Recent progresses in the CVD growth of graphene for electronic applications

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The field of graphene and related materials has progressed steadily, bringing about significant development in production and processing methods. The growth of graphene by chemical vapor deposition (CVD) is the most advanced technique for the fabrication of crystalline graphene over wafer-scale areas. CVD graphene grown on Cu is usually polycrystalline, but it is possible to tune the nucleation rate and growth kinetics to obtain graphene single crystals. This is usually achieved by adding controlled amounts of oxygen during the process: The pre-oxidation of the Cu catalyst is effective in passivating active nucleation sites on the surface (thus reducing the nucleation density), while an oxygen supply during CVD seems to ease the carbon precursor dissociation (thus speeding up the growth rate). By carefully balancing these two effects, mm-sized single-crystal graphene can be grown by CVD on Cu foils. Understanding the initial stages of the graphene growth is a key towards the full control on the process, which is required for reproducible device fabrication. In this talk, I will show how such advancements in production techniques translate to the fabrication of various electronic devices, such as solar cells and biosensors.