Ballistic Transport of Narrow-Channeled Epitaxial Graphene

TIAN SHEN, PEIDE YE, YANG SUI, YANQING WU, MIKE CAPANO, JAMES COOPER, LEONID ROKHINSON, Purdue University, LLOYD ENGEL, NHMFL — Large-area epitaxial graphene film by thermal decomposition of SiC wafer has provided the missing pathway to a viable electronics technology. Low temperature magneto-transport properties of narrow-channeled epitaxial graphene films with dimension of 100 nm to 500 nm, formed on the carbon face of semi-insulating 4H-SiC substrates in an Epigress VP508 SiC hot-wall chemical vapor deposition reactor, are systematically studied. Typical quasi-ballistic transport features, such as negative magnetoresistance or 1D weak localization, aperiodic magnetoresistance fluctuations, periodic magneto-resistance oscillations associated with channel geometry, bend resistance and quench of Hall effect associated with nanoscale junctions, are all observed. Magneto-resistance, being independent on parallel magnetic field up to 18 T, verifies the 2D nature of epitaxial graphene. 2. C. Berger et al., Science 312, 1191 (2006). 

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