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Optical Response of Metal Nanoantennas to Femtosecond Pulses[1]

SUSHMITA BISWAS, Dept of Physics and Astronomy, Univ of Pittsburgh, ALBERT HEBERLE, Dept. of Physics and Astronomy, Dept. of Electrical and Computer Engineering, University of Pittsburgh — Nanoscale metal antennas are promising devices for focusing light down to dimensions much smaller than the wavelength of light. This focusing can lead to strong optical enhancement of the response of single molecules or quantum dots placed in the antenna gap, as well as strong nonlinearities. The optical response of such antenna, however, is not well understood yet. Here, we will present results of our investigations of the linear and nonlinear optical response of silver nanoscale bowtie antennas to excitation with near-infrared pulses from a femtosecond Ti:sapphire laser. The antennas were fabricated with electron beam lithography and a lift-of process on glass substrates and semiconductor materials. They have lengths of a few hundred nanometers and gaps between 10 and 100 nanometers. We will discuss polarization dependence of the excitation sensitivity, second harmonic generation and other nonlinear effects.

References:
[1] P. Muhlschlegel et al., Science ,1607(2005).
[2] J.N. Farahani et al., Phys. Rev. Lett. 95,017402(2005).

[1]NSF-DMR PD 03-1710

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