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Triggering the Growth of Large Single Crystal Graphene by Chemical Vapor Deposition TIANRU WU, HAOMIN WANG, GUQIAO DING, DA JIANG, XIAOMING XIE, MIANHENG JIANG, State Key Laboratory of Functional Materials for Informatics, SIMIT, CAS — Graphene, a monolayer of sp2 carbon atoms, has been attracting great interests as an ideal two dimensional crystalline material. Fabrication technique for wafer scale graphene via chemical vapor deposition (CVD) was developed several years ago [1]. However, large scale graphene films from CVD method so far are found to be polycrystalline, consisting of numerous grain boundaries, which greatly degrade the electrical and mechanical properties of graphene [2]. Recently, we obtained hexagonal-shaped single-crystal monolayer graphene domains (∼1.2 mm) [3]. We adapted a strategy to synthesize larger size single crystal grains by regulating the supply of reactants and hytrogen. Nucleation density can be decreased to less than 1000 nuclei /m2. Gradually increase in the supply of reactants could break the equilibrium of growth and etching at the edge of hexagonal-shaped graphene grains. It drives the reaction toward quick growth of graphene domains during the whole CVD process. The graphene grains we obtained show high crystalline quality with high mobility of ∼13000 cm2V-1s-1, which is comparable to that of exfoliated graphene. The results achieved will definitely benefit for further practical application of graphene electronics. [1] Li X S, et al. Science, 2009, 324: 1312∼1314. [2] Huang PY, et al. Nature 2011, 469: 389-392. [3] Wu T R, et al. Adv. Func. Mater. 2012, Doi: 10.1002/adfm.201201577.

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