



### APPEAL

On March 28th, 2013 the APPEAL Consortium met at the TIPS Building, 800 Raymond Stotzer Pkwy, College Station, TX 77843 with the following members in attendance:

- ⇒ Baker Hughes
- ⇒ CAMERON
- ⇒ HOERBIGER
- ⇒ RTP Company



### PTIC

The Polymer Technology Industrial Consortium met on April 5th, with the following companies in attendance:

- ⇒ American Sabic
- ⇒ BASF
- ⇒ DOW Chemical
- ⇒ Flint Hills Resources, LP
- ⇒ Heritage Bag Company
- ⇒ Huntsman Corporation
- ⇒ Kaneka
- ⇒ Malvern Instruments, Inc.
- ⇒ Precision Growth Solutions, LLC.
- ⇒ Schlumberger
- ⇒ The Research Valley Partnership, Inc.
- ⇒ Total American Services, Inc.

#### Mark Your Calendars for PTC'S upcoming events:

- \* SCRATCH Consortium = April 24th, 2013 Cincinnati, Ohio
- \* APPEAL Consortium = October = tba Texas A&M University, College Station, TX
- \* SCRATCH Consortium = October = tba Texas A&M University, College Station, TX
- \* PTIC Consortium = October = tba Texas A&M University, College Station, TX

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SPE Student Chapter upcoming events



The PTIC also held the Student Poster Session on April 4-5, 2013. There were eleven entries. First place recipient received \$500, second place received \$300 and third place received \$200. Congratulations to these students and thanks to all the students that participated, there will be another opportunity to win a prize in the fall.

	Students Name	Students Poster Title
1	Adriana Pavia	"Magnetic Shell Crosslinked Knedel-like (SCK) Nanoparticles Designed for Hydrophobic Pollutant Entrapment and Recovery in Aqueous Environments"
2	Olivia George	"Shape Memory Polymer (SMP) Foams"
3	Kevin Pollack	"Hyperbranched fluoropolymer-polydimethylsiloxane-poly(ethylene glycol) crosslinked terpolymer networks designed for marine and biomedical applications: Heterogeneous non-toxic anti-biofouling surfaces"

### Polymer Technology Center

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PTC RESEARCHERS WORK TO IMPROVE DAMPING IN HIGH STIFFNESS MATERIALS.

Terry S. Creasy, Department of Mechanical Engineering

High stiffness/low mass materials are critical for improving fuel efficiency in transportation; however, these materials have little inherent damping. In the case of automobiles, drivers become fatigued and perhaps nauseous if they shake at about 6 Hz. To make advance transportation structures efficient and comfortable, we need to sacrifice some mass efficiency to improve damping and produce increased passenger comfort.



Recently, Texas AM researchers teamed with The Aerospace Corporation on a DARPA funded program called Materials Logic. This program sought novel composite materials that incorporate positive and negative stiffness materials with damping elements to produce a high stiffness/low mass composite sandwich panels with high damping.

Figure 1 shows the sandwich panel combines positive and negative stiffness materials. If we consider the fixed base to be the inside surface for the sandwich panel and the top surface to be the part of the panel exposed to the outside environment, we can limit the motion of the inner surface by building positive and negative stiffness materials into the core. At the interface between positive and negative stiffness materials, there is a motion amplification effect with interface displacement determined by positive and negative stiffness ratio. We can use this motion amplification to drive a damping system built within the sandwich panel. This damping system must provide a multi-functional response passively. The high motion inside the sandwich panel allows the damping element to dissipate energy by pumping complex viscous fluids. This fluid motion can provide additional functions, for example, thermal management.

Figure 2 shows a model sandwich panel built using rapid prototyping. In this model there is no negative stiffness material; we are determining the damping effectiveness by a loading this sandwich panel at steady sinusoidal displacements from 0.1 to 10 Hz. Figure 3 shows the results when these pumping elements, which we call hourglass elements, are filled with a viscous fluid or a shear thickening fluid. The 60,000 kcps fluid is a Newtonian silicone oil and the damping effectiveness – indicated by tan delta— falls as the driving frequency rises. At high frequency, the fluid viscosity is too high to allow the fluid to move and dissipate energy.

A goal of the Materials Logic program is to achieve passive, adaptive response across the frequency range. Figure 3 shows the outcome from an experiment. We have a novel shear thickening fluid filling the hourglass. Tan delta is almost constant across the frequency range; the fluid can adjust its viscosity under the driving displacements to meet requirements for flowing and dissipating energy. Advanced versions of this material could provide great benefits in aircraft and ground transportation.

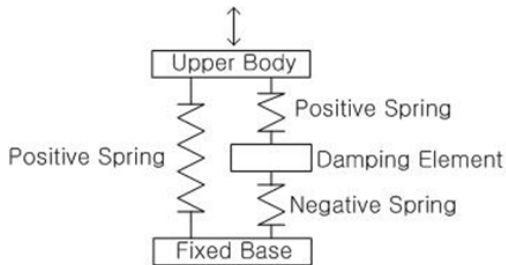


Figure 1. This schematic shows a sandwich panel with positive and negative stiffness materials incorporated between skins. The damping element at the interface between the positive and negative spring goes through large deformations when the upper body goes through small deformations.

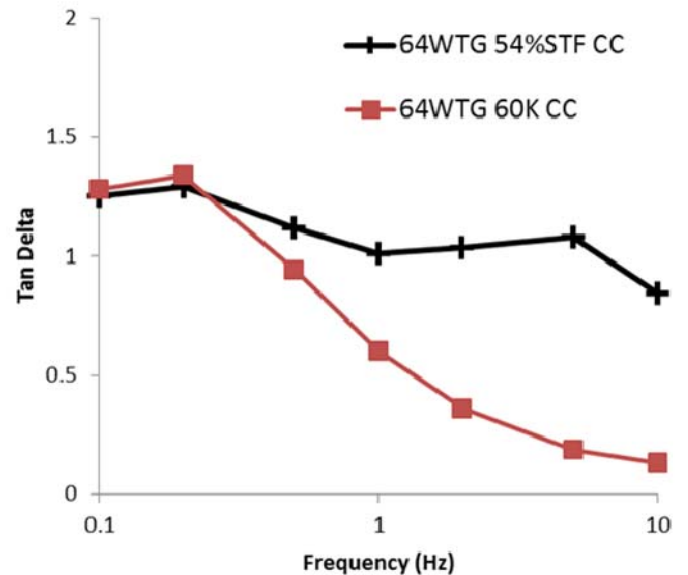


Figure 2. When a high viscosity simple fluid (square samples) runs in the damping element, of model shows that a peak in tan delta occurs at about 0.2 Hz and the performance falls off as frequency increases. The shear thickening fluid however shows a flatter response across the frequency range the cause its viscosity changes as the driving frequency rises.

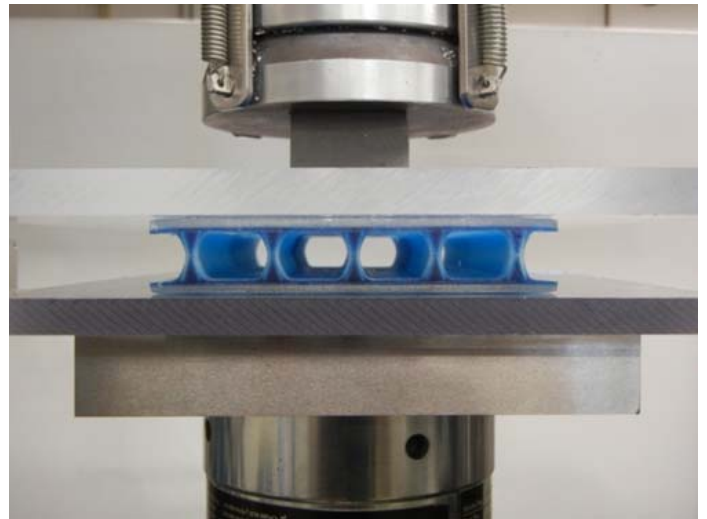


Figure 3. This damping-element sandwich panel was made using rapid prototyping. Understand the sinusoidal controlled displacements. The hourglass shape elements between the scans will pump fluids.



**President Loftin Appointed Homeland Security Academic Advisory Council Vice Chair**

U.S. Secretary of Homeland Security Janet Napolitano announced the appointment of President R. Bowen Loftin of Texas A&M University as the Vice Chair of the Homeland Security Academic Advisory Council (HSAAC).



Full story can be found at: [http://tamutimes.tamu.edu/2013/03/29/president-loftin-appointed-homeland-security-academic-advisory-council-vice-chair/?utm\\_source=tamutimes&utm\\_medium=email&utm\\_campaign=2013-03-29](http://tamutimes.tamu.edu/2013/03/29/president-loftin-appointed-homeland-security-academic-advisory-council-vice-chair/?utm_source=tamutimes&utm_medium=email&utm_campaign=2013-03-29)



**Assistant Professor Nicole Zacharia  
Dept. of Mechanical Engineering  
receives prestigious NSF CAREER Award**

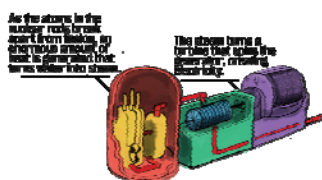
Dr. Nicole Zacharia, assistant professor in the Department of Mechanical Engineering and the Materials Science and Engineering Program at Texas A&M University, has received the prestigious Faculty Early Career Development (CAREER) Award from the National Science Foundation (NSF) for her proposal, "Electric Field Processing of Polyelectrolyte Complex."



Read more: <http://engineering.tamu.edu/news/2013/01/24/zacharia-wins-prestigious-nsf-career-award>

**On-campus reactor is site of educational research**

Down several corridors and through an unassuming door in the Zachry Engineering Center lies one of Texas A&M's more unique assets: a fully functional nuclear reactor.



The reactor on campus provides for a distinct learning environment and has served as a catalyst to bring international recognition to A&M as a leader in nuclear technology.

Full story: <http://www.thebatt.com/on-campus-reactor-is-site-of-educational-research-1.2976911>

**Texas A&M announces initiative to increase engineering enrollment to 25,000 students by 2025**

The 25 by 25 initiative was developed in response to the critical need to increase the engineering workforce of the state and the nation.

"Last year, more than 10,000 students applied for only 1,600 undergraduate slots available in the Dwight Look College of Engineering at Texas A&M, one of the top ranking public institutions for undergraduate and graduate degrees in engineering," Sharp said. "And universities from other states have set up offices to recruit our top students out of Texas. As a land grant institution, we are taking measures to provide access to a high quality engineering education for more students to keep our nation competitive in the global landscape."

The initiative has three guiding principles:

- Increase accessibility to engineering education at all levels;
- Transform the educational experience to better prepare students to engage in and meet the future needs of the engineering marketplace; and
- Deliver engineering education in a cost-effective and affordable manner.

Read more at: <http://news.tamus.edu/2013/01/23/texas-am-announces-initiative-to-increase-engineering-enrollment/>



**Assistant Professor Jodie Lutkenhaus  
Dept. of Chemical Engineering  
receives AFOSR Young Investigator Award**

As part of the U.S. Air Force Office of Scientific Research Young Investigator Research Program, Lutkenhaus received a \$350,000 grant to develop organic electrodes for structural energy and power, or in simple terms, "bullet-proof" batteries.

Full story at: <http://engineering.tamu.edu/news/2013/01/23/lutkenhaus-receives-afosr-young-investigator-award>



**Ochoa receives ASTM award for contributions to composite materials technology**

Dr. Ozden Ochoa, associate director for science and technology at the Army Research Laboratory Headquarters in Adelphi, MD., and a professor at Texas A&M University, has received the Wayne W. Stinchcomb Memorial Award from ASTM International Committee D30 on Composite Materials.

Read more: <http://engineering.tamu.edu/news/2013/04/04/ochoa-receives-astm-award-for-contributions-to-composite-materials-technology>

Howdy.

My name is Hiroaki Sugiyama; I had been working as a visiting scholar at the Polymer Technology Center (PTC) for two year until this January.

For two years my experience at Texas A&M University focused on the dispersion of nanomaterial in water, organic solvents and polymers, and developing easier and scalable process for industry. Although many things in the U.S. and Japan are quite different including research styles or life-style, I learned and enjoyed a lot.

I sincerely appreciate every PTC member's support. I would like to thank to Dr. Sue and my company for giving me this opportunity to study in the excellent research environment and for all the support.

Thank you,  
Dr. Hiroaki Sugiyama  
Kaneka Corporation



# PTC Faculty



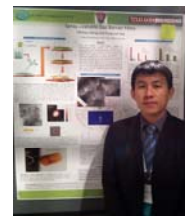
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## 2013 SPE Polyolefin Conference

At the 2013 SPE Polyolefin Conference in Houston, TX, February 24-27, 2013 the following TAMU student's were recipients of the following:

- ⇒ Minhao Wong-received 2nd place in the poster contest, poster title: "Spray-coatable Gas Barrier Films"
- ⇒ Ehsan Morgbelli-received the 2013 Polymer Modifiers and Additives scholarship.

Congratulations to these students.



## NOTE from the SPE Student Chapter President

Howdy!

I would like to extend a big thank you to everyone who has contributed thus far to making our semester a big success. We started off this semester with the first ever SPE Student Exchange Program with the University of Houston SPE chapter. The main goal behind this student exchange program is to have more cooperation between the student chapters of the SPE South Texas Section. It was a big success and everyone enjoyed hearing about the student's research. We also had a chance to tour their facilities.



For our February and March seminars, we had the pleasure of having Dr. Rafael Camargo from Huntsman International and Douglas White '78 who retired from DuPont and now teaches the Unit Operations laboratory for the Chemical Engineering Department. Both seminars were extremely informative and interesting. At the end of February, we travelled to the 2013 International Polyolefins Conference in Houston. We both volunteered and presented posters at the conference. The Texas A&M student chapter continues to thrive and flourish as the most active chapter in the SPE South Texas Section.

We still have quite a few events left for this semester with the following events:

**04/22-24: SPE ANTEC Conference:** Students will be travelling to Cincinnati, OH for the annual conference.

**05/06: Officer Elections:** This will be our final event for the semester. We will be electing officers for the next school year as well as having our annual end of the year dinner.

**TBA:** We are still working on scheduling our semester plant tour. We are aiming to have one in the May after the semester has concluded. The details and dates will be announced as soon as they become available

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 [jacqueline.pope@chem.tamu.edu](mailto:jacqueline.pope@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](mailto:plastics@plastics.tamu.edu). Also, be sure and visit our newly updated website at <http://plastics.tamu.edu> for chapter news, seminar information, events, member information, research highlights, and chapter photos.

Thanks and gig'em,

Jacqueline Pope, SPE President, TAMU Student Chapter

## Polymer Specialty Certificate Updates

Students that have applied for Certificate	26
Students that have received the Polymer Specialty Certificate	20
For more information: <a href="http://ptc.tamu.edu/certificate.html">http://ptc.tamu.edu/certificate.html</a>	



Jacqueline Pope, SPE Student Chapter President

## TAMU/SPE Student Chapter

To find out more about the TAMU/SPE Student Chapter please contact Jacqueline Pope at: [jacqueline.pope@chem.tamu.edu](mailto:jacqueline.pope@chem.tamu.edu)

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

