Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Rhodium Nanoparticles for Ultraviolet Plasmonics ANNE WATSON, XIAO ZHANG, Duke University, RODRIGO ALCARAZ DE LA OSA, JUAN SANZ, FRANCISCO FERNANDEZ, FERNANDO MORENO, University of Cantabria, GLEB FINKELSTEIN, JIE LIU, HENRY EVERITT, Duke University — We introduce the non-oxidizing catalytic noble metal rhodium for ultraviolet (UV) plasmonics. 8 nm tripod-shaped planar Rh nanoparticles (NPs) were synthesized by a modified polyol reduction chemistry. They have a calculated local surface plasmon resonance (LSPR) near 330 nm. To illustrate the UV plasmonic performance of Rh, p-aminothiophenol (PATP) was attached to the Rh NPs and enhanced Raman and fluorescence were observed upon UV illumination. The PATP Raman spectra produced by UV and visible excitation were respectively in and out of resonance with the Rh NP LSPR. This clearly revealed resonant spectral enhancement in the UV and accelerated photo-damage produced by intense local fields concentrated near the plasmonic Rh NPs. Simultaneously, surface enhanced fluorescence increased during 13 minutes of resonant UV illumination, providing direct evidence of charge transfer from the Rh NPs. The combined local field enhancement and charge transfer demonstrate essential steps toward plasmonically-enhanced ultraviolet photocatalysis. Due to its high chemical stability and strong plasmonic effect, Rh nanoparticles could find wide applications in UV plasmonics.

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Date submitted: 14 Nov 2014 Electronic form version 1.4