Optical properties of the tips for apertureless near-field microscopy\textsuperscript{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 $\sim 3$ 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.

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