

Abstract of the Proposed Lecture:

Coherent light and sound have become essential tools in modern medicine. Lasers are routinely used for both therapeutic and diagnostic applications, and real-time ultrasound scanning has become the dominant biomedical imaging modality in the world. Starting over thirty years ago, scientists and engineers have combined these modalities for applications ranging from noncontact sensing to novel molecular imaging techniques. In this talk, I will explore the history of integrated photonic-ultrasonic systems, focusing on examples where light generates sound, light detects sound, and sound “tickles” light. I will also present specific applications of integrated photonic-ultrasonic techniques, including photo-acoustics for molecular imaging, non-contact laser ultrasound systems for medical and non-medical applications, and optical coherence elastography (OCE) in which air-coupled ultrasound stimulates propagating shear waves in the eye and skin tracked with real-time, 3-D optical coherence tomography (OCT). The talk will conclude by discussing current barriers to clinical translation of these systems and possible ways to overcome the Obstacles.