Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Plasmon-mediated polarization-tuneable enhancement of optical absorption in a polymer film[1] EDWARD J. OSLEY, PAUL G. THOMPSON, CLAUDIU G. BIRIS, NICOLAE C. PANOIU, PAUL A. WARBURTON, University College London — We have fabricated and characterized arrays of nanoscale apertures displaying polarization-tuneable localized surface plasmon (LSP) resonances in the infrared. Arrays of asymmetric cruciform apertures were milled in a gold film using a focused ion beam and subsequently coated with Poly(methyl methacrylate) (PMMA). The aperture geometry is designed so that for a certain polarization state of the incident wave the LSP resonance occurs at the same wavelength as the C=O bond absorption peak in PMMA. The nanostructured film results in an order of magnitude increase in the absorption in PMMA by comparison with a continuous film. By changing the in-plane electric-field polarization of the incident light the LSP resonance shifts away from the PMMA absorption peak, allowing us to quantify the role of plasmonic field-focussing on infrared optical absorption in the polymer film. Numerical simulations show that the increased optical absorption is due to the field enhancement both inside the apertures as well as in their close proximity. We will discuss how this technique may be applied to studies of plasmon-mediated field focussing in other materials including photovoltaic materials.

[1]Work supported by EPSRC

Edward J. Osley
University College London

Date submitted: 18 Nov 2010 Electronic form version 1.4