



**Tyrone Porter, PhD**

**Professor and Chair of Biomedical Engineering, University of Texas at Austin**

## DISTINGUISHED BME SEMINAR

Host: Dr. Stanislav Emelianov

### **The diversity of lipid-coated nanoparticles in biomedical applications**

Lipids are extremely versatile biomolecules capable of encapsulating nanoparticles composed of gas, liquid, or solid. The diversity of lipid-coated nanoparticles that can be produced has enabled the development of innovative approaches to diagnosing and treating life-threatening or debilitating medical conditions. In this talk, I will present two nanoparticles being explored in the Diverse Engineering Applications Laboratory (D.E.A.L.) at UT Austin. First, I will review the development and utility of pressure-sensitive nanoemulsions (PSNE), which can be vaporized with high amplitude acoustic pulses. Vaporization produces microbubbles that can be driven to collapse energetically, radiating broadband emissions that are rapidly absorbed by surrounding tissue or generating intense stresses capable of fragmenting cells. We have taken advantage of PSNE vaporization with focused ultrasound for thermal and nonthermal ablation of solid tumors. Second, I will discuss the generation and characterization of indocyanine green (ICG) J-aggregates packaged within lipid vesicles. While free ICG can be utilized for near infrared (NIR) imaging of blood vessels, the contrast agent is cleared fairly quickly (<30 minutes) from circulation. ICG J-aggregates circulate for hours and absorb more photons at longer wavelengths than soluble ICG, which is advantageous for in vivo multispectral photoacoustic imaging as well as photothermal therapy. The versatility of lipid-coated nanoparticles makes the technology accessible to scientists and students from various disciplines, which can lead to many fruitful multidisciplinary collaborative projects.

**Tyrone Porter** is Professor and Chair of Biomedical Engineering and holder of the Donald J. Douglass Centennial Professorship in Engineering at The University of Texas at Austin. After receiving a Ph.D. in Bioengineering at the University of Washington and a postdoctoral fellowship at the University of Cincinnati, Dr. Porter started his academic career at Boston University in 2006. Over his career, Dr. Porter has made significant contributions to ultrasound use for therapeutic applications. For these contributions, he was elected a Fellow of the Acoustical Society of America (ASA) in 2017 and a Fellow of the American Institute for Medical and Biological Engineering (AIMBE) in 2021. Dr. Porter has held various leadership roles for professional societies, including a member of the Board of Directors for the American Institute of Physics (since 2020) and the Vice President for the ASA (2024-2025). In these roles, Dr. Porter has championed initiatives that broaden participation in the physical and biomedical sciences and expanded awareness of the positive impact that science has on society.