Characterisation of a New Graphite Substrate for Measurements of Adsorbed Gases

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New graphitic substrates for the study of 2D adsorbed systems have been developed, offering superior properties to those presently available. The material is based around a natural graphite, intercalated to form a potassium ammonia intercalation compound, and exfoliated. The exfoliation process has been studied systematically and is carefully controlled. By exfoliating and recompressing graphite we form networks of mesoscopic graphite platelets with average sizes of 50 to 150 nm. Chemical analysis of our substrates shows fewer magnetic impurities than grafoil GTA, and no residue from the intercalation process.
Rocking curves performed on the 002 x-ray diffraction line are used to estimate the mosaic spread of samples, and line broadening in the 110 diffraction lines is used to infer in plane crystallite size. Thermodynamic analysis of nitrogen adsorption isotherms at 74 K is used to derive adsorption potential distributions which are related to surface quality.
We also present electrical transport and magnetisation measurements on exfoliated graphite in the temperature range of 1.8 to 300 K and magnetic fields up to 9 T. A strong dependence of the in-plane resistivity and magnetoresistance on the degree of exfoliation and mean platelet size is observed. The influence of exfoliation on the band structure was studied by means of de Haas-van Alphen and Hall-effect measurements.

Section: DV - Devices

Keywords: exfoliated graphite, 2D helium film, adsorbed gases