

**FALL 2020 COLLOQUIUM SPEAKER**  
**NOVEMBER 4, 2020**

Wednesday's  
 1-1:50pm  
 ZOOM

**New Frontiers for Nano/biomaterials in Energy,  
 Energetic and Environmental Studies**

Rapid 21st century advancements in enabling science and technology have opened up myriad opportunities for nanobiomaterials, a multidisciplinary scientific field with roots in biology, materials science and nanotechnology. Such developments hold future promise for disruptive innovations in the quest for efficient and economical energy conversion, storage and dissipative materials. This talk will present our group's recent research works with diverse classes of functional and interacting nano- and biomaterials to alleviate three interconnected challenges of global significance – namely, renewable and sustainable energy, energetic materials for national security, and impacts of anthropogenic materials on our environment. The first half of this talk will focus on designer nanomaterials and bio-inspired materials for electrochemical and solar energy conversions/storage to address the impending energy crisis facing humanity in view of exhausting fossil fuel reserves by 2112. Specifically, results will be presented for composite and intermetallic nanomaterials synthesized via our patented Laser Ablation Synthesis in Solution (LASiS) techniques for advanced fuel cell electrocatalysis and supercapacitive applications. This will be followed by our recent attempts at mimicking nature's lessons on harvesting solar energy via fundamental studies on tailoring the photosynthetic protein complex, Photosystem I (PSI) that enables photo-electrochemical energy conversions with near unity quantum efficiency. The second half will introduce our current efforts at synthesizing metastable composite nanoparticles via LASiS for energetic applications, that is expected to provide a paradigm shift in the design of next-generation high-energy density materials for solid-state propulsion and explosives. The talk will conclude by briefly touching upon our investigations into the environmental impacts of engineered metal/metal oxide nanomaterials interacting with biological interfaces.

**ZOOM MEETING ID 967 5468 5049**

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**Dr. Dibyendu Mukherjee**

Research Professor,

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**Dibyendu Mukherjee** is a Research Professor with the Department of Chemical & Biomolecular Engineering (CBE) at the University of Tennessee, Knoxville (UT) where he directs the NanoBioMaterials Laboratory for Energy, Energetics & Environment (nbml-E3). His research focuses on the synthesis, assembly, and characterization of functional and interacting nano-biomaterials to impact three technological areas of global significance - energy, energetics, and environment. Dibyendu received his B.E. and M.S. degree in Mechanical Engineering from M. S. University of Baroda, India and the University at Buffalo (SUNY) respectively. He earned his Ph.D. in Mechanical Engineering from the University of Minnesota, Minneapolis. Subsequently, he was a postdoctoral researcher with the Environmental Sciences Division (ESD) at Oak Ridge National Lab (ORNL) and a Gibson research fellow with the CBE Department at UT. He holds a US patent on his novel Laser Ablation Synthesis in Solution-Galvanic Replacement Reaction (LASiS-GRR) technique for green synthesis of complex nanoalloys, and/or nanocomposites. His works have been featured on the cover of Journal of Materials Chemistry A, Nanoscale Advances, Materials Chemistry Frontiers, Applied Spectroscopy and Journal of Biophotonics. He has been an invited speaker at the 2014 MRS Fall meeting (Boston, MA), 2016 Materials Science Spring Colloquium at Boston University, the Chemistry Department at University of Duisburg-Essen (Germany), and the 2018 Advanced Nanoparticle Generation & Excitation by Lasers in Liquids (ANGEL 2018) conference (Lyon, France). He is a member of the American Chemical Society (ACS), Materials Research Society (MRS), and American Society for Engineering Education (ASEE).

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