## Abstract Submitted for the NEF12 Meeting of The American Physical Society

Mie Resonant Absorption in Periodic Si Nanopillar Arrays<sup>1</sup> FRANCISCO BEZARES, OREST GLEMBOCKI, JAMES LONG, RONALD REN-DELL, Naval Research Laboratory, RICHARD KASICA, National Institute of Standards and Technology, LORETTA SHIREY, Naval Research Laboratory, JUN-PENG GUO, University of Alabama at Huntsville, JOSHUA CALDWELL, Naval Research Laboratory — Although Mie resonators possess characteristics that offer many advantages in the development of novel photonic devices and have been widely studied, the extent to which they interact collectively as well as the relationship between their near- and far-field properties is relatively unexplored. In this talk, we report on the results of experiments in which bright field reflectance was carried out on periodically-arrayed Si nanopillars, fabricated via electron-beam lithography, to study their collective and far-field optical properties. In addition,  $\mu$ -Raman scattering measurements demonstrated a clear enhancement in both the incident laser absorption and the Raman scattering from the silicon nanopillars when the incident laser line and the Mie resonance of a nanopillar were coincident. This is directly correlated to electromagnetic near-field enhancement, as a function of nanopillar diameter and array pitch. Finite Element and Finite-Difference Time Domain simulations were carried out and provide valuable insight into the nature of these dielectric resonances, the mechanism by which the Raman signal is enhanced and are in good agreement with experimental results.

<sup>1</sup>FB is an ASEE Postdoctoral Fellow with residence at the Naval Research Laboratory

> Francisco Bezares Naval Research Laboratory

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