Fourth Quarter 2014

PTC NEWSLETTER

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

TEXAS A&M UNIVERSITY

Mark Your Calendars for PTC'S upcoming events:

*APPEAL Consortium = November 5th, at Texas A&M University, College Station, TX

*SCRATCH Consortium = November 6th, at Texas A&M University, College Station, TX

*PTIC Consortium = November 6th & 7th, 2014 at Texas A&M University, College Station

Inside the Newsletter...

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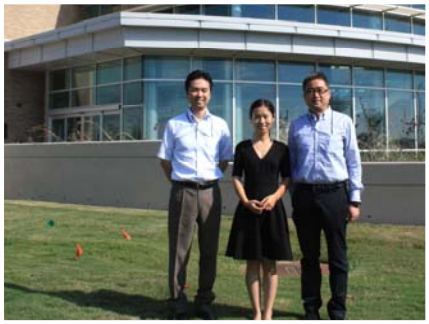
KANEKA US Materials Research Center (KMR) at Texas A&M University

Kaneka Corporation has long provided highly specialized products in the fields of chemistry, functional plastics, expandable plastics, foodstuffs, pharmaceuticals, medical devices, electronic materials and synthetic fibers. **KANEKA US Materials Research Center (KMR)**, a materials science research center, was established in October, 2013 on the campus of Texas A&M University, College Station, Texas. The primary mission of **KMR** is to unearth new knowledge leading to the development of novel and versatile technologies with new academic and business applications. **KMR** focuses on fundamental materials science research in the areas of nano-dispersion & nano-structured materials, surface/interface chemistry & dynamics, and polymer science & engineering. Current ongoing projects at **KMR** include functional nanocomposites using carbon nanotubes (CNT), and other rod-like and platelet nanoparticles, anti-scratch hard coatings, and high temperature resistant polyimide-based carbon fiber reinforced plastics (CFRPs). KMR plans to actively collaborate with universities, research institutes and industrial companies, as well as hire talented researchers with a Ph.D. degree.



Masahiro Miyamoto, Dr. Xi Zhang and Dr. Masaya Kotaki, Kaneka US Materials Research Center (KMR)

Dr. Hadi Nasrabadi, Petrolium Engineering

Experimental study of confinement effects on hydrocarbon phase behavior in nano-scale capillaries

Principal Investigators: Hadi Nasrabadi (TAMU PETE), Yucel Akkutlu (TAMU PETE), Debjyoti Banerjee (TAMU MEEN and PETE), Jodie Lutkenhaus (TAMU CHEN), and Hung-Jue Sue (TAMU MSEN)

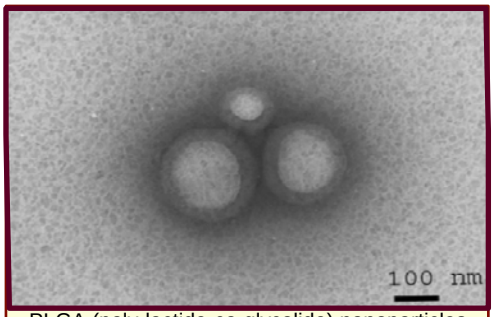
Phase behavior in shale remains a challenging problem in the petroleum industry due to many complexities. One complexity arises from strong surface-fluid interactions in shale nano-scale pores. These interactions can lead to a heterogeneous distribution of molecules, which conventional bulk-phase thermodynamics fails to describe. The majority of current models for phase behavior in shale are based on bulk-phase thermodynamics. There are currently no experimental data for hydrocarbon phase behavior in shale systems.

In this project, we will investigate the phase change in nano-scale capillaries using experimental approaches based upon selected "model" porous materials to accurately measure the effect of confinement on hydrocarbon phase behavior in shale. We will then extend the experiments by modifying the model material's surface both chemically and topographically. We will use molecular simulation to gain insight into the experimental results.

Dr. Carmen L. Gomes
Assistant Professor
Biological and Agricultural Engineering Department

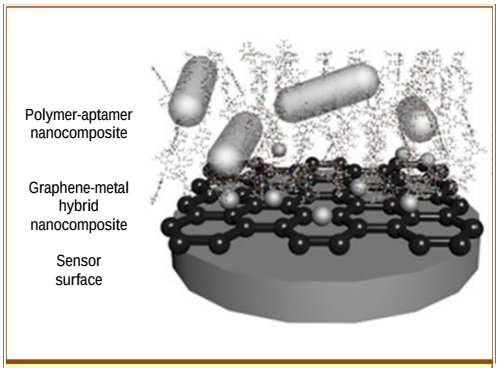
The Gomes Lab designs novel nanoscale materials using biopolymers for biotechnology and food applications. Our research activities include: design of delivery systems to carry, protect, and deliver functional compounds (bioactives) to their specific site of action (i.e.; increasing their bioavailability); development and optimization of colloidal dispersions that are able to control and extend the release of antimicrobial compounds in food and agricultural systems; and design biocompatible functional nanostructures and thin films that can sense and trap contaminants (pathogens, allergens, toxins, individual biological molecules, etc.) among others.

The study of stimuli-responsive biopolymer nanostructures is of particular interest. These biopolymers are capable of responding to changes in the surrounding environment and this response can be tuned to achieve the desired output. These stimuli-responsive nanostructures have been investigated in food safety applications as delivery systems of antimicrobials and as platforms for foodborne pathogen detection (biosensor). The uniqueness of our program is on engineering these stimuli-responsive biopolymers which include temperature, pH, optical, and electric potential sensitive polymers with reversible properties to achieve the desired output such as protection, exposure, and controlled delivery with focus on food safety.



PLGA (poly-lactide-co-glycolide) nanoparticles containing antimicrobial compound.

Specifically, poly-N-isopropylacrylamide (PNIPAAM) and naturally occurring alginate and chitosan polymers, temperature and pH-sensitive polymers; respectively, have been studied for dual-stimuli responsive applications including the design of colloidal nanoparticles for delivery of natural antimicrobials with enhanced antimicrobial activity against foodborne pathogens.



Sensor surface containing stimulus-responsive polymer-aptamer graphene-metal hydrid nanocomposites.

These polymers have also been studied on biosensors applications for entrap-ment and protection of capture probes including aptamers and lectins and for improved biosensor sensitivity with the main focus on real-time detection of foodborne pathogens such as *Listeria monocytogenes* and *Escherichia coli* O157:H7 in food products.

Visiting Scholar from China
Dr. Chunxia Zhao

Howdy, my name is Chunxia Zhao. I am currently a teacher at Southwest Petroleum University (SWPU) in Chengdu, China. I joined the Polymer Technology Center (PTC) on May 2014 as a visiting scholar and will work here for one year.

The purpose of my visit is to learn state-of-the-art characterization techniques from Professor Sue's high performance polymer composites group and to gain meaningful experience using new methods to toughen thermoset resins. I am so excited that I am able to learn new skills and master so many new methods for polymer testing here. This working experience is very important for my career and my research group back home.

I would like to thank Professor Sue and all of my PTC colleagues for their advice and assistance during my stay. I also want to acknowledge the financial support of the China Scholarship Council (CSC) for providing the necessary funds for this valuable opportunity.

Tatsuya Hirata, Visiting Scholar from Japan

My name is Tatsuya Hirata. I joined Dr. Sue's group in September 2014 as a visiting scholar, and I will be here for 2 years. I'm very glad to be able to collaborate with Dr. Sue and his group members.

I have worked for the Japanese chemical company, Asahi Kasei corp. for 7 and half years, and I could come here by taking advantage of an in-company system. Our company conducts research in various fields such as chemicals, fibers, construction materials, medicine, materials for electronics, etc. In my own work, I have developed materials for electronics, specifically buffer coating materials for IC chips. These materials are required to have various properties such as high toughness, high glass-transition temperature, and low coefficient of thermal expansion (CTE). I would like to learn how to control these properties, especially CTE, by studying different nanomaterials dispersed in a polymer matrix.

I would like to also learn the difference in culture and the approach to research between Japan and the US. If you are interested in my research or my company, please feel free to contact me at:

hirata.tj@om.asahi-kasei.co.jp

Money Magazine Ranks Texas A&M First In Texas

Texas A&M University is the top school in Texas among public institutions in *Money* magazine's new "best college values" rankings — and is included among the six top public universities nationally when combining quality, affordability and how an institution's graduates fare monetarily in their careers.

Full story: http://tamutimes.tamu.edu/2014/08/07/texas-am-ranks-first-among-texas-public-universities-by-money-magazine-and-fares-well-nationally/#.U-jYudF0y1s?utm_source=tamutimes&utm_medium=email&utm_campaign=2014-08-12

WHOOP! WHOOP!

Washington Monthly Ranks Texas A&M In Top Four

Texas A&M University ranks among the top four colleges in the nation—and first in Texas—in *Washington Monthly*'s new rankings, which take into major consideration factors such as research and service to the nation, as well as academic standing.

Full story: http://tamutimes.tamu.edu/2014/08/25/texas-am-a-top-four-university-in-contribution-to-the-public-good-rankings-by-washington-monthly/#.U_uZLdF0y1s?utm_source=tamutimes&utm_medium=email&utm_campaign=2014-08-26

Texas A&M Ranks First In Nation For 'Fittest Campus,' According To The Active Times

Texas A&M was followed in the rankings by the United States Military Academy at West Point and the U.S. Naval Academy at Annapolis, where, in both cases, physical fitness specifically figures in the qualifications for admission in addition to academic records and other personal factors.

Full story: http://tamutimes.tamu.edu/2014/08/25/texas-am-ranks-first-in-nation-for-fitness-campus-according-to-the-active-times/#.U_uH2tF0y1s?utm_source=tamutimes&utm_medium=email&utm_campaign=2014-08-26

TEES researcher leads project for DOE, EV Everywhere Grand Challenge

Dr. Perla Balbuena, a researcher with the Texas A&M Engineering Experiment Station (TEES), holder of the GPSA Professorship and a professor in the Artie McFerrin Department of Chemical Engineering, has been awarded $990,000 from the Department of Energy. Balbuena will lead a project to research design improvements and optimization of lithium-sulfur (Li/S) batteries in their application as plug-in electric vehicles (PEV) batteries. Her research will explore a phenomenon called the "internal shuttle effect" within the Li/S battery and evaluate a multitude of other impacts to the battery's chemistry.

Balbuena's research project is one of 19 sponsored by President Obama's EV Everywhere Grand Challenge that seeks to equalize affordability and convenience in PEVs for consumers, in comparison to current gasoline-powered vehicles.
Full story: http://engineering.tamu.edu/news/2014/09/04/tees-researcher-leads-project-for-doe-ev-everywhere-grand-challenge

Lutkenhaus' research classified as "Hot" by Soft Matter Journal

The research of Dr. Jodie L. Lutkenhaus, assistant professor and the William and Ruth Neely Faculty Fellow in the Artie McFerrin Department of Chemical Engineering, has received a "Hot" classification by the Royal Society of Chemistry's Journal Soft Matter.
Full story: http://engineering.tamu.edu/news/2014/08/29/lutkenhaus-research-classified-as-hot-by-soft-matter-journal

Liang's research featured in Popular Mechanics

Dr. Hong (Helen) Liang's research on how gold nanoparticles can destroy superbacteria in the human body such as *Escheria coli* and drug-resistant *Staphococcus aureus* was featured in Popular Mechanics. Liang is a professor in the Department of Mechanical Engineering at Texas A&M University and a PTC faculty member.

As bacteria develop resistance to antibiotics and other drugs, gold nanoparticles may be the answer to the future of medicine. Nanoparticles disrupt physical processes, rather than biological ones, so microbes are less likely to be able to find workarounds to the damage they cause, according to Liang.

Implanted medical devices often cause infections in the human body, as they provide a foreign surface for bacteria to adhere to. Some bacteria, like MRSA, can form "biofilms" on these surfaces. Biofilms are congregations of organisms that are all but impenetrable even to the most powerful antibiotics. Gold nanoparticles with titanium dioxide kill bacteria on contact. The combined metals siphon off electrons from the bacteria, with gold spurring the titanium dioxide into action. Unable to sustain their basic respiratory functions without the electrons, the bacteria die.
Full story: http://www.popularmechanics.com/science/health/life-extension/to-kill-superbacteria-bring-on-the-bling-16988989

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Society of Plastics Engineers Student Chapter at TAMU
News and Upcoming Events

Howdy! This year is set to be an exciting one for the SPE student chapter at TAMU. We are happy to announce that at ANTEC last spring, we again received an award for being one of the most outstanding student chapters in the nation. We are also thankful to the SPE South Texas Chapter for its continued support through donations and scholarships. We have lined up great speakers, planned fun events, and are looking forward to another great year.

Upcoming events:

October 25th	Chemistry Open House & Science Exploration – Promoting the importance of chemistry in everyday life
November 5th	Seminar by Dr. Misty Rowe, Principal Scientist at Halliburton
December 3rd	Seminar by Dr. Elisa Teipel, Engineering Operations Manager at Essentium Materials

All of our monthly seminars will be held in the chemistry building, room 2121, at 6 pm and are open to the public. For more information, feel free to contact us at plastics@plastics.tamu.edu. Also, check out our website, http://plastics.tamu.edu, for news, upcoming events, membership information, research highlights, and chapter photos.

Thanks and Gig 'em!

Lauren A. Link
SPE President
TAMU Student Chapter

Polymer Specialty Certificate Updates

Students that have applied for the Polymer Specialty Certificate	33
Students that have received the Polymer Specialty Certificate	30

For more information, please visit: 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:

lalink87@gmail.com

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

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