
Electrical & Computer Engineering
S E M I N A R
Louisiana State University

**Small and Bright: Tailoring
Luminescent Nanoparticles in Biology**

Gang Han

University of Massachusetts-Medical School

Abstract—Functional luminescent nanoparticles are promising materials for in vitro and in vivo optical imaging and therapy due to their unique optical and chemical properties. In this talk, I will present three new types of biocompatible luminescence nanoparticles. The first type of materials is upconversion nanoparticles (UCNPs). I will present new developments regarding engineering UCNPs towards deep tissue imaging, photodynamic therapy, optogenetic applications in neuroscience and immunotherapy. The second type of nanoparticles is persistent luminescence nanoparticles (PLNPs). They are bioluminescence-like and possess unprecedented in vivo deep tissue energy rechargeability, outstanding signal-to-noise-ratio with no need for an excitation resource (light) during imaging, and they can be directly detected with existing imaging systems. These nanoparticles continue to emit light for minutes or hours and, in some cases, days, after turning off the excitation source. These long-lasting, light-emitting nanocrystals can provide noninvasive imaging technology for evaluating structural and functional biological processes in living animals and patients. The third is a type of organic Bodipy nanoparticles that were tailored with outstanding NIR absorbing ability. Rather than the conventional laser light needed in PDT, I will present their ultralow power lamp operable PDT applications in deep tissue tumor treatment. Finally, I would like also to introduce a nanobug concept towards cancer treatment.

Bio—Dr. Gang Han is currently an Associate Professor at University of Massachusetts Medical School. He received his B.Sc. and M.S. degrees from Nanjing University, and his Ph.D. degree in Chemistry from University of Massachusetts-Amherst. He was a postdoctoral scholar at the Molecular Foundry, Lawrence Berkeley National Lab. He has authored in over 60 papers in Journals such as Nature, Nature Nanotechnology, Nature Communications, Elife, PNAS, JACS, Advanced Materials, Angewandte chemie, Nano lettersSmall, ACS Nano, which have cited over 6900 times, h-index 34. He was honoured awards such as the Worcester Foundation Mel Cutler Award, NIH Exceptional Unconventional Research Enabling Knowledge Acceleration (EUREKA) Award and Human Frontier Science Program Young Investigator Award. His current research focuses on the development of biocompatible functional luminescent nanoparticles and molecules for optical imaging and therapy.

When: Thursday, 4 May 2017, 13:30 - 14:30
Where: Room 1216 Patrick F Taylor Hall
Info: <http://www.lsu.edu/eng/ece/seminar>
Food: *Refreshments will be served.*

