Polymer Technology Center

First Quarter 2013

NEWSLETTER

Mark Your Calendars for upcoming events:

* APPEAL Consortium = March 28th, 2013
  Texas A&M University, College Station, TX
* PTIC Consortium = April 4th-5th, 2013
  Texas A&M University, College Station, TX
* SCRATCH Consortium = April 24th, 2013
  Cincinnati, Ohio

PTC is pleased to announce the newest Associate APPEAL Consortium member, please welcome Ensinger Company.

Ensinger

The Appeal Consortium met on November 1, 2012 with the following members in attendance:

- ⇒ Baker Hughes
- ⇒ Cameron
- ⇒ Ensinger
- ⇒ Hoerbiger
- ⇒ RTP Company

The Polymer Technology Industrial Consortium PTIC meeting was held on on November 2 with the following companies in attendance.

- ⇒ Dow Chemical
- ⇒ ExxonMobil Chemical Company
- ⇒ Flint Hills Resources
- ⇒ Hoerbiger Corporation of America, Inc.
- ⇒ Imperial College
- ⇒ Kaneka Texas Corporation
- ⇒ Petroleum Geo-Services
- ⇒ PolyLab LLC
- ⇒ South Texas Section of SPE
- ⇒ The Research Valley Partnership, Inc.
- ⇒ Total American Services, Inc.
- ⇒ University of Akron

Inside the Newsletter...

Polymer Technology Center
Texas A&M University, 3123 TAMU
College Station, TX 77843-3123
Website: http://ptc.tamu.edu

Dr. Hung-Jue Sue, PTC Director
979-845-5024
hjsue@tamu.edu

Isabel Cantu
979-458-0918
icantu@tamu.edu

TEXAS A&M UNIVERSITY

High Resolution Laser Induced Stress Wave Thermometry

C. Steve Suh, Mechanical Engineering

Given their prominent advantages over coherent optical source of long pulses, femtosecond lasers of high fluence exceeding the non-thermal melting threshold are ideal for the precision micro/nano-machining and fabrication of single crystalline silicon. The use of femtosecond pulsed lasers with fluence below the melting threshold generates no plasma and inflicts no damage to the semiconductor material. Such pulses induce extremely small heat affected zones and generate broad-band, high-frequency propagating shock waves for many types of non-destructive applications, including flaw detection, material characterization, geometric calibration, residual stress measurement, and thermometric profiling. During Rapid Thermal Processing (RTP) of silicon wafers, proper thermal control in real-time is required to ensure fabrication quality. It is essential to have a precise knowledge of the thermal state of the substrates being annealed at all time from room temperature up to 1,000° C. As feature size smaller than 90nm becomes dominant, non-contact, in-situ thermometry capable of ±1°C thermal resolution is called for.

To address the need we have developed in the Photomechanics Lab a Laser-Induced Stress Wave Thermometry (LISWT), which is a non-contact, emissivity-independent temperature diagnostics technology employing laser-generated ultrasonic guided waves to the interrogation of silicon wafers for thermal information as they undergo RTP. Thermometric techniques such as Lightpipe Radiation Thermometers (LPRTs) and Cable -less LPRTs (CLRTs) and those that use contact transducers and non-contact ripples all fall short of meeting the needed thermal accuracy as the emissivity of silicon wafer subject to rapid annealing is not sensitive enough to differentiate slightly differing surface condition and dopant contents. It has been experimentally demonstrated that LISWT could probe silicon wafers for temperature variations with ±1°C thermal resolution. As silicon wafers no longer behave elastically subject to temperatures higher than 600°C, but rather elasto-viscoplastically, to cover the full RTP temperature range, we have also established the physics dictating the elasto-viscoplastic behavior of the silicon thin structure at high processing temperature.

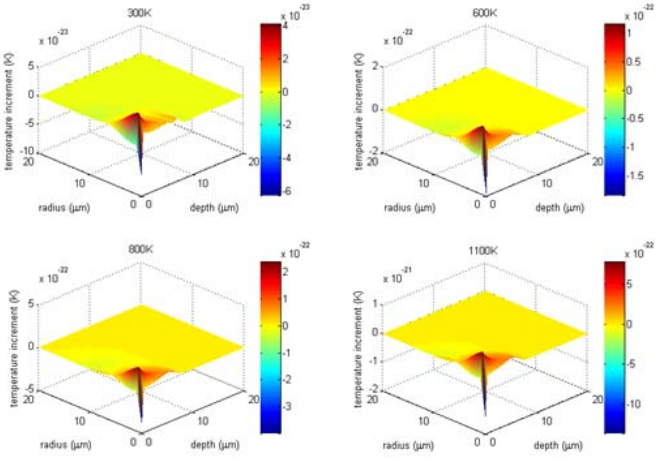
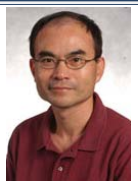


Fig. 1 Temperature increment of lattice temperature at t=10ns corresponding to four different ambient temperatures: 300K, 600K, 800K and 1,100K (laser pulse duration 500fs, spot size 10μm, laser fluence 0.005J/cm2)

Texas A&M Researchers Part Of Team Developing Cost-Saving Technology For U.S. Military

Hung-Jue Sue, Mechanical Engineering



Researchers at Texas A&M have been developing new technology in Meal, Ready to Eat (MRE) packaging that, when adopted, will save the US government millions each year in military spending. The research developments in packaging material have produced new types of films and outer covering for the MRE packages. These films are said to be lighter yet stronger than previously used materials and are capable of withstanding wartime conditions.

Other developments include a thin cardboard sleeve to replace cardboard boxes used to store the meals. The advantages of these sleeves are that that are more compact and easier to package and also use less material saving both on storage and production costs. Researchers from various departments were integral in the testing of these new packaging techniques and technologies. These included testing from the Entomology department on the packaging's resistance to bug infestation as well as testing from the Agricultural Engineering department to ensure the packaging materials used were safe and did not affect the flavor of the food.

While these new developments are very promising, it is yet to be seen whether they will be effective in implementation. As Dr. Sue of the Texas A&M Polymer Technology Center contends, "The military is known to be conservative regarding change. This is a very big change for them and it's about cutting the budget – saving money step-by-step. But at the end of the day, the soldiers have to like it or it won't work."

Source:http://www.kbtx.com/news/local/headlines/US-Military-Testing-Cost-Saving-Methods-Developed-In-College-Station-176175421.html

Texas A&M Defeats Oklahoma 41-13 in 2013 AT&T Cotton bowl

Freshman Heisman winning Quarterback, Johnny Manziel, led the Texas A&M Aggies to a 41-13 Cotton Bowl victory over the Oklahoma Sooners while setting a Cotton Bowl Record with 516 yards.

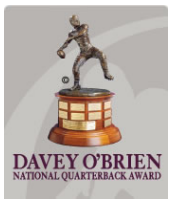
Full story: http://www.aggieathletics.com/ViewArticle.dbml?SPSID=632660&SPID=93232&DB_LANG=C&DB_OEM_ID=27300&ATCLID=205875975

WHOOP!

Johnny Manziel makes history as first freshman to win the Heisman Trophy

Texas A&M quarterback Johnny Manziel plants a kiss on his 2012 Heisman Trophy during a press conference after he became the first freshman to win the award Saturday, December 8, 2012.

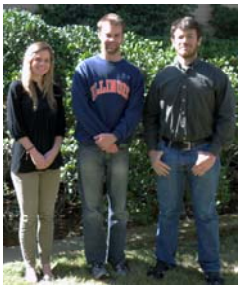
http://heisman.aggieathletics.com/



Texas A&M freshman quarterback Johnny Manziel wins the 2012 Davey O'Brien National Quarterback Award.

Johnny Manziel is the first freshman to ever receive the Davey O'Brien National Quarterback Award and the first winner from Texas A&M University.

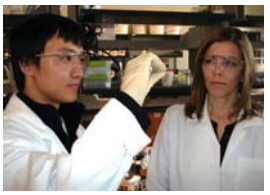
PTIC Student Poster Competition



PTC would like to congratulate the following recipients of the PTIC poster session. PTC received fourteen poster entries in the poster competition. A big thanks to all the students that participated in this event, and remember there will be another opportunity to compete in the Spring.

Polymer Technology Industrial Consortium (PTIC) Student Poster Session		
November 1-2, 2012		
	Students	Students Poster Title
1	Kevin Laux	"Effects of Multidirectional Sliding on the Wear and Transfer Film Formation in Polyetheretherketone(PEEK)"
2	Brennan Bailey	"Tailoring the Properties of PEG-DA Hydrogel Scaffolds"
3	Kevin White	"Three-dimensional spatial characterization of polymer nanocomposites"

Biomedical engineering's Melissa Grunlan develops "self-cleaning" membrane for implantable glucose sensors



Dr. Melissa Grunlan and her graduate student researchers have been developing a "self-cleaning" membrane to be used as a covering for implantable glucose-sensors. The "self-cleaning" properties of these membranes essentially eliminate the issue of "biofouling", one of the main obstacles of implantable sensors. "Biofouling" occurs when the body's natural immune response to unfamiliar objects, renders the sensor ineffective. Dr. Grunlan's development represents a major leap in biomedical sensor technology which will allow diabetics to monitor glucose levels more effectively.

Read more and watch the video online at:

http://engineering.tamu.edu/news/2012/11/30/biomedical-engineerings-melissa-grunlan-develops-self-cleaning-membrane-for-implantable-glucose-sensors

Grunlan's anti-flammable coating research featured in Textile World magazine

Dr. Jamie Grunlan, recently had his research on fire-retardant materials featured in the Nov/Dec 2012 issue of Textile World Magazine. The article discusses Dr. Grunlan's development of polymer-based coatings that prevent fabrics from completely igniting. This technology is said to have promising applications from lab and medical clothing to military tents.

More: http://engineering.tamu.edu/news/2012/12/21/grunlans-fire-resistant-coating-research-featured-in-textile-world-magazine

PTC Faculty

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@che.tamu.edu	979-862-1449
Elena Castell-Perez	ecastell@tamu.edu	979-862-7645
Xing Cheng	chengx@ece.tamu.edu	979-845-5130
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
Jaime Grunlan	jgrunlan@tamu.edu	979-845-3027
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	979-845-2682
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
J.N. Reddy	jnreddy@tamu.edu	979-862-2417
Cris Schwartz	cschwartz@tamu.edu	979-845-9591
Dan Shantz	shantz@tamu.edu	979-845-3492
Hung-Jue Sue	hjsue@tamu.edu	979-845-5024
Steve Suh	ssuh@tamu.edu	979-845-1417
Jyhwen Wang	jwang@tamu.edu	979-845-4903
John Whitcomb	whit@aero.tamu.edu	979-845-4006
Karen L. Wooley	wooley@tamu.edu	979-845-4077
Nicole Zacharia	nzacharia@tamu.edu	979-845-2204

SPE South Texas section

Howdy!
I would like to extend a big thank you to everyone who contributed to making our semester a big success. A huge thank you goes out to Dr. Mike Killough and Dr. Don Witenhafer. Dr. Killough gave our November seminar as well as hosted us on a plant tour to INEOS Olefins and Polymers USA in La Porte. Both events were very informative and fun, and we really appreciate Dr. Killough's hospitality. Dr. Witenhafer has been a great SPE South Texas liaison and has been very helpful in coordinating events with the South Texas Section. He also gave a very informative talk to our chapter in December.

We have a busy and exciting semester ahead of us with the following events:
01/22: SPE Student Exchange Program: Students from the University of Houston SPE Student Chapter will be coming to Texas A&M to give talks about their research @ 6 pm in CHEN 112. The main goal behind this student exchange program is to have more cooperation between the student chapters of the SPE South Texas Section.

01/31: SPE Student Exchange Program: Students will be traveling to the University of Houston to give talks about their research to the UH student chapter @ 4 pm.

02/24-27: International Polyolefins Conference: Students will be travelling to Houston for the annual conference. We will be volunteering and presenting posters at the conference.

03/04: Monthly Seminar: Dr. Doug White from Texas A&M will be speaking in CHEN 112 @ 6 pm.

04/23: Plant Tour: We will be attending the annual plant tour with the SPE South Texas Section to Performance Plastics in Houston.

04/27-05/01: 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: Dr. Rafael Camargo from Huntsman will be giving a monthly seminar. We will also be hosting an event in collaboration with BASF similar to the one we had last April. The details and dates of these events 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 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 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, Texas A&M 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: http://ptc.tamu.edu/certificate.html	

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

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

PTC Newsletter prepared by: Isabel Cantu
Edited by: Timi Ogunbekun & Spencer Hawkins