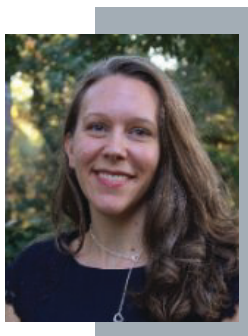
AUGUSTA UNIVERSITY
COLLEGE OF SCIENCE AND MATHEMATICS

Welcome to the Spring 2018 Materials Science Research Seminar Series!

SCIENCE HALL, W1002, SUMMERVILLE CAMPUS



FRIDAY, JANUARY 26, 2018, 1-2 p.m.

Materials Challenges in Renewable Energy

ELISE FOX, PHD
PRINCIPAL ENGINEER
FOX ENERGY INNOVATIONS, LLC
ACS ENERGY & FUELS, SAVANNAH RIVER NATIONAL LAB

This presentation will review the progress of renewable energy in the US over the past twenty years. We will discuss how materials development has helped increase the pace of adoption. In addition, this presentation will highlight how innovation in materials science and chemistry will further improve the efficiency and cost effectiveness of renewable resources.

FRIDAY, FEBRUARY 9, 2018, 1-2 P.M.

Probing spin-charge separation and fractionalized quasiparticle excitations in one-dimensional antiferromagnets using Resonant Inelastic X-ray Scattering

STEVEN JOHNSTON, PHD
ASSISTANT PROFESSOR OF PHYSICS
DEPARTMENT OF PHYSICS AND ASTRONOMY, THE UNIVERSITY OF TENNESSEE, KNOXVILLE, TN

One-dimensional (1D) magnetic materials have attracted significant interest as a platform for studying phenomena such as quasiparticle fractionalization and quantum criticality. The spin-1/2 1D Heisenberg antiferromagnet (AFM) is a simple and essential system in this context; its elementary excitations are spinons, chargeless collective excitations carrying spin 1/2. These spinons must be created in pairs, resulting in an excitation spectrum composed of two-, four-, six-, ... spinon continua. While scattering experiments observe the two-spinon continuum regularly, the presence of four-spinon excitations has only been inferred from discrepancies between measured and calculated spectral weights in phase space overlapping with the two-spinon continuum. In this talk, I will show how resonant inelastic x-ray scattering (RIXS) can access the four-spinon excitations directly and well separated from the two-spinon continuum. Our results provide the first direct measurement of four-spinon excitations in a 1D AFM and demonstrate that RIXS offers additional information on fractionalized excitations. When combined with ultrafast instrumentation, RIXS holds promise as a powerful tool in the search for quantum spin liquids.

FRIDAY, FEBRUARY 23, 2018, 1-2 P.M.

Novel Nitric Oxide Releasing Materials and Their Biomedical Applications

HITESH HANDA, PHD
ASSISTANT PROFESSOR
SCHOOL OF CHEMICAL, MATERIALS AND BIOMEDICAL ENGINEERING
UNIVERSITY OF GEORGIA, ATHENS, GA

Blood/material interaction is critical to the success of implantable medical devices, ranging from simple catheters, stents and grafts, to complex extracorporeal artificial organs which are used in thousands of patients every day. There are two major limiting factors to clinical application of blood contacting materials: 1) platelet activation leading to thrombosis, and 2) infection. Despite a thorough understanding of the mechanisms of blood–surface interactions, and decades of bioengineering research effort, the ideal non-thrombogenic prosthetic surface remains an unsolved problem. One approach to improving the hemocompatibility and bactericidal activity of blood-contacting devices is to develop materials that release nitric oxide (NO), a known potent inhibitor of platelet adhesion/activation and also an antimicrobial agent. Healthy endothelial cells that line the inner walls of all blood vessels exhibit a NO flux of 0.5 – 4.0 x10-10 mol cm-2 min-1, and materials that mimic this NO release are expected to have similar anti-thrombotic properties. Further, studies have shown that materials that release such NO fluxes can prevent microbial biofilm formation. In this presentation, the potential of incorporating NO donor molecules such as diazeniumdiolates or S-nitrosothiols (RSNOs) into various biomedical grade polymers will be discussed, as will the resulting hemocompatibility and antibacterial properties of such materials determined via short-term (4 h) and long-term (9 d) in vivo experiments using appropriate animal models.

Seminar series organizers:
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augusta.edu/scimath/chemistryandphysics/materials-thursday.php