



## CHEMISTRY SEMINAR 291

### Committing SINS and Other Acts of Infrared

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#### ABSTRACT

The Advanced Light Source (ALS) is a Department of Energy User Facility that provides spectrally broad and bright light for chemical analysis and imaging of natural and engineered materials. The infrared beamlines at the ALS take advantage of these source characteristics to perform label-free spectroscopic imaging of individual living cells, novel materials, and unique samples from the bottom of the ocean to the depths of space and everywhere in between. Diffraction and the long wavelengths of infrared light have traditionally limited the spatial resolution of far-field infrared techniques to the micron scale. Synchrotron infrared nano-spectroscopy (SINS) circumvents this problem by focusing light onto a conductive tip of an atomic force microscope (AFM) scanning in nanometer proximity to the sample. The conductive tip localizes the light in the near-field region of its apex, providing wavelength-independent spatial resolution limited only by the tip radius, which is typically  $< 25$  nm. I will discuss the potential of SINS and highlight several investigations of nanoscale and surface phenomena that were previously impossible to study with other IR techniques.

#### BIO:

Hans Bechtel is a research scientist at Lawrence Berkeley National Laboratory. He received his Ph.D. in physical chemistry at Stanford University while studying the effects of vibrations on chemical reactions. His postdoctoral work at the Massachusetts Institute of Technology investigated large amplitude motion in gas-phase isomerization reactions. Currently, he manages the infrared beamlines at the Advanced Light Source, where he develops state-of-the-art infrared instrumentation and collaborates with users to measure novel samples and materials. He has co-authored over 90 peer-reviewed publications.

