Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Cavity resonances of metal-dielectric-metal nanoantennas BHUWAN JOSHI, QI-HUO WEI, Liquid Crystal Institute, Kent State University — We numerically study the optical properties of metal-dielectric-metal nanoantennas. The nanoantennas consist of two metal nanocylinders stacked vertically with a dielectric disk spacer. The numerical analysis using finite difference time domain method (FDTD) shows that nanoantennas exhibit two types of resonances when the gap between the metal cylinders is below 5nm. One of the resonance corresponds to the antenna resonance, generates a peak in scattering spectra and the other corresponds to cavity resonance, produces multiple dips in the scattering spectra. The multiple dips are corresponding to the different cavity resonant modes; the resonant frequencies of these modes depend upon the gap size between the cylinders. It is found that as the gap size decreases, enormous electric field enhancement can be generated inside the cavity. For a particular gap size, electric field enhancement can be maximized by varying diameter of the dielectric disk and optimum condition is obtained when dielectric disk diameter is roughly half that of the metal cylinders. The cavity resonance can be explained as interference of gap surface plasmons between two metal cylinders.

Bhuwan Joshi
Liquid Crystal Institute, Kent State University

Date submitted: 18 Nov 2008 Electronic form version 1.4