

**DR. IRENE GEORGAKOUDI** is a Professor in the Biomedical Engineering Department at Tufts University. She received her BA in Physics from Dartmouth College, her PhD in Biophysics from the University of Rochester and performed postdoctoral work at the MIT GR Harrison Spectroscopy Lab and the Wellman Center for Photomedicine at Massachusetts General Hospital. Her lab is interested in the development of new and improved methods to assess different aspects of normal and diseased development of human tissues that rely on light interactions with endogenous chromophores and are thus non-invasive.

She is particularly interested in the development of quantitative methods to assess cell metabolism and matrix organization features in tissues non-invasively. Main application areas of research in the lab include cancer diagnostics, adipose tissue function, osteoarthritis, cardiovascular and neurodegenerative diseases. She has published over 100 peer reviewed manuscripts and book chapters in this area, and has served as the program chair, co-chair or session chair of over 25 international conferences in Biomedical Optics. She is currently an Associate Editor for the journal Optica and a fellow of the American Institute of Medical and Biological Engineering, of the Optical Society of America and SPIE.

**11/13/20**

## **DR. IRENE GEORGAKOUDI**

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### **MORPHOFUNCTIONAL TISSUE ASSESSMENTS THROUGH LABEL-FREE, HIGH RESOLUTION IMAGING**

**ABSTRACT:** Histopathological tissue evaluation procedures for disease diagnosis have remained essentially unchanged for the past century. Yet, they demand highly trained personnel, significant resources and infrastructure, and provide assessments of tissue that has been highly processed. Diagnostic features rely primarily on morphological characteristics and have not evolved to incorporate a wealth of functional information that we have acquired during the last decades regarding disease development. I will present an overview of studies that we have been pursuing that aim to exploit endogenous sources of optical contrast to yield quantitative metrics of not only morphological, but also functional cell and tissue properties, without the need to excise tissue. Specifically, I will discuss the use of two-photon excited fluorescence images acquired

based on detection of endogenous signal from NADH and FAD to acquire detailed information regarding changes in metabolic function. Such changes are directly related to changes in the relative levels of essential metabolic pathways and are detected in three dimensional engineered tissues, freshly excised tissues, animals and human patients in vivo. Further, I will discuss the potential of the combined use of endogenous fluorescence and scattering signatures of collagen fibers to assess subtle changes in organization and crosslinking that are associated with biomechanical changes in diseased tissues. Our ultimate goal is to perform such measurements in a manner that essentially brings the microscope to the patient enabling functional imaging to improve disease diagnosis and monitoring.

**FRIDAY, NOVEMBER 13 / 9:00 AM / VIA ZOOM**

**Zoom Registration** ▶ <https://bme.fiu.edu/seminars>



Through the generous support of the Wallace H. Coulter Foundation the Department of Biomedical Engineering facilitates weekly lectures each year during academic terms. Experts in all areas of Biomedical Engineering are invited to campus to provide a research seminar and to meet with faculty and students and to tour our academic and research facilities.

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