Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Terahertz Nanogap Plasmonics: Giant Field Enhancement M. A. SEO, H. R. PARK, S. M. KOO, O. K. SUWAL, S. S. CHOI, N. K. PARK, D. S. KIM, CENTER FOR SUBWAVELENGTH OPTICS TEAM — We show that a nanogap dividing two conducting planes can efficiently transmit terahertz electromagnetic waves with wavelengths in the millimeter range. Terahertz time domain spectroscopy is performed to probe transmittance over a frequency range of 0.1 THz to 1.5 THz. It was found that the transmittance continues to increase as the frequency decreases with a dependence of 1/f. The area-normalized transmittance, which is equivalent to the level of field enhancement, reaches the value of 800 at 0.1 THz for a sample with a 70 nm gap. Combined with the 1/f dependence, this indicates that strong local resonance is not a prerequisite for a large field enhancement. It is shown that the accumulation of charges at metal edges via light-induced currents creates a large horizontal electric field, which in effect attracts the incoming light. The enhanced field in the gap fully scatters towards the far-field because there exists no cut-off. With the broad 1/f spectral response, this structure can be an excellent launching pad for inducing terahertz nonlinearity, nano-particle detection, and for surface enhanced Raman scattering.

M. A. Seo

Date submitted: 20 Nov 2008 Electronic form version 1.4