Disruptive Innovation in Geoenvironmental Sensing: Bringing Raman Spectroscopy to the Field

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This presentation will describe the development of a compact, fiber-coupled, time-resolved Raman spectroscopy system that has been designed from the outset by building on the principles of disruptive innovation. The new sensing unit employs a 6.4 kHz repetition rate, 3 J/pulse, 900 ps pulsed diode laser operating in the visible wavelength range (532 nm) to exploit the natural temporal separation between Raman and fluorescence phenomena and thereby improve the quality of obtainable Raman observations relative to continuous wave (CW) and infrared systems, particularly for analytes examined in the presence of fluorophores. By making a set of counterintuitive design choices, the system is particularly low cost for its capabilities and is intended to provide the foundation for a wide range of in-line or fieldable sensing devices that could enhance the potential and affordability of chemical analyses in fluorescence-prone contexts. The system operating principle, design, and performance will be discussed along with its advantages and tradeoffs relative to traditional Raman techniques. These capabilities are then framed in the context of the challenge of obtaining valid and representative measurements of chemicals in the geoenvironment to facilitate cost-effective characterization, monitoring, and management strategies. Applications of the new system to the analysis of edible oils, petrochemicals, and chlorinated solvents and macro-nutrients in aqueous systems will be discussed.

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3:00 - 4:00 p.m.
Room 644, Mudd

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