



PTC

POLYMER TECHNOLOGY CENTER
TEXAS A&M ENGINEERING EXPERIMENT STATION



TEXAS A&M
UNIVERSITY.

Second Quarter 2014

NEWSLETTER

Mark Your Calendars for PTC'S upcoming events:

- * APPEAL Consortium = April 10 at TAMU, MEOB room 301, College Station, TX
- * PTIC Consortium = April 10 -11, 2014 at TAMU, MEOB room 301, College Station, TX
- * SCRATCH Consortium = April 30, 2014 in Las Vegas

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PTC is pleased to welcome and announce SABIC as the newest member to the SCRATCH Behavior of Polymers Consortium.



PTC is also pleased to welcome and announce TA as the newest member to the Advancing Performance Polymers in Energy Applications (APPEAL) Consortium; the Polymer Technology Industrial Consortium PTIC; and the SCRATCH Behavior of Polymers Consortium.



Researchers use common spray gun to create self-assembling nanoparticle films



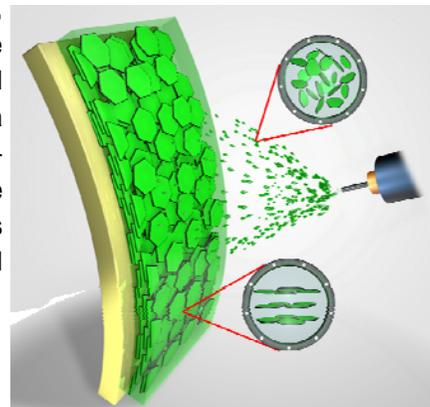
Dr. Minhao Wong
former PTC student

The promise of nanoparticles is their potential to modify the physical and mechanical properties of polymers for diverse applications, such as photovoltaic cells, sensors, or separation membranes. However, methods currently used to create desired nanostructure, however, rely on complex and energy-intensive techniques, such as layer-by-layer or patterning approaches, which are limited in scale and often have poor stability.

Publishing in Nature Communications (DOI: 10.1038/ncomms4589), Dr. Minhao Wong, a former graduate research assistant in the Polymer Technology Center of Dr. H-J Sue, Texas A&M University, Department of Materials Science and Engineering, and Dr. Ryohei Ishige of I²CNER (International Institute for Carbon-Neutral Energy Research), Kyushu University in Japan have developed a simple approach of applying a surface coating of thin, flat nanoplatelets using a common spray gun, which can be purchased off-the-shelf from an art supply store, to create a surface coating in which nanoplatelets spontaneously self-assemble into "nano-walls" that act as rigid barriers that prevent oxygen gas from reaching the surface. The nano-walls increase the barrier efficiency of the film by more than twenty times and are effective at low and high humidity levels.

Using this scalable and simple processing method, researchers have achieved extremely fine and highly ordered nano-scale features that are conventionally achieved with complex and energy-intensive manufacturing techniques, such as photolithography, which requires clean room facilities. This new technology is expected to be immediately useful in any application where blocking oxygen molecules is important, such as anti-corrosion paints for metal surfaces. The technique is simple and could be easily extended to other functional nanosheets.

In the future, researchers hope to adjust the composition of the nanoplatelets to control the passage of gas molecules through the nano-wall, for very inexpensive, yet efficient, gas separation membranes useful in industrial processes. They are also interested in introducing new functionalities, such as electrical conductivity or sensitivity to magnetic fields, so that large-area smart nano-walls can be fabricated. Many different kinds of nanoplatelets may potentially be used with this technology, so there are potentially countless possibilities for applications. Researchers hope to incorporate different nanoplatelets to create hierarchical structures with improved properties.



For more information, contact Dr. H-J Sue at hjsue@tamu.edu.

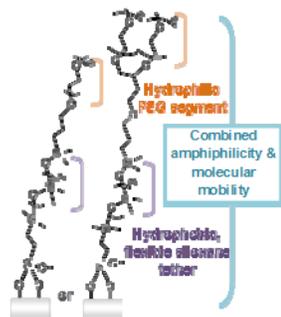
Dr. Melissa Grunlan,
Associate Professor
Dept. of Biomedical Engineering
and Dept. of Materials Science
and Engineering



Polymeric Biomaterials

The Grunlan Lab designs new polymeric biomaterials for medical devices and therapies, as well as for industrial applications. A distinction of our lab is inorganic-organic polymer hybrids prepared by combining inorganic silicon-containing polymers with organic polymers. We prepare polymeric biomaterials in many forms, including: bulk modified and surface-grafted coatings, hydrogels, elastomers, shape memory polymers and colloidal nanoparticles. Active project areas in our lab include: (1) anti-fouling coatings for marine and medical applications, (2) self-cleaning hydrogel membranes for implanted glucose biosensors, (3) hydrogel scaffolds to heal osteochondral defects and (4) shape memory polymers to heal bone defects.

A major research initiative in our lab is the development of environment-friendly, anti-fouling marine coatings. Currently utilized are toxic, ablative coatings which leach non-specific toxicants (e.g. copper) into seawaters. The accumulation of these toxic compounds is a significant environmental concern, particularly with respect to non-target marine life. A promising alternative is non-toxic silicone coatings which exhibit “foul-release” behavior – adhered organisms are detached via motion of vessel through water. However, their efficacy is limited. Thus, we are developing modified silicone coatings with a higher capacity to resist marine biofouling. Specifically, poly(ethylene glycol) (PEG)-silane amphiphiles developed in our lab may be incorporated into silicones to enhance anti-fouling behavior. These amphiphiles are comprised of a crosslinkable end group, siloxane tether and terminal PEG segment(s).



Left: Ph.D. students, Marc Rufin and Melissa Hawkins, prepare anti-fouling coatings.
 Right: Structure of PEG-silane amphiphiles introduced into silicone coatings.



Top: Enhanced resistance of modified-silicone coated panel to barnacle adhesion.

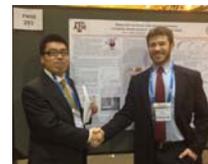
Dr. Mohammad Motaher Hossain

PTC's Post Doc

With his BS degree from Chittagong University of Engineering & Technology, Bangladesh, and MS degree from North Carolina A&T State University, Mohammad Motaher Hossain received his doctorate degree in Mechanical Engineering from Texas A&M University in December 2013. He joined professor H-J Sue's group in Fall 2009 as a Graduate Research Assistant and has since made significant contributions in the field of polymer scratch. His doctoral research focused on developing FEM models for fundamental understanding of polymer scratch behavior leading to quantitative prediction of scratch behavior of polymers, analyzing the underlying mechanics involved in the evolution of various scratch-induced deformation mechanisms in polymers and their relation to the observed scratch visibility, and investigating the effect of material parameters and surface properties on scratch behavior of polymers to enable designing better scratch and wear resistant polymers. He will be working with Professor H-J Sue as a post-doctoral research fellow at Polymer Technology Center with primary research focuses on tribological behavior polymeric materials, and fracture and failure analysis of polymeric films, predominantly using FEM modeling.



Dr. Kevin White
former PTC student



Our congratulations to Dr. Kevin White, who has recently accepted a Post-Doctoral Research Associate position at the International Institute for Carbon-Neutral Energy Research's (I²CNER) at Kyushu University in Japan.

I²CNER is the sixth member of the World Premier International (WPI) Research Center Initiative launched in 2007 by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT). The mission of I²CNER is to contribute to the creation of a sustainable and environmentally-friendly society by conducting fundamental research for the advancement of low carbon emission and cost effective energy systems and improvement of energy efficiency. Amongst the array of technologies that I²CNER's research aims to enable is the innovative, safe, and reliable production, storage, and utilization of hydrogen as a fuel in a hydrogen-based economy. I²CNER research also explores the underlying science of CO₂ capture and storage technology or the conversion of CO₂ to a useful product.



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. 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



Dr. M. Katherine Banks
Vice Chancellor and Dean of Engineering

Banks Elected To National Academy Of Engineering

"Election to the NAE is the highest honor an engineer can receive and indicates recognition by the leaders in the field of significant, society-impacting contributions to the profession," said John Sharp, chancellor of The Texas A&M University System. "We are tremendously proud of her for this prestigious honor and are pleased of our affiliation through her leadership of one of the largest engineering enterprises in the nation and a cornerstone of the A&M System."

ious honor and are pleased of our affiliation through her leadership of one of the largest engineering enterprises in the nation and a cornerstone of the A&M System."

Full story: http://engineering.tamu.edu/news/2014/02/06/banks-named-to-prestigious-national-academy-of-engineering?utm_source=tamutimes&utm_medium=email&utm_campaign=2014-02-07



Big Event Marks 32 Years Of Community Service

Call it a labor of love or an act of gratitude, but an estimated record 20,000 Texas A&M University students are scheduled to work on 2,000 jobs Saturday (March 29) in the annual Big Event community service project.

Full story: http://tamutimes.tamu.edu/2014/03/24/big-event-marks-32-years-of-community-service/#.UzBJ1tFOW1s?utm_source=tamutimes&utm_medium=email&utm_campaign=2014-03-25



Texas A&M Among Top 4 Public Universities Nationally For Affordability And High Return On Investment

Texas A&M University is one of the nation's four most affordable comprehensive public universities with high return on investment (ROI) — what its graduates are projected to earn during the first 20 years of careers — according to new rankings by [Payscale](http://payscale.com), an online organization that focuses on affordability combined with high quality in higher education. The survey places Texas A&M top in Texas among public colleges and universities.

Full story: http://tamutimes.tamu.edu/2014/04/01/texas-am-among-top-4-public-universities-nationally-for-affordability-and-high-return-on-investment/#.Uzq5s9FOW1s?utm_source=tamutimes&utm_medium=email&utm_campaign=2014-04-01



Lutkenhaus appointed William and Ruth Neely Faculty Fellow

Dr. M. Katherine Banks, vice chancellor and dean of engineering, has appointed Dr. Jodie Lutkenhaus the William & Ruth Neely Faculty Fellow in Chemical Engineering.

Full story: <http://engineering.tamu.edu/news/2014/01/09/lutkenhaus-appointed-william-and-ruth-neely-faculty-fellow>



Dr. Jodie Lutkenhaus, Assistant Professor
Dept. of Chemical Engineering

Dr. Steve Suh is co-author of two textbooks, contributes to an encyclopedia

Dr. C. Steve Suh, associate professor in the Department of Mechanical Engineering, recently published his second book, "Control of Cutting Vibration and Machining Instability: A Time-Frequency Approach for Precision, Micro and Nano Machining," which he co-authored with Dr. Meng-Kun Liu.

Full story: <http://engineering.tamu.edu/news/2013/12/03/dr-steve-suh-is-co-author-of-two-textbooks-contributes-to-an-encyclopedia>



Dr. C. Steve Suh, Associate Professor
Dept. of Mechanical Engineering



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

Grunlan named to editorial board of Journal of Materials Science

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>

Visiting Scholar from Mexico

Howdy! My name is Rene Perez Cuapio, I am a Ph.D. student at Puebla University in Mexico. I am working at the Polymer Technology Center (PTC) as a visiting scholar from September 2013 until August 2014.



The purpose of my visit is mainly to acquire new skills and knowledge on synthesis and characterization of ZnO nanocomposites for applications in semiconductor devices. At PTC I have used new techniques that I did not have the chance to learn before. Additionally, my stay here has been an enriching experience. I have enjoyed meeting people from different countries with different cultures and backgrounds.

I would like to thank Dr. Hung-Jue Sue for giving me the opportunity to improve my skills. I also want to thank my professors in Mexico (Dr. Héctor Juárez Santiesteban and Dr. Mauricio Pacio Castillo) for all their assistance in helping me to fulfill this training through CONACyT. I hope this work will pave the way for a promising long-term collaboration between both institutions.

PTC Faculty Members



SPE Spring Scholarships

The following students were selected as the 2014 SPE SPRING Scholarship recipients:

- Adriana Pavia-Sanders
- Kyle J. Cluff

Visit the PTC website periodically for Fall Scholarships opportunities.

Congratulations to these students!!!



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2014 Polyolefin Conference Recipients

The Polyolefin Conference was held in Houston, Texas on February 24-26, with the following student recipients.

Student Poster winners

- Marouen Hamdi = won 1st place, poster titled: "New Approach to Quantitatively Determine Scratch and Mar Visibility Resistance of PP and Talc-Filled TPO"
- Peng Li = honorable mention: "Epoxy Nanocomposites Containing Self-assembled Smectic α -ZrP Nanoplatelets For Structural and Functional Applications"

Scholarship recipients

- Melissa Hawkins
- Peng Li

Congratulations to these students!!!

TAMU/SPE Student Chapter Upcoming Activities

BY Adriana Pavia-Sanders

Howdy Ags!

Having kick-started the semester, we have many things to be thankful for. Our SPE Student Chapter has been recognized by the National SPE with the Outstanding Student Chapter Award for 2014! Also, several of our members who attended the Polyolefin conference in February were rewarded with a handful of scholarships and poster awards. We will also be welcoming our new SPE liaison David Hansen during our April Monthly seminar.



As the semester continues, we have several activities and monthly seminars to look forward to:

- 4/2 Monthly seminar with South Texas Project (STP) representative Catherine Gann
- 4/25 Relay for Life
- 4/28-30 SPE ANTEC Conference
- 5/7 2014-2015 elections and end of the year banquet
- 5/8 STP Nuclear Power Plant Tour

Monthly seminars, as always, are open to everyone, but if you are interested in taking part in our plant tours or other events, you will need to become a national SPE Member. If you are interested please email me at adriana.pavia@chem.tamu.edu for an application. The fee is \$31 for student members, but we will subsidize part of the cost for you to bring the price down to \$25.

If you have any questions or suggestions, do not hesitate to contact us at plastics@plastics.tamu.edu. Also, be sure to visit our website, <http://plastics.tamu.edu>, for chapter news, seminar information, events, membership information, research highlights, and chapter photos.

Also, if you are interested in running for an officer position, send us an email so we can add you on the ballot!

Thanks and gig 'em
 Adriana Pavia-Sanders
 SPE President
 TAMU Student Chapter

Polymer Specialty Certificate Updates

Students that have applied for Certificate	30
Students that have received the Polymer Specialty Certificate	24
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 Adriana Pavia-Sanders at:
adriana.pavia@chem.tamu.edu

Visit the SPE Student Chapter website at:
<http://plastics.tamu.edu>