Infrared Mapping Below the Diffraction Limit

Peter R. Griffiths, Professor Emeritus, Department of Chemistry, University of Idaho, Moscow, ID 83844-2343, USA

pgriff@uidaho.edu

Infrared microspectroscopy involves the measurement of infrared spectra through a reflecting microscope. The spatial resolution of such measurements is determined by the diffraction limit, which is approximately equal to the wavelength for transmission measurements and two to four times less for measurements made by attenuated total reflection (ATR). Two ways of improving significantly over this limitation will be described in this talk giving rise to a new field of infrared spectroscopy dubbed nanospectroscopy. In the first, which was developed in Germany by Keilmann and Hillenbrand and commercialized by Neaspec, the phenomenon of scattering from a sharp metallic tip is applied using a technique known as scattering near-field scanning optical microscopy (s-NSOM). The second involves a combination of atomic force microscopy and photothermal infrared spectroscopy was first developed by Dazzi in France and later commercialized by Anaspec. The spatial resolution of these techniques is better than 100nm.

Both will be described in this talk and applications of each will be shown.