



PTC

POLYMER TECHNOLOGY CENTER
TEXAS A&M ENGINEERING EXPERIMENT STATION



TEXAS A&M
UNIVERSITY.

Third Quarter 2014

NEWSLETTER

Mark Your Calendars for PTC'S upcoming events:

***SCRATCH Consortium:** November 6, 2014 at Texas A&M University, College Station, TX (Aggieland)

***PTIC Consortium:** November 6-7, 2014 at Texas A&M University, College Station, TX (Aggieland)

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SPE Student Chapter
News

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Advancing Performance Polymers in Energy Applications (APPEAL)

The APPEAL Consortium held their semiannual meeting on April 10th, with the following APPEAL members in attendance:

- Baker Hughes
- RPT Company
- ELEMENT
- Schlumberger
- Ensinger
- Single Buoy Moorings Inc.
- Hoerbiger



Polymer Technology Industrial Consortium Meeting (PTIC)

The PTIC Consortium meeting was held on April 10th-11th, with the following members in attendance.

- Agilent
- Flint Hills Resources, LP
- Puebla University-Mexico
- Baker Hughes
- Heritage Bag Company
- RTP Company
- BASF-The Chemical Company
- Huntsman Corporation
- Schlumberger
- Consultants
- Kaneka Texas Corporation
- Society of Plastics Engineers-SPE
- DOW Chemical Company
- Malvern Instruments Inc.
- UTEX Industries
- ExxonMobil
- Nat'l Center of Packaging Material—China



SCRATCH Behavior of Polymers Consortium (SCRATCH)

The SCRATCH Consortium meeting was held in Las Vegas, NV on April 30th, 2014, with the following SCRATCH members in attendance:

- Advanced Composites, Inc.
- Mytex Polymers
- Avery Dennison
- SABIC
- Imerys Talc
- Texas State University
- Kaneka





Organic Chemistry and Polymers

By: Dr. David Bergbreiter
Presidential Professor for
Teaching Excellence
Department of Chemistry

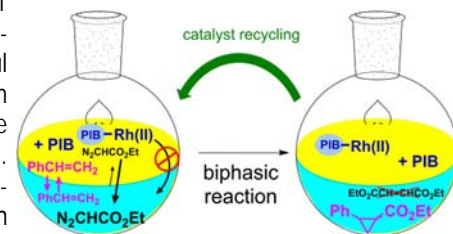
Research in the Bergbreiter laboratory is focused on synthetic chemistry – chemistry that leads to new agents for modifying common polymers, chemistry that allows us to engineer new stable properties at polymer surfaces, and chemistry that uses common polymers to facilitate homogeneous catalysis.

The first of these projects is an expanding venture that includes newly funded research involving our colleagues at the Qatar campus along with polyolefin producers in Qatar. Recent discoveries in our lab have shown that we can functionalize polyisobutylene oligomers so as to make dyes, including making otherwise very insoluble species like highly polarized phthalocyanine dyes soluble in melted polyolefins (figure on the left). In our new project, we are further exploring this chemistry and extending it to develop new ways to make nanocomposites. The general idea is to synthesize a variety of polyolefin oligomer derivatives that can be used as phase handles to make species that are otherwise insoluble in alkanes soluble. This is expected to allow us to bulk modify polyolefins by simply dissolving functionalized nanoparticles in the polymer melt, avoiding the need to use shear mixing to make polyolefin nanocomposites.

The second project is a continuation of a long-standing effort in our group that has included basic chemical studies of the surface properties of functionalized as well as new strategies for surface grafting, by both covalent layer-by-layer surface functionalization and conventional grafting from chemistry. This work has allowed us to prepare stimuli-responsive materials that change their characteristics in response to a physical stimulus. For example, studies have had some success in designing supported membranes that have permeability that turns off and ON to water or OFF to 1 M sodium sulfate, as shown by the figure above for a surface that is fully wet by water but superhydrophobic toward a drop of water containing Na₂SO₄. Other studies have shown that thermoresponsive materials that contain acidic or basic groups undergo similar changes in hydration that affect their stability using temperature changes.

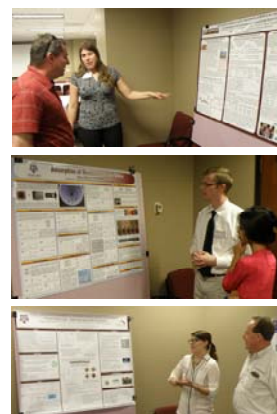
The third project, that aims to use polymers to facilitate catalysis, is also an extension of prior work. The new aspects of this project

involve the use of inexpensive polymers as recyclable, nonvolatile, and nontoxic organic solvents—substitutes for conventional organic solvents. In preliminary work, we have shown that polyethylene waxes that form low viscosity melts upon heating to approx. 75 °C can replace hexane and heptane solvents, serving not just as solvents but also as recyclable media for polyolefin-ligated homogeneous catalysts useful in reactions ranging from polymerizations and fine chemical synthesis. Recent work now published online for some Rh(II)-catalyzed chemistry



has further shown that these same polymeric solvents also serve as 'anti-leaching' agents, in some cases substantially reducing leaching of fully recyclable polymer-bound precious metal catalysts. Our continuing work aims to further understand these effects and to determine how we can exploit these new types of sustainable solvents. We expect to develop green chemistry approaches to the use of a variety of homogeneous catalysts. The catalysts we have studied and propose to study include transition metal catalysts like photoredox Ru catalysts, Ru metathesis catalysts, Pd catalysts used in cross-coupling chemistry, oxidation catalysts, organocatalysts, and catalysts based on nanomaterials. By using a variety of polymers including functionalized polyolefins, new types of polystyrene derivatives, and block copolymers, we expect to be able to develop new ways to facilitate reactions that are otherwise too inefficient to be practical in applications outside of an academic laboratory.

Congratulations to these students for winning in the PTIC Student Poster competition with their posters titled below.



Polymer Technology Industrial Consortium (PTIC)

Student Poster Session Recipients

April 10th-11th, 2014

MAJOR	Students Name	Students Poster Title
CHEM	1st Rita Silbernagel	"Unconventional Metal-Organic Frameworks (UMOFs) for the Separation of Lanthanides from Actinides and Americium from Curium"
CHEM	2nd Kyle Cluff	"The Adsorption of Metallocenes on Silica"
CHEM	3rd Lauren Link	"Photo-crosslinked Poly(thioether-co-carbonate) Networks derived from the Natural Product Quinic Acid: Toward rigid degradable biomaterials"



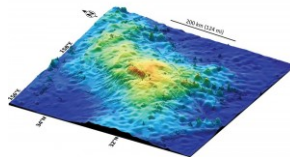
Grad Students Rank Texas A&M No. 2 In the Nation For Public Affairs & Policy Education

In an analysis of online ratings by graduate students, Texas A&M University ranked in the nation's top two for its graduate programs in public affairs and policy education. With its Bush School of Government and Public Service, along with the Department of Political Science in the College of Liberal Arts, the university is preparing future public servants and policy-makers with innovative programs, top-notch professors, and a big dose of Aggie Core Values.

Full story: http://tamutimes.tamu.edu/2014/01/21/grad-students-rank-texas-am-no-2-in-the-nation-for-public-affairs-policy-education/#.UuKZadLnbct?utm_source=tamutimes&utm_medium=email&utm_campaign=2014-01-24

World's Largest Volcano Now Named Tamu Plateau

The world's largest volcano – all 120,000 square miles of it – is now officially named for Texas A&M University and is called Tamu Plateau, the U.S. Board of Geographic Names (BGN) has announced.



A 3-d map of the Tamu Plateau formation. (Photo courtesy of IOBP)

Full Story: http://tamutimes.tamu.edu/2014/04/17/worlds-largest-volcano-now-named-tamu-plateau/#.U1AgstFOW1s?utm_source=tamutimes&utm_medium=email&utm_campaign=2014-04-18

Gibraltar Currents Show Proof Of Past Climate Changes

Examination of core samples extracted near the Strait of Gibraltar show definitive proof of shifts in climate change since about six million years ago, and also provide new evidence of a deep-earth tectonic pulse in the region, according to a team of international scientists that includes a Texas A&M University researcher.



The JOIDES Resolution arriving in Lisbon, Portugal after scientists studied sediments and ocean currents off the Strait of Gibraltar (Photo: Texas A&M)

Full Story: http://tamutimes.tamu.edu/2014/06/12/gibraltar-currents-show-proof-of-past-climate-changes/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+tamuNewsFull+%28TAMU+News+Articles%29#.U58AzNFOw1s&utm_source=tamutimes&utm_medium=email&utm_campaign=2014-06-17



Chemical Engineering's Dr. Jodie Lutkenhaus receives 3M Nontenured Faculty Award

Dr. Jodie Lutkenhaus, the William and Ruth Neely Faculty Fellow in Chemical Engineering and an assistant professor in the Artie McFerrin Department of Chemical Engineering at Texas A&M University, has been awarded a 3M Nontenured Faculty Award. Lutkenhaus was recognized for her work on electroactive polymers for energy storage.



Full story: <http://engineering.tamu.edu/news/2014/04/09/lutkenhaus-receives-3m-nontenured-faculty-award>

SAMPE Rapid Prototyping Design Contest

TAMU undergraduate takes 3rd place in the SAMPE Rapid Prototyping Design Contest. Mr. Benjamin Ross, who expects to graduate with a BS degree in Mechanical Engineering next December, took 3rd place in the SAMPE's first ever Rapid Prototyping design contest. Mr. Ross took a fundamental approach with his design. Under the rules, he determined the optimum wall thickness needed to avoid buckling into the cylinder. Mr. Ross has worked in Dr. Terry Creasy's Hybrid Multifunctional Composites laboratory over the last year.



Congratulations to Mr. Benjamin Ross

Grunlan named to editorial board of Journal of Materials Science



Dr. Jaime Grunlan, Associate Professor
Dept. of Mechanical Engineering

"It's a big honor to have been invited to be an editor of JMS," Grunlan said. "Chris Cornelius (University of Nebraska), Steve Eichhorn (University of Exeter), Greg Rutledge (MIT) and myself will be working hard to fill the shoes of Robert Young (University of Manchester), who is retiring after many years of service to the journal."

Full Story: <http://engineering.tamu.edu/news/2014/01/14/grunlan-named-to-editorial-board-of-journal-of-materials-science>

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TAMU/SPE Student Chapter Activities

2014-2015 SPE Student Chapter Officers

The SPE student chapter officer elections were held on May 7th, 2014, with the following officers elected for 2014-2015:

President- Lauren Link

VP of sciences- Adriana Pavia-Sanders

VP of engineering- Haiqing Yao

Secretary- Jennifer Summerhill

Treasurer- Rita Silbernagel

Activities coordinator- Joseph Baker

Publicity coordinator- Jeniree Flores

Webmaster- Kevin Laux



KANEKA

Scholarship recipients

The scholarship recipients for the SPE and Kaneka Scholarships were recognized at the PTIC meeting on April 11, 2014.

SPE scholarship recipients are as follows:

Adriana Pavia-Sanders, CHEM; and Kyle J. Cluff, CHEM with the SPE Liason Dr. David R. Hansen.



KANEKA scholarship recipients are as follows and acknowledged by the Representative from Kaneka and President Mr. Shinji Mizusawa.

● **KANEKA Undergraduate Scholarships:**

Tyler Rice, MEEN; and William Guzman, CHEM

● **KANEKA Graduate Scholarships:**

Jongbok Lee, CHEM; and Haiqing Yao, MSEN

● **KANEKA Senior Graduate Scholarships:**

Fuwu Zhang, CHEM; and Jacqueline Pope, CHEM

● **KANEKA Visiting Scholar/Exchange Student Scholarship:**

Xiaofei Zhang, Chengdu, China and Rene Perez Cuapio, Puebla, Mexico

● **KANEKA Junior Faculty Scholarship:**

Dr. Jodie Lutkenhaus, CHEN



Dr. Jodie Lutkenhaus, CHEN faculty receiving the Faculty award from Mr. Shinji Mizusawa, President of Kaneka Americas Holding.

Polymer Specialty Certificate Updates

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For more information: http://ptc.tamu.edu/certificate.html	

TAMU/SPE Student Chapter

To find out more about the TAMU/SPE Student Chapter, please contact Lauren Link: at:

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Visit the SPE Student Chapter website at:

<http://plastics.tamu.edu>

