Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Measurements of Effective Schottky Barrier in Inverse Extraordinary Optoconductance Structures[1] L.C. TRAN, F.M. WERNER, S.A. SOLIN, Washington University in St. Louis, ADAM GILBERTSON, L.F. COHEN, Imperial College London — Individually addressable optical sensors with dimensions as low as 250nm, fabricated from metal semiconductor hybrid structures (MSH) of AuTi-GaAs Schottky interfaces, display a transition from resistance decreasing with intensity in micron-scale sensors (Extraordinary Optoconductance, EOC) to resistance increasing with intensity in nano-scale sensors (Inverse Extraordinary Optoconductance I-EOC). I-EOC is attributed to a ballistic to diffusive crossover with the introduction of photo-induced carriers and gives rise to resistance changes of up to 9462% in 250nm devices. We characterize the photo-dependence of the effective Schottky barrier in EOC/I-EOC structures by the open circuit voltage and reverse bias resistance. Under illumination by a 5 mW, 632.8 nm HeNe laser, the barrier is negligible and the Ti-GaAs interface becomes Ohmic. Comparing the behavior of two devices, one with leads exposed, another with leads covered by an opaque epoxy, the variation in Voc with the position of the laser can be attributed to a photovoltaic effect of the lead metal and bulk GaAs. The resistance is unaffected by the photovoltaic offset of the leads, as indicated by the radial symmetry of 2-D resistance maps obtained by rastering a laser across EOC/IEOC devices.

[1]SAS has a financial interest in PixelEXX, a start-up company whose mission is to market imaging arrays.

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Date submitted: 08 Nov 2012 Electronic form version 1.4