

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

A UHV-LT-STM System for Optical Experiments¹ DAVID R. DAUGHTON, DONGHUN LEE, JAY A. GUPTA, The Ohio State University — The combination of optical techniques and scanning tunneling microscopy (STM) provides insight into a diverse set of physical processes including surface chemistry, surface-photon interactions, and spin scattering in semiconductors. We present a novel cryogenic temperature, ultrahigh vacuum STM which incorporates a maneuverable, high numeric aperture lens, with sub-5 micron spot size, in proximity to the tunnel junction. Modifications to our microscope have been made to improve upon the 12.5 K base temperature and 10 pm tip stability. Our initial efforts are focused on studies of photo-chemical reactions and chemical identification by tip-enhanced Raman spectroscopy (TERS). UHV deposition techniques have been developed for a variety of molecules well suited for TERS studies including azulene, azobenzene, methylene blue, and C60. Electrochemically and chemically-etched Ag and Au tips are optimized for field enhancement with characterization by scanning electron microscopy and collection of the plasmon emission from the tip. Raman spectra have been collected from molecule-coated tips in vacuum to test the optical setup for TERS. <http://www.physics.ohio-state.edu/~jgupta>

¹Supported by the Beckman Foundation.

David R. Daughton
The Ohio State University

Date submitted: 26 Nov 2007

Electronic form version 1.4