineering, in conjunction with the Institute for Innovation and Design in Engineering (IIDE), has pioneered the senior capstone design classes. These have traditionally worked to build on students' classroom learning in Mechanical Engineering and develop their skills in the engineering design process. The capstone courses provide an opportunity to work with an industrial sponsor applying students' prior engineering education to work toward creative design solutions of the sponsors' design challenge. The first semester emphasizes product innovation where teams develop more than one conceptual design based on the sponsor's product needs, followed by a second semester of detail design of proposed concept(s). Students work as teams during both semesters guided by design studio faculty and interactions with sponsors.

The interaction with sponsors provides engineering reality for students through conversations with experienced professional engineers, and the design studio experience along with interaction with faculty and fellow team members provides experience in scheduling the completion of necessary tasks during the conceptual and design processes. Sponsors and faculty guide but do not initiate or perform engineering tasks.

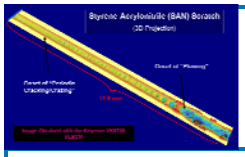
Approach: In the Capstone Mechanical Engineering Design courses, students are exposed to three different but closely related processes in a teamwork environment. Initially, students are taught the innovation process that is required to create a new product starting with a "blank sheet of paper." Then, each team is assigned to an industry sponsor that not only provides a "real world" problem, but also provides periodic "real world" review and criticism. The solution to this design project requires two semesters, where concepts are reduced to an embodiment during the first semester. In the second semester, students are taught the more generic product design and development process that apply to existing product variations, or improvements, as well as to product innovation. The sponsor's design project, continued to completion in the second semester, includes product drawings, prototypes, test procedures, and, time permitting, actual testing.

As novices, the students on each team develop the ability to derive (through repeated iteration) a need statement that defines an unfamiliar industry problem provided by the company sponsor. The need statement is then divided into numerous independent functions that the design must ultimately perform. These independent functions are further broken down into many sub-functions. Through brainstorming, three or more conceptual designs are derived that each meet the functional requirements. With a rigorous down-select evaluation process the student teams each select a final concept with which to proceed further into a preliminary design. Teams typically present formally to the sponsor (at the company location) the Need Statement, Function Structure, Concepts, and Down-Select, as well as the final concept selected by the sponsor for the Preliminary Design. Once a preliminary design is chosen, each member of the multi-disciplinary team identifies, formulates, and solves the engineering problems required to satisfy themselves (and the sponsor) that the selected design will perform as originally conceived.

The final design phase is then initiated. In this phase the detailed design (complete with a full set of detailed drawings) and the detailed analysis (including hand calculations as well as sophisticated computer analyses) are completed. Each team is then required to write a complete report (typically 150-200 pages) on the final, detailed design and prepare a final presentation that depicts the results of each step in their design process. Reports are delivered to the sponsor a day prior to the presentation. The final design presentation lasts for approximately an hour and is usually conducted at the sponsor's site with upper management in attendance.

Program Objective: The objective of the capstone design courses is to teach senior engineering students a top-down systems design process that enables and encourages innovation and have them apply this process to a challenging design project to help them internalize the process. The challenging projects and mentoring provided by project sponsors is invaluable in the learning process. Sponsor's financial support supplements the resources provided by the collaborating departments to support excellence in the senior design program. Projects are of current interest to the participating sponsors. Sponsors are expected to commit engineering resources to direct and mentor groups of highly motivated and innovative students often of multidisplinary background.

Faculty Member's Expertise: IIDE, of which Dr. C. Steve Suh is the Director, has twelve faculty members with individual specializations that cover a very broad spectrum of engineering topics including innovation design methodology, manufacturing, product cost modeling and analysis, environmental impact, energy systems, automotive engineering, biomimetric design, carbon form, nano-composites, tribology of polymers and polymer-based components, dynamic instability diagnostics and prognostics, laser thermometry, CAD/CAM/CAE, and material processing technology. Several have past industrial experiences, and most teach both undergraduates and graduates in Mechanical Engineering. Information about the IIDE Faculty may be found at the website: http://www1.mengr.tamu.edu/iide/. Additional information for Department of Mechanical Engineering Faculty is available at http://www.mengr.tamu.edu.



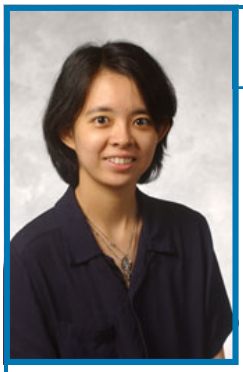
PTC Short Course: Scratch and Wear of Polymers and Composites Rescheduled to April 6-7, 2010 Texas A&M University

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



PTC Facutlty Member: Dr. Anastasia Muliana receives the Presidential Early Career Awards for Scientists and Engineers (PECASE) Award

This PECASE project deals with a multi-scale framework that integrates thermal, electrical, and mechanical responses including loading rate and physical aging effects of the constituents to the overall multi-field responses of smart composites. The studied smart composites consist of laminated fiber reinforced composites and piezocomposite transducers of PZT fiber/particle and epoxy matrix, suitable for multifunctional morphing structures. The framework will be extended to study multi-field performance of smart functionally graded structures. By adopting the functionally graded concept, in which the compositions and microstructures of the constituents are gradually varied, discontinuities in field variables at the interfaces of the constituents can be minimized.

The proposed study will enhance understanding of the multifunctional performance of smart structures under extreme environments while recognizing multi-field responses of the constituents. The use of piezocomposites forms pliable smart composites, making them suitable for morphing structures. The multi-scale framework can be used to analyze responses of smart structures under unsteady aerodynamic loadings, which can support design optimization of intelligent aerospace vehicles.

PTC Visiting Scholar, Dr. Benjamin T.A. Chang

Dr. Chang received his Ph.D. in Material Science from the University of Rochester. He worked for Shell R/D Center (Westhollow Technology Center) in Houston for 25 years. In 2005 he retired from Shell and founded his company, PolyLab LLC, to continue his R/D in Coating/Polymer. He is a certified NACE Coating Inspector, NACE/SSPC Protective Coating Specialist, NACE CIP Instructor, and a PE in Texas. He has been working since 2006 with Prof. Hung-jue Sue of Texas A&M University, Mechanical Engineering Dept. and Polymer Technology Center on a US DOT sponsored research project on "External Pipeline Coating Integrity". The purpose of this project is to assess the integrity of External 3 layer polyolefin and Fusion Bonded Epoxy Pipeline Coatings. This project was also sponsored by a team of pipeline coating industries – Dow Chemicals, 3M, NOV Tuboscope, Shaw-Cor. This project has generated five technical papers with significant new discoveries to the pipeline coating industry. This was a successful project to combine academic theory and practical industry approaches to generate important and practical results to the industry.

PTC Post-Doc, Dr. Chien-Chia Chu

Howdy! My name is Chien-Chia Chu and this is my second time to join the group. I left to serve a one-year military training service in Taiwan. This time I will be a full time post-doc and will be in charge of chemical material parts. Thanks to Dr. Sue for the opportunity to come to the U.S. again to continue the projects. I am so honored that I have the opportunity to study and research at Texas A&M University. I stayed in the U.S. for one year last time and had already gotten used to the people, food, and life in this area.

This time I am going to share my experience on creating new ideas and also cooperate with some Ph.D. students in Dr. Sue's group. I am making sure that I can work hard and get along with all students well. Finally, I hope that everything will be great in the future.

PTC Post-Doc, Dr. Han Jiang

With his Bachelor and Master Degrees in Mechanics from ChongQing University, China, Dr. Jiang received his PhD degree in Mechanical Engineering from Texas A&M University this year. He is currently working with Professor Sue as a post-doctoral research fellow at Polymer Technology Center. He also worked as a visiting scholar at the University of Science and Technology of Lille, France. With years of experience in multi-language/culture team environment, his expertise focuses on material properties and behavior, damage/failure analysis, Finite Element numerical simulation. His current research topic involves polymer surface damages such as scratch, mar, and abrasion. Dr. Jiang also works on external pipeline coating integrity issues which is sponsored by Department of Transportation to develop a novel methodology for evaluation of coating properties for the oil and gas industry. He is open to R&D career opportunity in the field of material science/mechanical engineering and can be reached at jianghantamu@gmail.com or through Polymer Technology Center.

PTC Post-Doc, Dr. Yi-Ling (Ivan) Liang

Dr. Yi-Ling (Ivan) Liang graduated from the Center for Polymer Sci. & Eng., Lehigh University in '09 and joined the Polymer Technology Center (PTC) in August 2009. His dissertation focused on the toughening mechanisms of epoxy based, nanosilica reinforced nanocomposites and epoxy-nanosilica-rubber hybrid nanocomposites. The above work has received the Excellence in Polymer Sci. & Eng. Award granted by the Society of Plastic Engineers, Lehigh Valley Section in 08.

Under Dr. Hung-Jue Sue's guidance, Ivan's research in PTC mainly concentrates on the structure-properties studies of polymer based nanofillers (including nanorubber, nanoplatelet, and carbon nanotubes) and reinforced nanocomposites. In addition, he will extend his research interests to polymer-scratch studies on nanocomposites. Although it has been almost two months since the day he joined PTC, Ivan recently said "I still feel excited to participate in the novel projects and work with other talented researchers at Texas A&M University".

PTC Faculty

Name	E-mail Address	Office #
Perla Balbuena	Balbuena@tamu.edu	979-845-3375
Dave Bergbreiter	bergbre-iter@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-darens-bourg@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

TAMU SPE Student Chapter New Officers for 2009-2010

Howdy!! From the Society of Plastic Engineers (SPE) student chapter, the purpose of this organization is to promote student awareness as well as scientific and engineering knowledge in polymer related areas at Texas A&M University.

We are pleased to introduce our 2009-2010 Officers:

- **President: Jennifer Carvajal**
- **Treasurer: Geetha Chimata**
- **Secretary: Kevin Plumlee**
- **Public relations: Jean Njoroge**
- **Activities Coordinator : Melanie Perera**
- **Web Coordinator : Johannes Guenther**
- **Publicity Coordinator : Casie Hillard**

As President of this organization, I would like to thank Dr. Cris Schwartz our faculty advisor, and the Polymer Technology Center for their orientation and collaboration; their support has been very important for us. Also, I would like to extend an invitation to all industrial representatives to interact with us as well as support our activities, which are intended to encourage the formation of our future scientists and engineers as active leaders and experts in Polymer Science.

We are looking forward to continuing to provide our members with outside the classroom experiences and networking opportunities through our seminar series and an active participation in SPE Conferences among other excellent programs.

If you are interested in additional information or in sponsoring our chapter, please email us at spe@plastics.tamu.edu.

Jennifer Carvajal
SPE Student Chapter President
Texas A&M University

Jennifer A. Carvajal Diaz, Chemical Engineering, Internship Experience with BASF

In my opinion, an important and efficient way for a student to establish a link between academic knowledge and practical applications is through a professional internship. An internship can provide additional skills to graduate students interested in a professional career in the industry sector as well as a broad vision of career possibilities.

I had a great and valuable experience during my internship at the High Temperature Polymerization group at BASF (Wyandotte, Michigan). This group focuses on polymer research and I had the opportunity to work in an interesting and innovative project.

During this internship, I enjoyed and learned a lot and it has given me a better perspective about how the research and development works in the Industry sector. Additionally, I had the opportunity to meet excellent people and work with a very enthusiastic and dynamic team. This experience has been very important for my professional development and I am very thankful to my advisor Dr. Tahir Cagin, Dr. Volker Schaedler (HTPG manager) and BASF for giving me the opportunity to expand my vision and acquire a more diverse background for my scientific formation.

Jennifer Carvajal

Update information of Polymer Specialty Certificate

Students that have applied for Certificate	**15**
Students that have received the Polymer Specialty Certificate	**10**

For more information:
http://essap.tamu.edu/polymer.htm

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