Twisting Bilayer Graphene Superlattices

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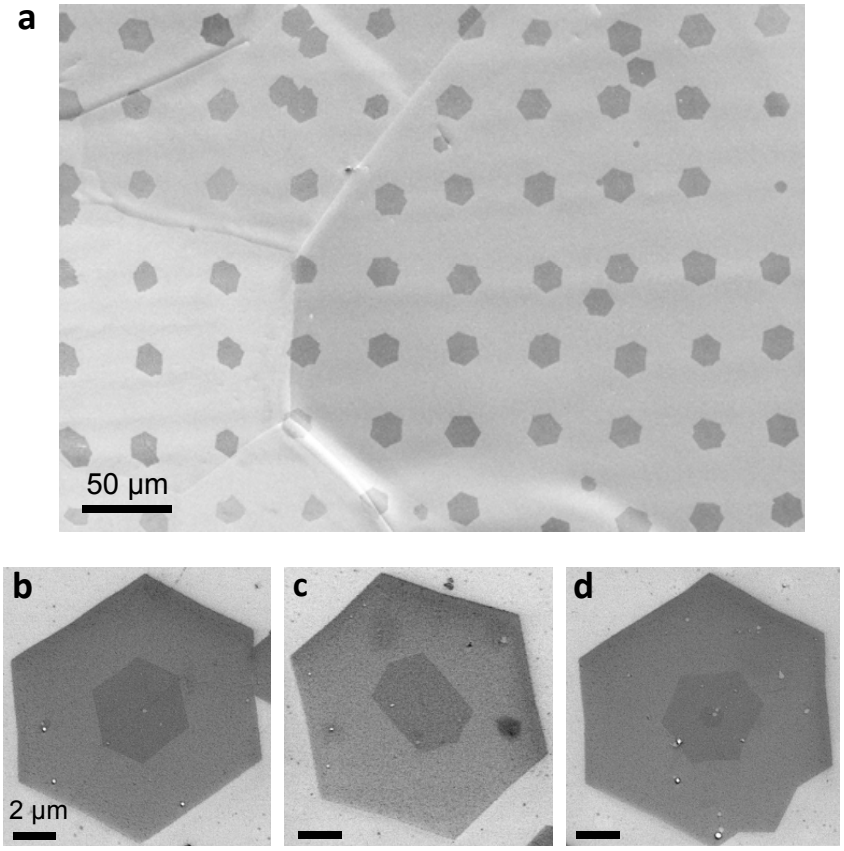
ABSTRACT

Bilayer graphene is an intriguing material in that its electronic structure can be altered by changing the stacking order or the relative twist angle, yielding a new class of low-dimensional carbon system. Twisted bilayer graphene can be obtained by (i) thermal decomposition of SiC; (ii) chemical vapor deposition (CVD) on metal catalysts; (iii) folding graphene; or (iv) stacking graphene layer one atop the other, later of which suffers from interlayer contamination. Existing synthesis protocols, however, usually result in graphene with polycrystalline structures. The present study investigates bilayer graphene grown by ambient pressure CVD on polycrystalline Cu. Controlling the nucleation in early stage growth allows the constituent layers to form single hexagonal crystals. New Raman active modes are shown to result from the twist, with angle determined by transmission electron microscopy. The successful growth of single-crystal bilayer graphene provides an attractive jumping-off point for systematic studies of interlayer coupling in misoriented few-layer graphene systems with well-defined geometry.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50 μm
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