



We are pleased to present the featured Guest Speakers for our April 6th (Student Night) meeting:

In-situ micro-CT characterization of mechanical properties and failure mechanism of cementitious syntactic foams

Halim Kerim Bas
PhD Student
Civil Engineering NYU

Abstract:

Lightweight cementitious materials, such as foamed concretes, are generally known to show poor mechanical properties (e.g., compressive strength and elastic modulus). The lack of control over the size, shape, and distribution of air voids severely limits the improvement of mechanical properties in lightweight cementitious materials. This work is focused on manufacturing and examining the mechanical properties of cementitious syntactic foams with hollow glass microspheres. Use of

hollow particles to incorporate porosity allows for the control over the size, shape, and volume fraction of voids present in the composite. Hollow glass microspheres with several different densities (0.15–0.60 g/cm³) are used in different volume fractions (20%–50%) to manufacture the cementitious syntactic foams. The results show that cementitious syntactic foams have compressive strengths (32–88 MPa) and elastic moduli (10–20 GPa) for a given range of low density (1.15–1.80 g/cm³), which are better than other cellular cementitious materials in the same density range. Using in-situ micro-CT scanning, it has been illustrated that the micro-fracture mechanisms due to compressive loading in CSFs depend on the microsphere density and aging of the material.

Dark energy in a weak gravitational field

Anya Parker-Lentz
Bachelor's Student
Applied Physics NYU

Abstract:

Dark energy is a very mysterious subject in contemporary science, accounting for 70% of the energy in our universe. While it may be responsible for the accelerated expansion of the universe, there are no viable independent experiments, to date, to detect the presence of dark energy. In order to understand how dark energy might influence the motion of particles in ambient conditions, we developed the geodesic equation for the motion based on the metric of our universe, the Robertson-Walker metric. The equation for the geodesic predicts the motion of a particle free from all external force. The Einstein equation, $R_{\mu\nu} - \frac{1}{2} R g_{\mu\nu} + \Lambda g_{\mu\nu} = [8 \pi G / c^4] T_{\mu\nu}$ which relates the geometry of spacetime to energy, includes the Ricci tensor $R_{\mu\nu}$, the Ricci scalar R , the metric tensor $g_{\mu\nu}$ (in this case, the Robertson-Walker metric), and the stress-energy tensor $T_{\mu\nu}$. The factor Λ is the cosmological constant, which describes dark energy. Using the Einstein equation, along with the Robertson-Walker metric, we analyze the possibility of detection of dark energy in the peculiar motion of galaxies.





We are pleased to present the featured Guest Speakers for our April 6th Meeting:

Fabrication of asymmetric, hierarchically porous polyimide- derived carbon thin films by hard templating

Megha Sharma and Mark Snyder

Department of Chemical and
Biomolecular Engineering,
Lehigh University

Abstract:

The promise of inorganic membranes such as carbon molecular sieves (CMS) to revolutionize continuous high-selectivity gas and liquid separations has been quelled, in

part, by persistent struggles to break through commercial performance barriers associated with the well-known trade-off between permeability and selectivity. Synthetic challenges common to CMS and other inorganic membrane materials include the need to minimize defect-free membrane thickness while simultaneously tailoring membrane texture and function as well as improving areal scaling in order to meet stringent demands for industrial separations. In this talk, we will present a facile hard-templating approach, which we have recently extended to produce ultra-thin microporous polyimide-derived CMS films that are self-supported on three-dimensionally ordered mesoporous (3DOM) carbon layers. This approach exploits convectively deposited, size-tunable silica nanoparticle colloidal crystal films as a sacrificial template and poly (pyromellitic dianhydride-co-4,4'-oxydianiline) (PAA) as the carbon source used for replicating the template voids. A key feature of the hard-templating approach discussed in this talk is the multi-scale role of the silica colloidal crystal template. Namely, in addition to establishing mesoscale structure of the 3DOM underlayer, we find that the template-replica interface can be exploited to tune microscale structure as well. Specifically, we find that the sp^2 carbon allotrope content, the origin of microporosity in CMS materials, is sensitive to and tunable by template and processing conditions as assessed by Raman spectroscopy. This talk will also highlight the process

of polymer-mediated transfer of the asymmetric films among substrates (e.g., porous supports), and 'one-pot' template-replica co-assembly strategies that hold promise for transitioning from flat to three-dimensionally corrugated films, and, thereby, dramatically improving membrane area per volume

MEETING DETAILS

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

Time: 5:45 – 8:30

Cost: \$20.00 Adv Registration; \$25.00 at Door; Students – Free

This meeting is open to all SAMPE members, spouses, guests, and other interested parties

Reservations contact Megan Casey at mbc872@gmail.com by noon Wednesday before the meeting. Meal options are available.

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:





2016 – 2017 Meeting Schedule

September 8, 2016 – Steve Medlar, Rutgers University

October 6, 2016 – Student Night, Presentations from Somerville High School

October 26 - 29, 2016 – CAMX, Anaheim CA, sponsored jointly by SAMPE and ACMA

November 3, 2016 – Ben Bordoloi, Ames Rubber Co.

December 1, 2016 – Paul Cylenica, SGL

February 2, 2017 – J.P. Masson, Nagase America Corp.

March 2, 2017 – Mike Jablon, Honeywell

April 6, 2017 – Student Night

May 4, 2017 – Amir Islam, Bally Ribbon Mills

May 22-25, 2017 – SAMPE Seattle, Seattle WA

June 1, 2017 – Tour of New Tappan Zee Bridge, Tarrytown, NY

June 26, 2017 – 34th NJ SAMPE Golf Outing, Picatinny Arsenal

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