Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Laser-Induced, Local Oxidation of Copper Nanoparticle Films During Raman Measurements ANGELA R. HIGHT WALKER, GUANGJUN CHENG, IRENE CALIZO, National Institute of Standards and Technology (NIST), Gaithersburg, MD 20899 — The optical properties of gold and silver nanoparticles and their films have been thoroughly investigated as surface enhanced Raman scattering (SERS) substrates and chemical reaction promoters. Similar to gold and silver nanoparticles, copper nanoparticles exhibit distinct plasmon absorptions in the visible region. The work on copper nanoparticles and their films is limited due to their oxidization in air. However, their high reactivity actually provides an opportunity to exploit the laser-induced thermal effect and chemical reactions of these nanoparticles. Here, we present our investigation of the local oxidation of a copper nanoparticle film induced by a visible laser source during Raman spectroscopic measurements. The copper nanoparticle film is prepared by drop-casting chemically synthesized copper colloid onto silicon oxide/silicon substrate. The local oxidation induced by visible lasers in Raman spectroscopy is monitored with the distinct scattering peaks for copper oxides. Optical microscopy and scanning electron microscopy have been used to characterize the laser-induced morphological changes in the film. The results of this oxidation process with different excitation wavelengths and different laser powers will be presented.

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Date submitted: 28 Nov 2010 Electronic form version 1.4