Fabrication of graphite substrates to study two dimensional helium films

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The homogeneity of a substrate is important to investigate the quantum properties of helium films at low temperatures. For instance, the surface heterogeneities in Grafoil substrate induces the broadening of heat capacity near the density of the $\sqrt{3}$ x $\sqrt{3}$ [1]. The heat capacity of helium films adsorbed on a ZYX substrate shows much sharper transition at the critical density. We will report preliminary study on making homogeneous graphite substrate with large surface area and well defined orientation. A highly oriented pyrolitic graphite(HOPG) is used as a base material. HOPG is intercalated by potassium with a two-zone vapor transport technique and then exfoliated by heating slowly the intercalated graphite to 1000 °C.

1. S. Nakamura et al. JLTP v171, p711 (2013).

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