

Physical Chemistry Seminar



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Seeing Molecular Vibrations: Chemical Imaging for Biomedicine

Innovations in spectroscopy principles and microscopy technology have significantly impacted modern biology and medicine. While most of the contemporary bio-imaging modalities harness electronic transition (fluorescence), nuclear spin (magnetic resonance imaging) or radioactivity (positron emission tomography), vibrational spectroscopy has not been widely used yet. Here we will discuss an emerging chemical imaging platform, stimulated Raman scattering (SRS) microscopy, which can enhance the otherwise feeble spontaneous Raman eight orders of magnitude by virtue of stimulated emission. When coupled with stable isotopes (e.g., deuterium and ^{13}C) or bioorthogonal chemical moieties (e.g., alkynes), SRS microscopy is well suited for probing in vivo metabolic dynamics of small bio-molecules which cannot be labeled by bulky fluorophores. Physical principle of the underlying optical spectroscopy and emerging biomedical applications such as imaging lipid metabolism, protein synthesis, DNA replication, protein degradation, RNA synthesis, glucose uptake, drug tracking and tumor metabolism will be presented.

Monday, December 8, 2014
4:00 P.M.
2033 Young Hall