Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Simulations of surface plasmons launched on gold nanogratings IAN WHITE, JENNIFER STEELE, Department of Physics and Astronomy, Trinity University — A gold nanograting with a dielectric coating containing fluorescent molecules can enhance the intensity of fluorescence at certain frequencies due to the excitation of surface plasmons. Fluorescence is enhanced by two mechanisms: (1) an enhanced electromagnetic field at the excitation frequency of the fluorophores and (2) surface plasmon modes providing extra decay channels for fluorophores. Previous studies on corrugated film gratings show that coupling to higher diffraction order plasmons occur with lower efficiency. We find that for wire gratings, fluorophores couple to higher order plasmon modes on both sides of the gold wires with uniform efficiency. We also measure directional enhanced fluorescence on both the active (reflection) and substrate (transmission) side of the gratings. In this work, gold nanogratings with a dielectric coating were modeled using COMSOL Multiphysics software, which solves Maxwell's equations in the region of the grating. As the thickness of the dielectric layer containing the fluorophores is increased, the plasmon modes shift. The behavior of the gratings was simulated as a function of height of the gold wires and thickness of the dielectric coating. These simulations will inform future experiments.

Ian White
Department of Physics and Astronomy, Trinity University

Date submitted: 19 Nov 2011 Electronic form version 1.4