Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Optical properties of the tips for apertureless near-field microscopy[1] DISHA MEHTANI, N. LEE, R. D. HARTSCHUH, A. KISLIUK, M. D. FOSTER, A. P. SOKOLOV, I. TSUKERMAN, The University of Akron — Apertureless near-field optical microscopy is based on the enhanced optical signal in the vicinity of a metal or metal-coated tip via surface plasmon generation in the metal. Resonant excitation of the plasmons is crucial for maximizing enhancement under the tip. However, it remains a challenge to measure the optical properties of the nanoscale apex of a tip with a radius much smaller than the wavelength of light. We have developed a system to measure optical properties of tips based on the principle of total internal reflection microscopy. Optical resonance spectra of silver- and gold-coated tungsten and silicon nitride tips exhibit a dependence on the metal deposited. We also measured the wavelength dependence of tip-enhanced Raman signal. The enhancement of the Raman signal for silicon with gold-coated silicon nitride tips was found to be ~ 3 times stronger for a wavelength of 647 nm than for 514.5 nm. The former is closer to the plasmon resonance observed for this tip at $\sim$680 nm. Additional examples correlating enhancement with resonance excitation will be presented.

[1]This research was supported by an NSF-MRI grant (DMR-0215966) and Air Force Research Laboratory

Disha Mehtani

Date submitted: 30 Nov 2005 Electronic form version 1.4