## Abstract Submitted for the MAR09 Meeting of The American Physical Society

Anomalously high conductivity in bromine-intercalated graphite<sup>1</sup>

A.F. HEBARD, S. TONGAY, J. HWANG, D.B. TANNER, D. MASLOV, University of Florida — We have found that when graphite is intercalated with bromine, the ab-plane (c-axis) conductivity sharply increases (decreases). Characterization of the Br intercalated samples by exposure time, weight uptake, sputter Auger spectroscopy and X-ray diffraction show a Br concentration that is uniformly distributed within a graphite host having an expanded interplanar spacing  $d_c$ . The ab-plane conductivity is enhanced by several orders of magnitude in the temperature range from 300 K down to 1.7 K and shows no sign of saturation with increasing Br concentration. Hall measurements confirm a pronounced increase in the density of negative carriers consistent with an increased optical reflectivity (below 3000 cm<sup>-1</sup>). The inferred plasma frequencies and extrapolated dc conductivities are consistent with the transport measurements. The diamagnetic susceptibility decreases with increasing Br concentration and follows a temperature dependence from which a Fermi energy that increases with increasing Br concentration is extracted. By increasing  $d_c$ , the ab-plane conductivity of Br intercalated graphite begins to resemble the additive contributions of parallel connected doped graphene sheets and thus has implications for carbon based electronics.

<sup>1</sup>Work spported by NSF #DMR-0704240 and DOE #DE-FG02-OLER45984.

A. F. Hebard University of Florida

Date submitted: 23 Nov 2008 Electronic form version 1.4