

BIOENGINEERING

Fall 2019 Seminar

Date: Thursday, October 31, 2019
Time: 12:00 pm - 1:00pm
Location: Exploratory Hall, Room L111
(Videoconferencing to SciTech, K. Johnson Hall Rm 254)



Tyrone Porter, Ph.D.

Biography: Ultrasound can be used to noninvasively vary the pressure within tissue by several atmospheres. The design of particles that respond specifically to these pressure variations is an active area of research within biomedical ultrasound. In this talk, I will discuss the development and utility of pressure-sensitive nanoemulsions that can be vaporized with high amplitude acoustic pulses. The bubbles produced by vaporization can be driven to collapse, radiating broadband emissions that are rapidly absorbed by surrounding tissues and generating stresses sufficient for

transient permeabilization of cells. In one project, we demonstrate the vaporizable nanoemulsions can be used to facilitate transport of biomolecules into cells efficiently and with minimal cell death. In a second project, we show that it is possible to dramatically reduce the acoustic power and exposure time required for tumor ablation using vaporizable nanoemulsions. Recently, we have utilized the combination of nanodroplets and ultrasound for focal ablation in the brain. Finally, new innovations for targeted imaging and localized therapy based upon the current research will be discussed.

Title: Biomedical applications for ultrasound-triggered exploding nanodroplets

Abstract: Tyrone Porter is an Associate Professor in the Departments of Mechanical Engineering and Biomedical Engineering at Boston University. Additionally, he is the Associate Director for the Nanotechnology Innovation Center and Co-Director for the NIH-funded Translational Research in Biomaterials training program. Dr. Porter completed his graduate work in the Department of Bioengineering at the University of Washington in 2003. He was awarded the Frederick V. Hunt Postdoctoral Fellowship and the R. Bruce Lindsay award from the Acoustical Society of America (ASA) in 2003 and 2008, respectively, and in 2017 he was inducted as a Fellow of the ASA. His research interests lie at the intersection between biomedical ultrasound, materials science, biophysics, and nanomedicine. Under his leadership, the Nanomedicine and Medical Acoustics Laboratory (NanoMedAL) has made significant contributions to the use of ultrasound for noninvasive ablation of solid tumors, permeabilizing biological interfaces for drug delivery, and triggering drug release from stimuli-responsive nanocarriers