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Extraordinary Electrical Conductance in GaAs-In Hybrid Structures[1] YUN WANG, K.A. WIELAND, S.A. SOLIN, Washington University in St.Louis — Following the demonstration of extraordinary magnetoresistance (EMR)in semiconductor-metal hybrids[2], it has been realized that EMR is but one example of a general class of EXX phenomena that can be geometrically enhanced by the judicious choice of sample geometry. Two other EXX phenomena reported recently are extraordinary piezoconductance, EPC, and extraordinary Optoconductance, EOC. Here we address a fourth EXX phenomena, extraordinary electrical conductance, EEC. We develop a new design concept for an EEC sensor, which is a van der Pauw plate structure of Si-doped GaAs with a non-magnetic metallic shunt on top so that the external E field is perpendicular to the interface. EEC arises from the current redistribution between the shunt and GaAs when an external E field lowers the Schottky barrier at the interface. This allows more electrons to tunnel through and results in a larger conductance. We compare the response of a sample with a Schottky barrier to an unshunted sample and to a shunted sample with an Ohmic contact. The conductance of each sample was measured as a function of temperature, bias current and external perturbing field. In addition, we will compare the EEC structure to the Schottky diode structure to illustrate the advantages of an EEC sensor for static charge imaging.

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[2]S.A. Solin et al., Science **289**,1530 (2000).

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