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Department of Biomedical Engineering

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Date Friday, December 05, 2025
Time 12:00 to 1:00 PM
Location SEC 203

Title: *Diverse biomedical applications of lipid-coated particles*

Abstract: Lipids are extremely versatile biomolecules capable of encapsulating particles composed of a gas, liquid, or solid. In this talk I will present three particles that have been developed for various projects in the biomedical sciences. 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, generating intense stresses capable of permeabilizing cell membranes and homogenizing solid tumors. In a second project, we encapsulated the optical imaging tracer indocyanine green (ICG) into liposomes designed to remain in circulation for hours. This enabled two-photon (2P) imaging at multiple depths that required at least an hour of light exposure, which was not possible with unencapsulated ICG. Third, I will describe the generation and characterization of ICG J-aggregates packaged within lipid vesicles. ICG J-aggregates absorb more photons at longer wavelengths than soluble ICG, which is advantageous for in vivo multispectral photoacoustic imaging as well as photothermal therapy at deeper locations in tissue. The versatility of lipid-coated particles makes the technology accessible to scientists and students from various disciplines, which can lead to many fruitful multidisciplinary projects.

Bio: Dr. 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. He is a Fellow of the Acoustical Society of America (ASA) and a Fellow of the American Institute for Medical and Biological Engineering (AIMBE) for contributions to the fields of nanomedicine and biomedical ultrasound. Dr. Porter has held various leadership roles for professional societies, including a member of the Board of Directors for the American Institute of Physics (AIP) and the Vice President for the ASA. In these roles, Dr. Porter has championed initiatives that broaden participation in the physical and biomedical sciences and expanded awareness on the positive impact that science has on society.