



We are Pleased to Present these featured Guest Speakers for our April 7th Meeting:

Student Night

F. Cellini, S.D. Peterson
and M. Porfiri, NYU

Mechanochromic Soft Materials for Mechanical and Fluid Sensing

Abstract

Mechanochromic polymers are a novel class of soft active materials that present a linear relation between fluorescence emission and mechanical stretch. This beneficial property can be leveraged for the design of small scale systems with application in mechanical and fluid sensing. Here, we present an experimental and theoretical framework for the study of mechanochromic elastomers and gels and we investigate their reversible optomechanical behavior. To discuss the application of mechanochromic polymers in fluid measurements, we present results for differential pressure sensing using thin film mechanochromic membranes and we introduce a methodology for detection of mechanochromic response using commercial color cameras. Finally, we

present results from our recent work on the synthesis and characterization of small scale fluorescent polymer sensors for environmental fluid mechanics measurements.

Alyssa D'Apice
NYU

Calcium and Carbon Dioxide Effects on the Viscosity of Mucin

Abstract

Mucin is a glycoprotein involved in the production of mucus. It is essential in various defense and cleansing mechanisms, but mucus that is too viscous can be detrimental to one's health. We hypothesize that carbon dioxide and cross-linking calcium ions are involved in changing the viscosity of mucin. We aim first to prove that mucin can hold various amounts of calcium and then determine whether or not calcium ions affect the viscosity.

Initially, two-chambered dialysis cells separated by a semi-permeable membrane were set up allowing calcium ions to pass freely between the chambers. One chamber was filled with a porcine-derived mucin solution, while the other was filled with different calcium chloride solutions.

The samples were allowed to diffuse overnight and the calcium concentrations were measured by a titration method. This method was not sensitive enough to quantitatively measure low calcium concentrations.

Fluorescent calcium indicators, Fura-2 and Indo-1, promised to be more sensitive and also have high selectivity for calcium. Our goal is to obtain a graph of calcium concentration as a function of the dye's fluorescent intensity; however, this is made difficult by the spectrometer's sensitivity to indicator concentration. Once the data produces a curve, it will serve as a reference to accurately measure the unknown calcium concentrations in the mucin samples.

In the future, our fluorescence technique will be used to measure calcium ion concentration in mucin after equilibrium dialysis with various calcium solutions. A rheometer will be used to measure the viscosity of mucin when it has bound to various amounts of calcium. Mucin samples will also be exposed to varying concentrations of carbon dioxide to determine its effect on viscosity.





April 7th Meeting (continued):

Student Night

Joseph Madrazo
NYU

New Perfluoropolymer Synthesis for Gas Membrane Separation

Abstract

One facet of the research being done in this lab is new perfluoropolymer synthesis.

These polymer molecules are synthesized through batch processes and then completely fluorinated (usually with salts) meaning that all of the hydrogens are replaced with fluorine atoms (similar to Dupont's famous Teflon product). The polymer is then used to create a thin membrane which is used for natural gas separation. Now you might be wondering what the significance of this kind of science is, well natural gas separation at the moment has an estimated global market of \$2-3 billion dollars per year, with only 10% of that market share being held by membrane processes. 90% of the market has been held by amine absorption processes which are have an extremely high energy consumption and are highly pollutant. With the demand for natural gas rising as well

as the need for environmentally safe production alternatives, the need for reformative technology is growing.

The advanced perfluoro membranes being developed in our labs have been tested and have shown a high-pressure mixed gas CO₂/CH₄ selectivity that is 100% higher than that of the current industrial standard. 100% higher! If these properties can be translated into high volume membrane production for use in the field than this research will transform the natural gas treatment industry forever.

Alaa Abd Ali
Rutgers

Strengthening Autoclaved Aerated Concrete Beams using Basalt Fabrics with Inorganic Matrix

Abstract

The Autoclaved aerated concrete (AAC) is attractive for use as building elements due to their light weight as compared to normal concrete, fire resistance, ease of construction, energy efficiency, and sound insulation. In

most of these applications, the precast structural elements made of AAC are subjected bending forces. Since the bending strength of AAC is very low, the flexural capacity is enhanced in this study using basalt fabric attached to AAC using inorganic matrix .

MEETING DETAILS

Place: Bridgewater Manor, Bridgewater, NJ; (908) 658-3000

Time: 5:45 – 8:30

Cost: \$15.00 Adv Registration; \$20.00 at Door; Students – Free
This meeting is open to all SAMPE members, spouses, guests, and other interested parties

Reservations contact John Osterndorf at 973-248-5885 or at jfo0956@gmail.com by noon Wednesday before the meeting.
Directions to Bridgewater Manor: From I-287 north, take exit 22A (206 south). Go thru two lights, Bridgewater Manor is on right. From I-287 south, take exit 22. Make right at end of ramp. Make next left, a jughandle to cross 202/206 to go south on 202/206. Go thru three lights, Bridgewater Manor is on the right:





2015 – 2016 Meeting Schedule

September 10, 2015 – Garry Hoffman, 3HTi, LLC.

October 1, 2015 – Louis Pilato, Bio-Based Resins

October 26 - 29, 2015 – CAMX, Dallas TX, sponsored jointly by SAMPE and ACMA

November 5, 2015 – Joe Landolina, Suneris Technologies Inc.

December 3, 2015 – Aram Mekjian, Mektech Composites Inc.

February 4, 2016 – Dennis Prentice, Rob Demaree, IMR Test Labs

March 3, 2016 – Mary Shafer, Fabric Development

April 7, 2016 – Student Night - Short presentations from NYU and Rutgers student members

May 5, 2016 – Dilip Shah, A&C Catalysts, (tentative)

May 23 - 26, 2016 – SAMPE Long Beach, Long Beach CA

June 2, 2016 – TBA

July 7, 2016 – 33rd NJ SAMPE Golf Tournament, Picatinny Arsenal

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April 2016

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Aram Mekjian is President of Mektech Composites Inc, a Distributor for Hexion Inc's Phenolic resins. He is the exclusive North American Distributor for Cellobond Phenolic resins, now owned by Hexion, which he introduced to the US market in 1990 as Business Manager for BP Chemicals. Prior to that, Aram was the Technical Director and Product Manager for Aristech Polyesters for 13 years.

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