

Department of Electrical and Computer Engineering

Title: «**Surface Enhanced Raman Spectroscopy for Chemical Sensing and Biomedical Imaging: Microsystems and Microtumors**»

Chrysafis Andreou
Memorial Sloan Kettering Cancer Center, New York City, NY

Thursday, 29th June 2017, 15:00 – 16:00
Room 105, Building ΚΩΔ 03, New Campus - University of Cyprus

Abstract:

Within our bodies, in our food, and our environment, molecules hold the secret of our health and, too often, our demise. By developing efficient and cost-effective chemical sensing techniques we could detect the onset of disease or a chemical threat, and promptly pursue the appropriate remedy. In this talk I will present my research focusing primarily on surface enhanced Raman scattering (SERS) for visualizing molecules. Raman spectroscopy can be used to identify molecules based on their interactions with light, but it has innately very weak signal. With SERS, plasmonic nanoparticles can be used to massively amplify the Raman signal, in certain cases making it possible to detect even single molecules. Microfluidic systems allow us to direct fluids and control the interactions between nanoparticles and sample with exquisite precision, and in this way optimize and standardize analysis while minimizing sample volume and processing time. I will present my work on microfluidic systems for biofluid and breath analysis. Additionally, by engineering targeted SERS nanoproboscopes, we can direct them to specific molecules in the body in order to locate and image cancerous lesions. In my current project, I have developed different targeting strategies for imaging microscopic tumors in the lungs, liver, and ovaries, too small to be detected by current clinical imaging methods. Together, optical imaging, microfluidic systems, and nanoparticles become powerful tools, that allow for generalized analysis techniques for biological samples and living systems.

Biography:

Chrysafis Andreou graduated from the Pennsylvania State University in 2006, with B.Sc. in Mathematics and in Physics (with Honors). His graduate studies consist of a M.Sc. in Electrical Engineering at the University of Cyprus (2008) and Ph.D. in Biomolecular Science and Engineering at University of California, Santa Barbara (2013). He is currently a Research Scholar at Memorial Sloan Kettering Cancer Center in New York. His research focuses on visualizing molecules of interest by using optical imaging techniques, nanoparticles, and microfluidics. By engineering systems based primarily on surface enhanced Raman scattering (SERS) nanoparticles, Chrysafis has developed platforms for biosample analysis and imaging of different types of cancer. His main research goal is to develop miniaturized, quick, and cost-effective systems for chemical analysis, health monitoring, and bioimaging applications.