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Listening to Molecular Conversations with Infrared Nanoscale Imaging BENJAMIN POLLARD, MARKUS RASCHKE, Univ of Colorado - Boulder — Nanoscale composition underlies many properties of materials through a complex relationship between structure, molecular coupling, and the response of the material as a whole to light. Infrared imaging and/or spectroscopy are ideal tools for measuring those relationships, but they are limited by the diffraction limit to a spatial resolution of several micrometers. Scattering Scanning Near-field Optical Microscopy (s-SNOM) provides the ability to perform infrared imaging and spectroscopy beyond the diffraction limit, with nanometer resolution. In s-SNOM, light is focused onto the apex of a nanoscale metallic tip. We then detect the scattered light from the tip-sample interaction in the optical near-field of the samples surface. By scanning across the sample, we map out the s-SNOM signal with nanometer spatial resolution, enabling the measurement of nanoscale structure with sensitivity to chemical variations, crystallinity, molecular orientation, and coupling between molecules or neighboring domains. For example, we can map out the electric field variation within a single nanodomain of a block copolymer. Augmented by new light sources and engineered tips, it is possible to better probe the relationship between nanoscale composition and materials function.

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