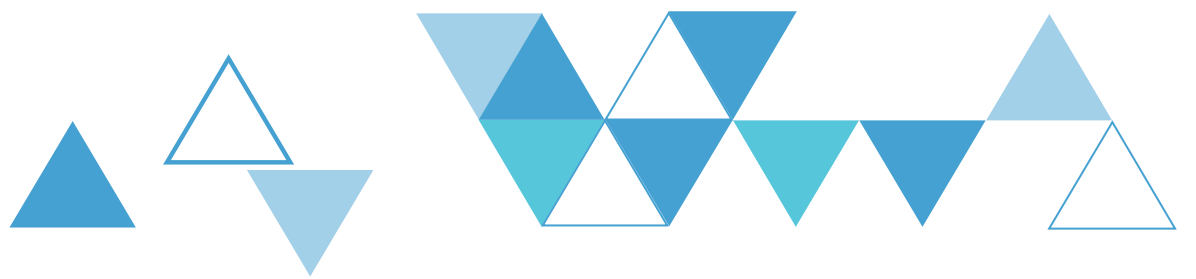




AUGUSTA UNIVERSITY  
COLLEGE OF SCIENCE  
AND MATHEMATICS



# Welcome to the Fall 2019 Materials Science Research Seminar Series!

SCIENCE HALL, W1002, SUMMERVILLE CAMPUS



**FRIDAY, SEPT 27, 2019, 1-2 p.m.**

**Exploring the Interactions between Light and Materials for Chemical Processing**

**GEORGE LARSEN, PHD**

SENIOR SCIENTIST A , SAVANNAH RIVER NATIONAL LABORATORY, SAVANNAH RIVER SITE, AIKEN, SC

Chemical processing at Savannah River Site is typically done at very large scales, deep within shielded nuclear facilities. Therefore, it would seem counterintuitive that such processes could be improved by using very small particles and light. Similarly, the interior of a nuclear reactor contains some of the most intense radiation to be found on earth. Ultraviolet (UV) light irradiation, on the other hand, is a common everyday occurrence for most people, but UV light can also reveal behavior that occurs within the depths of a reactor core. In this talk I will present some of our recent research centered around light-based processes. I will first discuss our use of the photothermal effect of nanoparticles to improve chemical reactions. Then, I will describe our recent investigations using UV light to study hydrogen permeation from tritium producing burnable absorber rods (TPBARs), as well as the use of UV light to improve radiation detectors. Finally, the use of light to probe the optical and magneto-optical effects of hydrogen in metals will be discussed.



**FRIDAY, OCTOBER 4, 2019, 1-2 p.m.**

**Quantum Dragon Nanodevices: Zero Electrical Resistance in Disordered Systems**

**MARK A. NOVOTNY, PHD**

PROFESSOR AND HEAD, DEPT OF PHYSICS AND ASTRONOMY,  
WILLIAM L. GILES DISTINGUISHED PROFESSOR, MISSISSIPPI STATE UNIVERSITY, MISSISSIPPI

Quantum effects in nanodevices can lead to unexpected physical properties. Quantum dragon nanodevices are introduced. They can have very strange shapes, be very disordered, be very tatty, and still have complete electron transmission when attached appropriately to uniform leads. Complete electron transmission is the basis for zero electrical resistance in four probe measurements. Furthermore, even though the quantum dragon devices have arbitrarily strong locally-correlated disorder, they exhibit 'order amidst disorder'. A number of quantum dragon devices will be described, as well as instances where small deviations cause nanodevices to be almost quantum dragons.



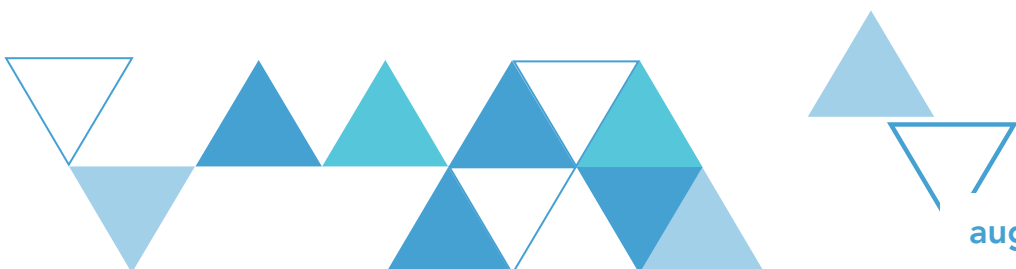
**FRIDAY, NOVEMBER 15, 2019, 1-2 p.m.**

**Noble Metal and Rare-Earth Doped Glasses for Photonics**

**JOSÉ A. JIMÉNEZ, PH.D.**

ASSISTANT PROFESSOR OF CHEMISTRY  
DEPARTMENT OF CHEMISTRY AND PHYSICS AUGUSTA UNIVERSITY, AUGUSTA, GA

Glasses displaying distinct optical properties have been of interest to mankind for centuries. For example, the famous Lycurgus cup (<https://www.smithsonianmag.com/history/this-1600-year-old-goblet-shows-that-the-romans-were-nanotechnology-pioneers-787224/>) is known to display the dichroic effect due to the presence of metallic nanoparticles dispersed within the glass. In modern times, the plasmonic properties of metallic nanoparticles continue to intrigue scientists and motivate research for technological applications. In this talk, recent work by the author will be presented regarding the synthesis, characterization, and optical properties of noble metal-doped glasses. Further, the influence of additional co-doping with luminescent rare-earth ions is considered having in mind photonic applications for the glasses in light-emitting devices.



**Seminar series organizers:**  
**Dr. Trinanjan Datta (tdatta@augusta.edu)**  
**Dr. Shaobin Miao (smiao@augusta.edu)**

[augusta.edu/scimath/chemistryandphysics/materials-thursday.php](http://augusta.edu/scimath/chemistryandphysics/materials-thursday.php)