Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Electrical Detection of Surface Plasmon Resonance in Individual Gold Nanowires CHRISTOPHER LAFRATTA, Univeristy of Maryland College Park, DANIEL LIM, JULIET ZNOVENA, University of Maryland College Park, LINJIE LI, University of Maryland College Park, JOHN FOURKAS, University of Maryland College Park — Plasmon absorption in individual gold nanowires has been detected electrically. Gold nanowires, electrochemically synthesized in polycarbonate templates with diameters of 40 nm and lengths of 5 μm, are connected under an optical microscope using multiphoton absorption polymerization (MAP). MAP uses a prepolymer acrylic based resin and a focused ultrafast laser to stereolithographically pattern with sub-micron resolution. For this experiment, nonconducting acrylate leads are made by MAP to connect to a single gold nanowire. These polymer leads can then be made conductive by surface modification followed by electroless copper enhancement. In this way the resistance of a single nanowire can be measured in a four-probe scheme. The gold rod can then be optically excited near its plasmon absorption peak. The excitation is quickly converted to heat, which is observed as an increase in resistance. This electrically detected plasmon absorption has been found to be linearly dependent on light intensity and is also sensitive to the direction of the polarization with respect to the rod. This non-optical plasmon detection is of basic interest but may be applicable for intrabeam polarization detection or electrical detection of biomolecules.

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Date submitted: 30 Nov 2005 Electronic form version 1.4