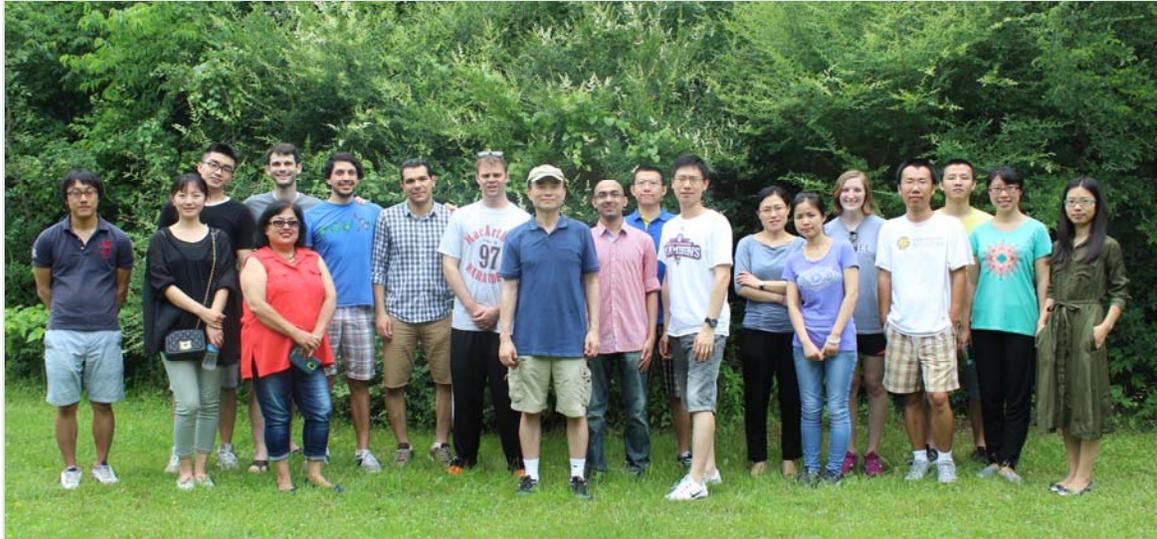


Fourth Quarter 2016

Newsletter



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SPE Student Chapter
& PTC News

Mark Your Calendars!

Scratch Behavior of Polymers Consortium-SCRATCH

October 5th-Troy, Michigan
From noon-4:30
after the TPO Conference

Polymer Technology Industrial Consortium-PTIC

October 13th — 14th
College Station, TX
Texas A&M University



EVONIK
INDUSTRIES
degussa.



SOLVAY

Please welcome the newest members to the APPEAL
Materials Producers Group (APPEAL MPG).



Please welcome our newest member to the Polymer
Technology Industrial Consortium (PTIC).



Please welcome our newest member to the SCRATCH
Behavior of Polymers Consortium (SCRATCH).



PTC

POLYMER TECHNOLOGY CENTER

TEXAS A&M ENGINEERING EXPERIMENT STATION
Phone: (979) 458-0918 Website: <http://ptc.tamu.edu>



The Hybrid Multifunctional Composites Group
Dr. Terry S. Creasy
Materials Science and Engineering

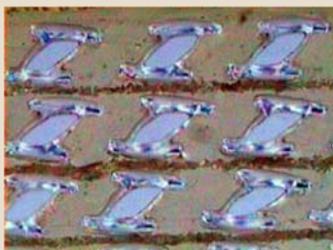
Dr. Terry S. Creasy, an associate professor in the Materials Science and Engineering department, studies the manufacturing science of polymer components, polymer matrix composites, and hybrid composites that have multiple functions in a structure. Past

DARPA projects focused on “machine augmented composites,” or MAC materials, that used biomimetic, cellular structures to enable adjustable stiffness, damping, and shape.

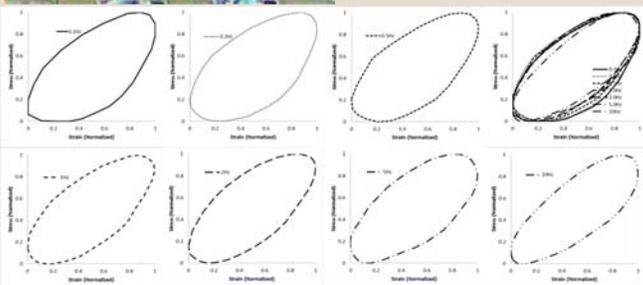
In the latest project, sandwich panels containing ‘hourglass’ channels filled with a shear-thickening fluid showed adaptive damping in the 0.1 to 10 Hz frequency range, which is important in reducing driver fatigue and nausea in road vehicles. “The panel exhibited high damping at every test frequency because the fluid viscosity adjusted to match the driving frequency,” Dr. Creasy explained. Previously, these cellular composites were used in an active structure that mimicked the nastic motion available in plants such as the mimosa and the venus flytrap. In that project, Bell Helicopter applied the material to a tilt rotor propeller design that could change the blade twist to optimize vertical take off/landing, horizontal cruise, and all flight points in between.

Presently, Dr. Creasy’s students Ms. Ruaa Al-Mezrakchi and Mr. Scott Attaway are investigating the processing effects of temperature profile control while solidifying thick wall thermoplastic components for the APPEAL consortium with Ms. Al-Mezrakchi performing the processing studies and Mr. Attaway investigating the resulting mechanical properties at 400°F.

Other projects have Mr. Dewashish Shah working on composite flywheel fabrication and Mr. Yuwei Zhang working on active materials for architecture that self regulates the building environment for occupant comfort and energy efficiency. Mr. Shah will use the carbon nanofiber produced by Dr. Mohammad Naraghi’s group in Aerospace Engineering.



This image shows 3 layers of nastic MAC composite core. Pressure applied to the channels drives the panel to deform in shear.

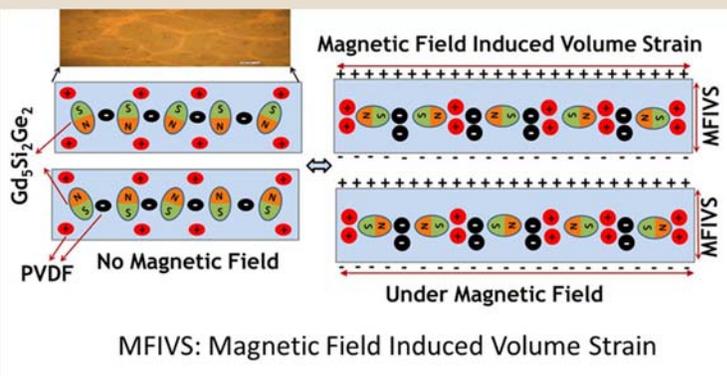


The large hysteresis loops show that the adaptive fluid-filled composite produced high damping across the frequency range of interest.

Energy-Converting Piezoelectric Polymer Composites
Dr. Hong Liang
Mechanical Engineering and Materials Science and Engineering



Piezoelectric polymers have been widely used as energy harvesters for electronic devices such as MEMS. Increasing their performance efficiency has been of great interest to many. Finding an alternative approach for cost-effective fabrication is key for further development. To obtain optimum energy conversion, we developed a hybrid material, multiphase magnetocaloric- Poly (Vinylidene Difluoride) piezoelectric composite. The magnetocaloric material is an alloy that possesses an adiabatic effect that undergoes phase transformation with significant volume change. Such change, as we believed, would be beneficial to further enhance energy conversion from mechanical to electrical in a piezoelectric polymer. With this design in mind, we developed a synthetic process to make the hybrid. There are two ways to make this material to generate electricity, using either an external magnetic field, or a thermal cycle. Under an external magnetic field, the material exhibited a power density of 14.3 mW/cm³.Oe when the concentration of the magnetocaloric phase (Gd₅Si₂Ge₂) was at 4 %wt. This was due to the magnet-induced strain in Gd₅Si₂Ge₂ leading to the voltage generation in the piezoelectric polymer. The power density of the hybrid system has been proven to be significantly higher than each single phase alone. ¹Furthermore, the temperature-driven electrical power generation was found to be more than 10,000 times higher than the polymer alone. ²The coupling of magnetic and piezoelectric effects enables multi-energy conversion that is unique for device design and clean energy harvesting.



¹M.F. Ozaydin and H. Liang, “Multi-energy Conversion of Gd₅(Si₂Ge₂)-Poly (Vinylidene Fluoride), a Hybrid Material,” Appl. Phys. Lett., 105, 062903 (2014); <http://dx.doi.org/10.1063/1.4893296>

²Cleveland, M. and H. Liang, Magnetocaloric piezoelectric composites for energy harvesting. Smart Materials and Structures, 2012. 21(4).

Texas A&M Engineering Top in Nation for Best College Value Ranking

Texas A&M University's College of Engineering is No.1 on Best College Values' ranking of the 50 Best Value Bachelor's in Engineering, ranking ahead of the University of California, Berkeley, and Georgia Institute of Technology, which ranked second and third, respectively. Texas A&M is the only university in Texas among the top five.



Full story: <http://goo.gl/dpmK0f>

Females Sweep Top Student Leadership Posts at Texas A&M University

Aggies are celebrating a major milestone this school year: Women command all the top student leadership spots, pushing back against Texas A&M University's long-held image as a predominantly male institution.

The top Aggie women are Student Body President Hannah Wimberly, Senior Class President Claire Wimberly and Texas A&M Corps of Cadets Commander Cecille Sorio. Hannah and Claire are twin sisters.



"It's extremely significant that we have this, and it really shows the beauty of Texas A&M University because I guess people wouldn't think that with it starting as an all-male military land grant school, but the truth is I find a strong presence of women," said Chief Marketing and Communications Officer Amy Smith.

TAMU opened 140 years ago as a military land-grant college.

Full story: <http://goo.gl/ID9mPH>

Texas A&M University Cited As One Of Nation's Top Colleges For Women

Texas A&M University, known for decades as an all-male college, is one of 50 U.S. institutions featured in a new "Best Colleges and Universities for Women" article — and the only public university in Texas so cited.



Women now account for almost half of the 60,000+ students at Texas A&M, which ranks among the top five universities in the nation in student body size. Last fall, women totaled 30,677 in the university's overall enrollment, with men totaling 33,699.

Full story: <https://goo.gl/info/zEp2z>

Texas A&M Researchers Study Next Generation Implanting Materials With Titanium-Gold Compound

According to the American Academy of Orthopedic Surgeons, two of every 100 Americans have an artificial joint where the ends of bones are removed or resurfaced and replaced with plastic, ceramic or metals. Titanium and ceramics such as alumina [aluminum oxide] and zirconia [zirconium oxide] account for most artificial joints.



Dr. Hong (Helen) Liang, along with her graduate student, M. Fevzi Ozaydin, have been studying a titanium-gold compound that is four times stronger than titanium and most steel alloys.

Full story: <http://goo.gl/hc9glj>

Drs. Wayne Hung and Shen-Jen "Tony" Hsieh Share Manufacturing Expertise With Educators Locally, Nationwide in Summer Programs

This past summer, two professors participated in programs to help teachers and two-year college faculty learn more about general and automated manufacturing.

Drs. Wayne Hung and Tony Hsieh, professors in the Manufacturing and Mechanical Engineering Technology (MMET) program, each combined classroom and hands-on manufacturing education with educators from the area as well as across the nation.



Dr. Wayne Hung

"How do we get people interested in manufacturing? This was the crucial question that spurred the creation of this program," said Hung.



Full story: <http://goo.gl/qxfrNn>

Texas A&M Ranked First In State For Women In STEM

The Aggies ranked first in Texas and 12th nationally on a list of colleges that graduate the most women in science, technology, engineering and math majors.

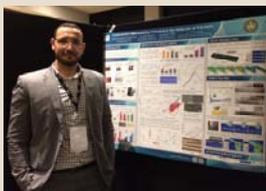


It may be interesting to note at Texas A&M that the deans of the colleges of science, engineering and education are all women, and the top three student leaders are all female as well.

Full story: <https://goo.gl/QodSn9>

PTC Faculty Members

Name	E-mail Address	Office #
Mustafa Akbulut	makbulut@tamu.edu	979-847-8766
Perla Balbuena	balbuena@tamu.edu	979-845-3375
Dave Bergbreiter	bergbreiter@tamu.edu	979-845-3437
Janet Bluemel	bluemel@tamu.edu	979-845-7749
Tahir Cagin	cagin@tamu.edu	979-862-1449
Homero Castaneda	hcastaneda@tamu.edu	979-458-9844
Elena Castell-Perez	ecastell@tamu.edu	979-862-7645
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-darensbourg@tamu.edu	979-845-5417
Yossef Elabd	elabd@tamu.edu	979-845-7506
Lei Fang	fang@chem.tamu.edu	979-845-3186
Carmen Gomes	carmen@tamu.edu	979-845-2455
Micah Green	micah.green@tamu.edu	979-862-1588
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
Jodie Lutkenhaus	jodie.lutkenhaus@tamu.edu	979-845-3361
Anastasia Muliana	amuliana@tamu.edu	979-458-3579
Mohammad Naraghi	naraghi@aero.tamu.edu	979-862-3323
K.R. Rajagopal	krajagopal@tamu.edu	979-862-4552
Hung-Jue Sue	hjsue@tamu.edu	979-845-5024
Steve Suh	ssuh@tamu.edu	979-845-1417
Svetlana A. Sukhishvili	svetlana@tamu.edu	979-458-9840
Jyhwen Wang	hwang@tamu.edu	979-845-4903
John Whitcomb	whit@aero.tamu.edu	979-845-4006
Karen L. Wooley	wooley@tamu.edu	979-845-4077



Emerging Polymer Technologies

Summit 2016

September 14-16, 2016

Melbourne, Australia

Congratulations to graduate student Marouen Hamdi for being awarded first place in best oral presentation titled: "Fundamental Understanding on Scratch Behavior of Polymeric Films and Laminates" and best poster titled: "Fundamental Understanding of Scratch & Mar Behavior of Polymers."

CONGRATULATIONS

Society of Plastics Engineers Student Chapter at TAMU

News and Upcoming Events



Howdy! Our SPE chapter was very excited to start our new school year this September by hearing a talk from Kaneka at our first meeting on September 12. Next month (October 3) Brandon Sweeney from Essentium Materials will come to give a talk in Room 2122 of the chemistry building – all are invited to attend!

So far in 2016, we have been involved in many volunteer activities including STEMfest with the Girl Scouts of America, Super Techno Science Night at Southwood Valley Elementary, and Rock Prairie Elementary Science and Technology Night. We have also participated in the SPE International Polyolefins Conference in Houston and once again received an award for one of the best student chapters at ANTEC in May 2016. We look forward to carrying out more volunteer events this fall, including Chemistry Open House in October. We as always are grateful to the SPE South Texas Chapter for its support through donations and scholarships. If you are interested in becoming involved with our chapter, please contact our social media coordinator Tim Tsao (yi-yun.timothy.tsao@email.tamu.edu) and check out our group on Facebook!

Thanks and have a great semester!

Mary Layne Harrell

SPE President for TAMU Student Chapter



Our new officer photo for 2016-2017 (pictured from left): Tim Tsao, Social Media Coordinator; Xun He, VP Engineering; Mohammed Haque, Publicity Coordinator; Mary Layne Harrell, President; Shin Hye Ahn, VP Science; Simcha Felder, Secretary; Yanyan Wang, Activities Coordinator; and Kevin Wacker, Treasurer

Polymer Specialty Certificate Updates

Students that have applied for the Polymer Specialty Certificate	56
Students that have received the Polymer Specialty Certificate	39

For more information, please visit: <http://ptc.tamu.edu/certificate.html>

Have Questions?

[Dr. Hung-Jue Sue](#)

[Isabel Cantu](#)

PTC Director

E-mail: icantu@tamu.edu

E-mail: hjsue@tamu.edu

Phone: 979-458-0918

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PTC

POLYMER TECHNOLOGY CENTER

TEXAS A&M ENGINEERING EXPERIMENT STATION
Phone: (979) 458-0918 Website: <http://ptc.tamu.edu>

PTC newsletter prepared by:
Isabel Cantu
edited by: Megan Nicholson,
Zachary Thornburg and
Natalie Benner