



POLYMER TECHNOLOGY CENTER

Fall 2010 Edition



PTC Newsletter

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MARK YOUR CALENDAR FOR PTC'S UPCOMING CONFERENCES!

- **October 28th-29th - PTIC**
@ *Texas A & M University*

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NEWEST APPEAL, PTIC & SCRATCH MEMBERS



PTC is pleased to announce our newest members in their respective consortia:

- **Advancing Performance Polymers in Energy Applications (APPEAL)**
PTC welcomes HOERBIGER Corporation of America, Inc.
- **Polymer Technology Industrial Consortium (PTIC)**
PTC welcomes Cadillac Products Packaging Company
- **Scratch Behavior of Polymers Consortium (SCRATCH)**
PTC welcomes Altuglas International Arkema Group



The Scratch Behavior of Polymers Consortium meeting was held on October 6, 2010 at Sterling Heights, MI. The Companies present are as follows.

- **Advanced Composites, Inc.**
- **Altuglas International Arkema Group**
- **Braskem**
- **Chrysler Group LLC**
- **Dow**
- **ExxonMobil**
- **Ford Motor Company**
- **GM**
- **International Automotive Components**
- **Korea Research Institute of Chemical Technology (KRICT)**
- **MyTex Polymers**
- **Phillips Sumika Polypropylene Corporation**
- **Rio Tinto Chemical**
- **Washington Penn**



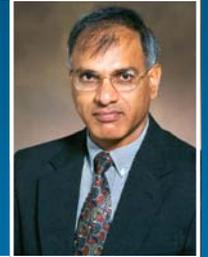
Dr. Daniel Shantz, Chemical Engineering appointed Nesbitt Professor

Dr. Daniel Shantz was recently appointed holder of the Ray Nesbitt Professorship III in Chemical Engineering by the Vice Chancellor and Dean of Engineering Dr. G. Kemble Bennett. Dr. Shantz is an Associate Professor and Associate Head for Undergraduate Programs in the Artie McFerrin Department of Chemical Engineering at TAMU. He received his Ph.D. from the University of Delaware in 2000 and joined TAMU in 2001.



Dr. J.N. Reddy Receive Honorary Doctorate, Career and Lifetime Achievement Awards

Distinguished Professor and holder of the Oscar S. Wyatt Chair in the Dept. of Mechanical Engineering, Dr. J.N. Reddy received an honorary doctorate degree (Honoris Causa) from the Technical University of Lisbon, Portugal. Dr. Reddy was also honored with the Advanced Computations Engineering and Experimenting (ACE-X) Award for Career Achievements at the organization's 4th International Conference (ACE-X 2010). The American Society of Composites also recognized Dr. Reddy for Lifetime Achievements in Composite Materials at their annual technical meeting. Dr. Reddy is a renowned researcher in broad fields of applied mechanics and computational engineering science.



Research Spotlight: Dr. Nicole Zacharia's focus on Polyelectrolyte Coatings

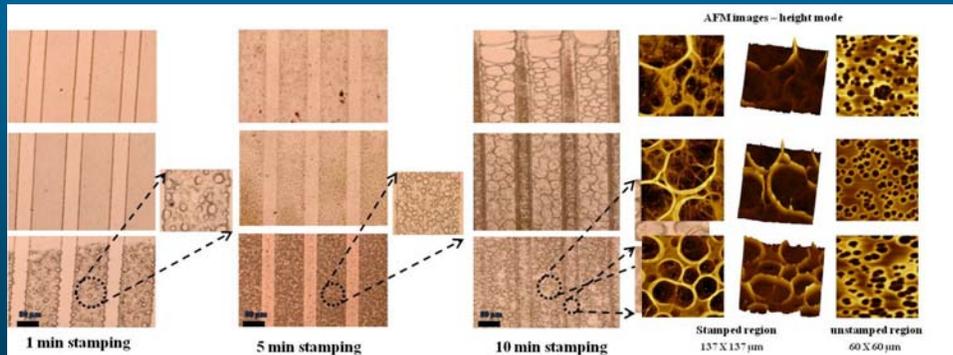
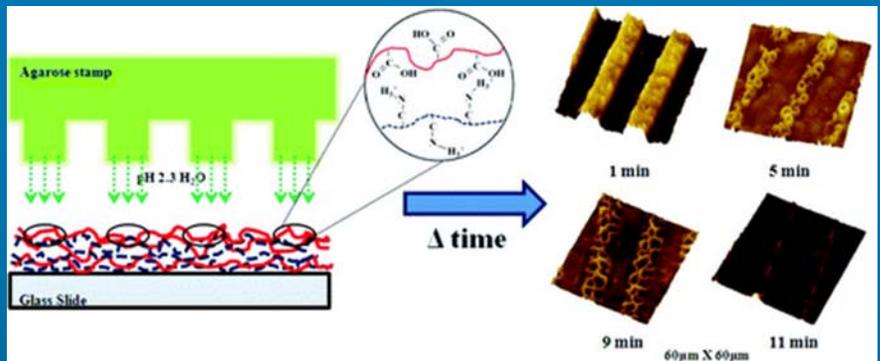
Dr. Nicole Zacharia joined Texas A&M's mechanical engineering materials division in 2009 as an assistant professor. She holds a Ph.D. in polymeric and biomaterials from MIT (2007). Her research group focuses on adaptive and complex structures from soft materials. Her main areas of research are polyelectrolyte multilayers (PEM) and asymmetrically functionalized colloidal particles.

Dr. Zacharia's research on PEM thin films and coatings has been focused on self-assembly and the development of novel patterning methods. PEMs assemble through a set of sequential adsorptions

via the layer-by-layer (LbL) process. The group recently (*Lanmguir*, 2010, 26, 136-37) presented a novel method of patterning PEM films by the use of hydrogel stamps, a technique called WETs stamping. With this technique, the Zacharia group is able to modify both the surface and the bulk of these thin films to create maps of chemical, mechanical and other properties, as well as to create gradient structures which are otherwise difficult to fabricate. The figures shown give a general schematic for how the stamping process works and some examples of gradients in pore density that may be fabricated on the micron scale.

The Zacharia research group is also interested in different types of LbL assembly. Spray assisted assembly promises to remarkably speed up the film assembly process and expand the type of substrates that can be used.

One project sponsored by the Texas Space Grant Consortium plans to examine spray LbL as a way to create more robust conductive textiles that might be used for "smart" uniform functions. Another type of assembly the group is also interested in assembly by manipulating polyelectrolyte adsorption with electrical fields and hopes to greatly reduce the number of steps required to create thicker films.



TAMU NEWS

2010 TAMU ENROLLMENT IS UP FROM PREVIOUS YEARS



2010 enrollment = 49,426

Increase over last year = 724

2010 freshmen class = 8,203

TAMU Graduate Recruit Ranking

According to The Wall Street Journal survey—Texas A&M was ranked second (behind Penn State) for graduates who are academically well-rounded and prepared for the job market, according to nearly 500 companies that recruit graduates. To read about it, visit:

<http://online.wsj.com/article/SB10001424052748704554104575435563989873060.html>

Whoop!!!

AGGIE FACTS

Q: What does "A&M" stand for?

A: Texas A&M, the state's first public institution of higher education, was opened on Oct. 4, 1876 as the Agricultural and Mechanical College of Texas, and at that time the "A" and "M" initials were used to abbreviate the name components.

Q: What is an Aggie?

A: An Aggie is a student at Texas A&M University. In the early 1900s A&M students were referred to as Farmers. The term Aggie began to be used in the 1920s and in 1949, when the yearbook changed its name to Aggieland, Aggie became the official student body nickname.

Q: What is the Corps of Cadets?

A: Texas A&M was established in 1876 as a military institution, and the Corps of Cadets has played an important part in its history and development. While membership is now voluntary, the A&M Corps of Cadets form the largest uniformed body of students outside the U.S. military academies.

PTC News

Memorandum of Understanding (MOU) between PTC and Korea Research Institute of Chemical Technology (KRICT)



TAMU and KRICT have entered an agreement where both parties agree to the following:

- Invitation of scientists to each other's institution
- Participation in workshops and training courses in each other's organizations on scratch behavior of plastics
- Collaboration on database construction of scratch behavior of plastics
- Exchange of technical information, materials, and publications

The MOU shall remain in force for a period of five years.

Prof. Shenghong Dai
National Chung-Hsin University in Taiwan
Friday, August 13, 2010
ENPH Room 301
Applications of Cabodiimide Chemistry
In Polymer Synthesis



ABSTRACT

In our recent study on isocyanate related chemistries, we have found two useful applications of carbodiimides that show promising utilities in polymer syntheses.

In the first case, we have developed a novel poly-condensation strategy for the synthesis of well-defined polyamides of narrow molecular weights based on modification of isocyanate-carboxylic acid condensation polymerization. In our new synthesis, a small amount of hindered carbodiimide was deployed to the polymerization as an initiator, followed by a slow but simultaneous addition of diisocyanate and diacids. This new reaction mode produces polyamides of narrowed molecular weight distributions with their PDIs reduced to 1.2~1.4 from 2.5 in a regular mode. It is found the controlled formation of polymers is preferentially through the diacid-addition to the unhindered portions of poly-CDI formed in transient, followed by fragmentation of adducts into polyamides. This mechanism seems to be general for making PA of low PDI with most of diacids and diisocyanates tested.

In the second case, a successful chemical functionalization on multi-walled carbon nanotube (MW-CNT) through addition of macrocyclic carbodiimides (MC-CDI) onto the carboxylic groups of CNT has been achieved. The formation of acylurea ringed-adducts has been shown to be an excellent way of dispersing CNT in organic media. In the meantime, the formed ringed-acylurea groups attached to the modified CNT can also serve as latent reactive groups capable of crosslinking polymers in formation of PU polymeric composites.

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APPEAL - Advancing Performance Polymers in Energy Applications

The initial academic research objectives of the APPEAL Consortium were discussed and defined on September 27th, and initial material samples have started to flow in. This initial phase of work is focused on the establishment of sound characterization methods that will expose the many important conformational and primary polymer structural properties of our targeted product families. Dr. Bluemel and her student assistants will be focusing on applying NMR and FTIR methods for elucidation of monomer sequencing, chain defects (isomeric defects, branch points, chain ends and contaminating species) and other structural features of the polymer chains in our various samples. Dr. Schwartz is in the midst of commissioning some of our newly acquired thermo-mechanical testing instruments. Dr. Sue is leading an initial examination of reinforcement of PEEK materials with novel nano scale fibers to obtain differentiated property balance in these filled systems when compared with traditional commercial fibers. Dr. Bremner is preparing a series of commercial material samples, generated under carefully controlled thermal processing conditions, and is preparing data sets consisting of measurement of a variety of high temperature mechanical properties of these same samples. With his recent appointment as Adjunct Professor at Texas A&M, Dr. Bremner will be present on campus one day per week to assist with the Consortium programs.

Our industrial membership drive continues, and we are having to adapt our timelines for membership initiation to meet the budgeting and disbursement cycles of the invited member companies. A number of high interest companies will be making final decisions to proceed with membership in the next few weeks. Presently there is sufficient funding to initiate the work mentioned above and generate the tangible results which serve to demonstrate our capabilities and value to the prospective industrial members. An early objective will be to deliver technical literature and data which will enable our industrial partners to better understand the value that the consortium brings and to provide them with property models that will aid in their product development and material selection.

The research group is also continuing to seek opportunities for funding and resource commitments from outside private and public sector agencies that will enable expansion of our research programs. All in all, we are off to a good start, and working to demonstrate the value of the Consortium research to members and academia alike.



TAMU/SPE Student Chapter News

What: 1st SPE General Meeting
When: Monday September 13th @ 6:00 PM
Where: CHEN 111



Casie Hillard, President of SPE Student Chapter

At this meeting, they discussed general information for all old and new members. First, they presented an overview of the great benefits of being an SPE member such as, scholarships and internship connections, then they discussed all upcoming events the SPE Student Chapter has planned for the semester including, upcoming seminars, conferences, and chemical plant tours. The SPE Student Chapter plans on getting more involved with campus events this semester. The SPE President, Casie Hillard, encourages you to join us to learn about different opportunities in the SPE student chapter and in the polymer industry as a whole. To find out more at the TAMU/SPE Student Chapter please contact Casie Hillard at: chilliard@mail.chem.tam.u.edu

Polymer Specialty Certificate Updates

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For more information:

<http://ptc.tam.u.edu/education.html>

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