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Magnetization Study of Sulfur-doped Graphitic Nano-platelets and Single Walled Carbon Nanotubes J. ZHU, L. OLIVEIRA, R. PODILA, Department of Physics and Astronomy, Kinard Lab of Physics, Clemson University, Clemson, SC 29634-0978, S. NEELESHWAR, Y.Y. CHEN, Institute of Physics, Academia Sinica, Taipei 11529, Taiwan, J. HE, M. SKOVE, A.M. RAO, Department of Physics and Astronomy, Kinard Lab of Physics, Clemson University, Clemson, SC 29634-0978, DEPARTMENT OF PHYSICS AND ASTRONOMY, CLEMSON UNIVERSITY COLLABORATION, INSTITUTE OF PHYSICS, ACADEMIA SINICA COLLABORATION — Recently we investigated the magnetic behavior of as-prepared and sulfur doped chemically exfoliated graphene nano-platelets (GNPs) and single walled carbon nanotubes (SWCNTs). The doping was achieved by annealing desired carbon nanostructures with 0, 1.0, 1.5 and 3 at% sulfur in an evacuated quartz tube at 1000 °C for 1 day, followed by multiple rinsing in alcohol and drying in vacuum to remove excess sulfur. The isothermal M vs. H as well as the temperature-dependent M vs. T measurements were obtained using a vibrating sample magnetometer. We found that sulfur doping drastically changes the magnetic behavior of the as-prepared samples (both SWCNTs and GNPs). The results of zero-field-cooling (ZFC) and field-cooling (FC) in M vs. T measurements indicated the existence of large amount of coupled super-paramagnetic domains, along with antiferromagnetic domains. The saturation magnetization decreased in S doped GNPs, while a contrasting trend was observed in S doped SWCNTs. The role of edge states and structural defects in carbon nanostructures in the observed magnetic properties will be discussed.

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