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Synthesis of Large-grain, Single-crystalline Graphene by a Novel Chemical Vapor Deposition Method and Electrical properties YI ZHANG, LUYAO ZHANG, PYOJAE KIM, MINYUAN GE, CHONGWU ZHOU, University of Southern California — Graphene, a two dimensional, honey comb arrangement of carbon atoms has drawn significant attention with its interesting physical and electronic properties. Tremendous efforts have been made to synthesize large-scale, high quality, single-layer graphene (SLG). Based on previous studies, CVD graphene with large grain size (less grain boundaries) and low defect density would show an enhancement of device mobility. Here we report a novel CVD method to synthesize graphene with grain size up to several hundreds of micrometers on copper foil. Raman surface map of individual graphene grain indicated that the large-grain graphene was single-layer and with very low defect density. Selected Area Electron Diffraction (SAED) also confirmed that the each individual graphene island was a single grain. Morphology study was also performed to investigate the relation between the shape of graphene and growth parameters. Furthermore, the large-grain graphene was transferred to SiO_2/Si for the field effect study, and the device mobility derived from the large-grain graphene was $\sim$ 5,200 $cm^2/V/s$. The achieved high device mobility indicates that the large-grain single-crystalline graphene is of great potential for graphene-based nanoelectronics.

Yi Zhang
University of Southern California

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