



Dr. Mark Arnold

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ECE SPEAKER SERIES

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12:00pm-1:30pm

EGR BLDG 2 RM W122

NONINVASIVE SPECTROSCOPY FOR ANALYTICAL MEASUREMENTS OF GLUCOSE IN PEOPLE AND POLARIZABILITY IN NOVEL ORGANIC CO-CRYSTALLINE MATERIALS

Abstract:

Noninvasive spectroscopy provides the means to analyze a sample in a nondestructive manner. The concept is to pass a selected band of electromagnetic radiation through the sample of interest and extract the desired chemical information from an analysis of the resulting spectrum. The power of this approach is realized by collecting chemical information without modifying the sample, thereby enabling direct, in situ measurements both continuously and in real-time. The trick is to find a way to get the desired chemical information in a selective and reliable manner given the inability to use separations or reagents to enhance the measurement. This presentation will focus on two types of noninvasive spectroscopy. First, the potential of near infrared spectroscopy will be discussed for the measurement of glucose in people with diabetes as well as the measurement of cellular nutrients in bioreactors used to produce bio-therapeutics. Second, terahertz time domain spectroscopy (THz-TDS) is a relatively new spectroscopic method that produces high signal-to-noise measurements over the 0.5-100 cm^{-1} spectral range. The analytical potential of THz-TDS will be demonstrated for the measurements of the dielectric and polarizability properties of organic co-crystals.

Biography:

Mark Arnold is the Edwin B. Green Chair Professor of Laser Chemistry at the University of Iowa. He earned his doctorate in analytical chemistry from the University of Delaware in 1982 and has since been a member of the chemistry faculty at the University of Iowa. He has recently been appointed Director for the Center for Biocatalysis and Bioprocessing, a campus-wide interdisciplinary biotechnology center focusing on advancing basic and translational research associated with the broad field of biocatalytic science. Professor Arnold's research program focuses on the development of in situ chemical sensing technology designed to record concentrations of selected chemicals within a system of interest. Examples include noninvasive glucose measurements in people with diabetes and real-time monitoring of hemodialysis during treatment of people with end-stage renal failure. In the spirit of translational research and economic development, Professor Arnold has teamed with others to create ASL Analytical, Inc. for the purpose of commercializing this near infrared sensing technology for real-time monitoring and control of bioprocess platforms used in the production of a variety of commercial products, including biotherapeutics. Recently, his academic research program has expanded to include developing the analytical capabilities of terahertz time domain spectroscopy (THz-TDS) for the noninvasive characterization of novel cocrystal materials.

For additional information, please contact Dr. Wei-Chuan Shih at wshih@uh.edu