DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE

SPRING 2017 SEMINAR SERIES

Sponsored by: Purdue Pharma L.P.
Bristol-Myers Squibb Company

WEDNESDAY, FEBRUARY 15, 2017 **TIERNAN HALL**
2:30 PM **ROOM 373**

GUEST SPEAKER

Dr. Andres Campiglia
Professor and Graduate Coordinator
Department of Chemistry
University of Central Florida
Orlando, FL

TOPIC

Can we find the needle in the haystack?

ABSTRACT

Photoluminescence spectroscopy is widely regarded as a sensitive technique, but in solution photoluminescence spectra are generally featureless. Inhomogeneous broadening from the surrounding solvent or matrix obscures the underlying information. This means that both fluorescence and phosphorescence spectra are not very useful for identification, and photoluminescence mixtures cannot be analyzed without previous chromatographic separation. Similarly, spectral broadening is a problem when studying photo-physical phenomena, conformational changes, or the interaction between a photoluminescence probe and the matrix of analysis.

Reducing the sample temperature often leads to spectral narrowing, which is especially pronounced in the so-called high-resolution techniques. A cryogenic approach with tremendous potential for environmental analysis is Shpol'skii spectroscopy. This technique has long been recognized for its unique capability of providing efficient and adequate resolution of polycyclic aromatic hydrocarbons (PAHs) in environmental samples without previous chromatographic separation. Since many PAHs are highly suspect as etiological agents in human cancer, their chemical analysis is of great environmental and toxicological importance.

Despite its unique capability, the widespread use of Shpol'skii Spectrometry for routine analysis of environmental samples has been hampered by several reasons. These include inconvenient sample freezing procedures, questions about signal reproducibility for calibration purposes, time-consuming spectral acquisition, sample degradation upon excitation and data analysis limited to spectral information. This seminar presents significant advances on all fronts.

I will discuss an instrumental system specifically designed to collect multidimensional data formats at liquid nitrogen (77K) and liquid helium (4.2K) temperatures. Wavelength time matrices, excitation emission matrices and time-resolved excitation emission matrices are rapidly collected with the aid of a cryogenic fiber optic probe, a pulsed laser excitation source and a multi-channel detection system. With this methodology, we have been able to fulfill a significant gap in the environmental analysis of PAHs with very similar chromatographic behaviors and almost identical mass fragmentation patterns.

BIOGRAPHY

Dr. Campiglia is a Professor at the Department of Chemistry of the University of Central Florida. His area of expertise is Analytical Chemistry. His research interests focus on the development of novel methodology for the analysis of chemicals with environmental, toxicological and forensic relevance. During his entire academic career, Dr. Campiglia has secured competitive, peer-reviewed extramural funding from the most prestigious agencies in this country, including the National Science foundation (NSF), National Institutes of Health (NIH), National Institute of Justice (NIJ) and the Department of Energy (DOE).
This level of funding has allowed him to guide numerous M.Sc. and Ph.D. Chemistry students. In the past 5 academic years (2011-16), he was the research advisor of 8 Ph.D. Chemistry graduates. All the students he has mentored have been substantially prolific, co-authoring articles in peer-reviewed, top-tier analytical chemistry journals. Within this time period (2011-16), his research group has published 43 articles in peer-reviewed journals, 2 book chapters and made 58 presentations in peer-reviewed scientific meetings.

Dr. Campiglia has been the Graduate coordinator of the UCF-Chemistry M.Sc. and Ph.D. programs since 2003. He is currently an editorial board member of the International Journal of Spectroscopy and holds a join faculty appointment at the University of Sao Paulo, Faculty of Pharmaceutical Sciences of Ribeirao Preto, Sao Paulo, Brazil.

Committee Members: Edgardo Farinas, Yong-Ick Kim, Mengyan Li,
Som Mitra, Zeyuan Qiu