

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Measurement and analysis of extraordinary electroconductance in Ti-GaAs hybrid structures¹ S.A. SOLIN, A.K.M. NEWAZ, Y. WANG, J. WU, Washington University in St. Louis, W.-J. CHANG, V.R. KAVASSERI, I.S. AHMAD, I. ADESIDA, R. BASHIR, University of Illinois at Urbana-Champaign — We present a comprehensive study of a new phenomenon, extraordinary electroconductance (EEC), in microscopic and mesoscopic metal-semiconductor hybrid structures (MSH) at room temperature with different geometrical characteristics. Our artificially designed MSH structures show highly efficient external electric field sensing properties not exhibited by bare semiconductor structures. The EEC device has been fabricated from a GaAs epitaxial layer with a Ti/Au shunt. When subject to an external electric field it gives a maximum 5.2% EEC effect corresponding to an external electric field resolution of 3.05V/cm at a bias field of 2.5 KV/cm. Moreover, the study reveals a strong dependence of the transport properties on the geometry of the MSH. An analytical 2-layer model is developed which provides good agreement with the experimentally observed data.² We propose that scaled down nanoscopic EEC sensor arrays can be used as a novel technique for imaging the charge distribution on a single cell surface in real time.

¹Supported by the NIH, the NSF, and the WU CMI.

²Y. Wang, *et. al.*, **App. Phys. Lett.**, 92, 262106 (2008)

A.K.M. Newaz
Washington University in St. Louis

Date submitted: 11 Nov 2008

Electronic form version 1.4