

Scanning-probe chemical nano-imaging

Ref:

H. A. Bechtel, E. A. Muller, R. L. Olmon, et al., Ultrabroadband infrared nanospectroscopic imaging, PNAS (2014).

E. A. Muller, B. Pollard, and M. B. Raschke, Infrared Chemical Nano-Imaging: Accessing Structure, Coupling, and Dynamics on Molecular Length Scales, J. Phys. Chem. Lett. DOI: 10.1021/acs.jpclett.5b00108 (2015).

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Nano IR (s-SNOMS), at ALS

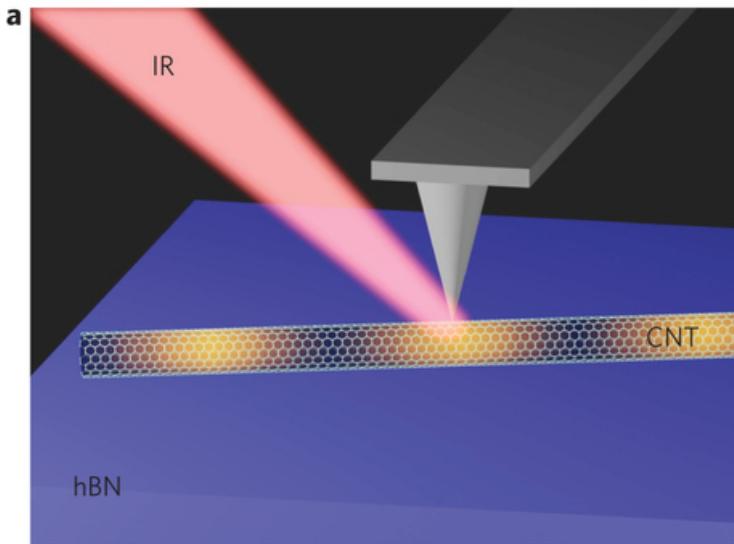
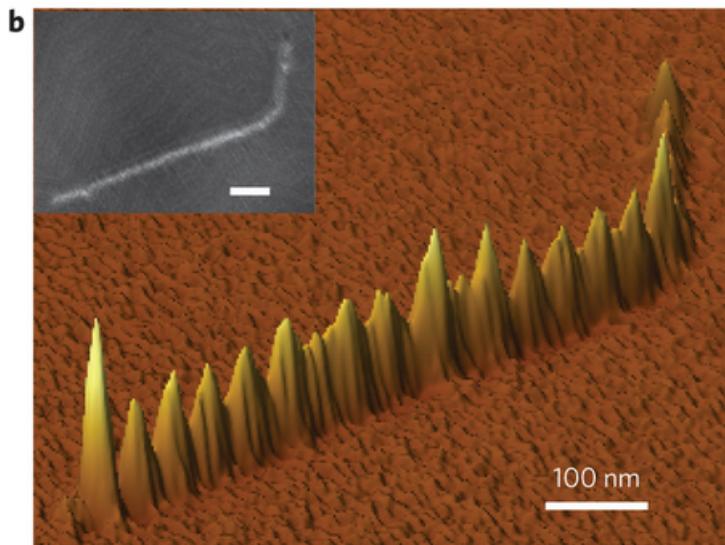


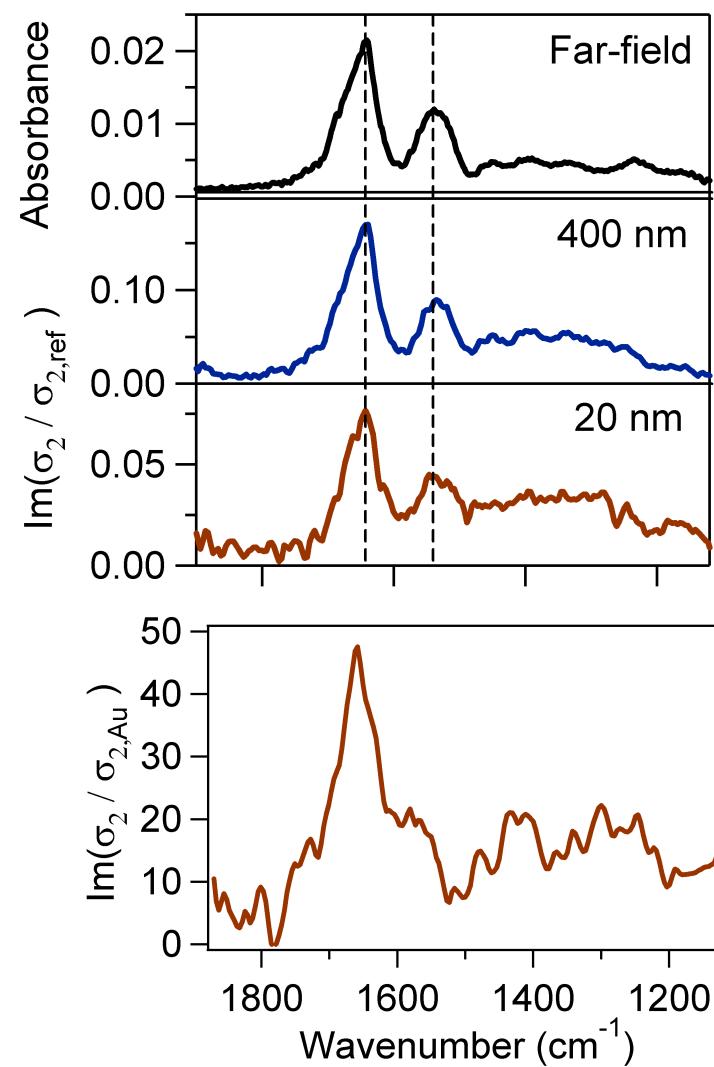
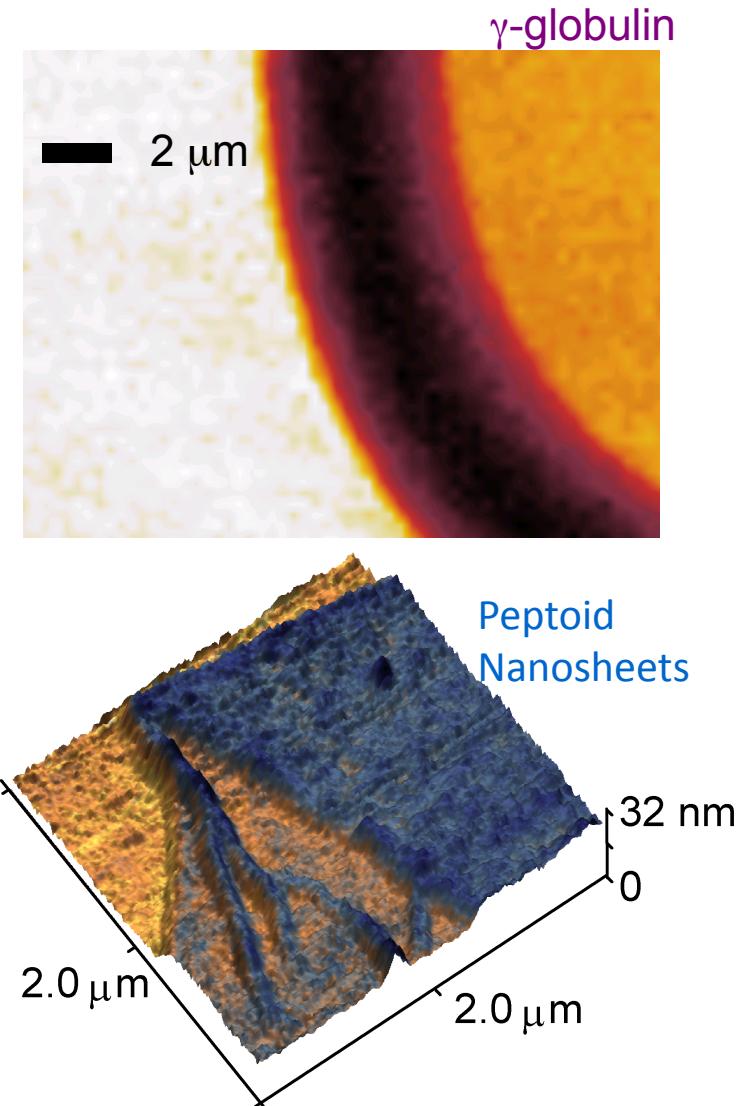
Illustration of principal of s-SNOM. Infrared (IR) light is focused onto the apex of a metal-coated AFM tip, the large near-field momentum of which enables optical excitation of plasmons in the carbon nanotube (CNT) on a hBN substrate. Interference between the tip-excited plasmon wave and its reflection from the nanotube end leads to periodic modulation of tip-scattered infrared radiation measured by an HgCdTe detector in the far field.

1-dim plasmon in carbon nano-tube, s-SNOMS



Three-dimensional plot of the near-field scattering intensity (height) along a representative SWNT. Prominent modulation of the infrared scattering intensity from the one-dimensional plasmon can be observed over the whole nanotube. Inset: AFM topography image of the same SWNT. Scale bars, 100 nm.

Protein sensitivity, s-SNOMS at ALS



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