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Large Scale Graphene Synthesized on Metal and Transferred to Insulators: Material and Electronic Properties YONG P. CHEN, H. CAO, D. PANDEY, I. CHILDRES, D. ZEMLYANOV, V. DRACHEV, R. REIFENBERGER, Purdue University, Q. YU, S. SIRIPONGERT, S. PEI, University of Houston, J. LIAN, RPI, H. LI, University of Missouri — We report a systematic study of the material and electronic properties of large scale graphene films grown on metal then transferred to insulator substrates. Few-layer graphene films as large as several cm's in size are grown by cooling-induced surface segregation on Ni under ambient pressure (Q. Yu *et al.*, APL **93**, 113103 (2008)). The Ni is subsequently etched by acid and graphene film transferred on thin SiO_2 on doped Si wafer. TEM and STM images show the expected graphitic lattice structure locally with atomic resolution. XPS and Raman spectroscopies further confirm the high quality of transferred graphene films. At larger scale, various SPM and optical imaging reveal non-uniform thickness and considerable height fluctuation, with the film consisting with domains ($\sim$1 μm in size) separated by elevated ridges. Using the doped Si as backgate, we observe moderate field effect in such transferred graphene films. Magnetotransport at variable temperatures show negative magnetoresistance at low magnetic field and characteristic features of weak localization in graphene, allowing us to extract information on carrier scattering in such large scale graphene.

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