Abstract Submitted for the MAR09 Meeting of The American Physical Society

Generation and transport of photo-excited carriers in diamond¹ F.J. HEREMANS, G.D. FUCHS, C.F. WANG, D.D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara, 93106, RONALD HANSON, Kavli Institute of Nanoscience, Delft University of Technology, The Netherlands — Photo-excited carrier transport in diamond has generated substantial interest in the past few years. The combination of high thermal conductivity, large band-gap, and large dielectric breakdown make diamond attractive in optoelectronic, high-power and high-frequency applications. Here we present measurements of electrical conduction by sub-band gap photo-excited carriers between metallic gates lithographically patterned on the surface of single-crystal type Ib diamond. The time-dependent charging and discharging photo-currents follow a "stretched exponential" form, which results from a trap state conduction mechanism mitigated by a local space charge. We also perform photo-excited magneto-transport as well as energy-dependant photo-conduction measurements to investigate the detailed origins of this sub-gap photo-excited conduction.

¹This work was supported by AFOSR and ARO.

Joseph Heremans Center for Spintronics and Quantum Computation, University of California, Santa Barbara, 93106

Date submitted: 01 Dec 2008 Electronic form version 1.4