# Chemical vapor deposition growth of large grapheme single crystal from ethanol

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Ethanol as a precursor has proven effective in the chemical vapor deposition (CVD) synthesis of graphene on both Ni foils and Cu capsule substrates. For applications of graphene in field effect transistors or as transparent conducting electrodes, larger singe-crystal graphene without any grain boundaries shows superior electrical performance and has attracted enormous interests. Here we report a protocol to synthesize large graphene single crystals (up to 600 μm) using ethanol as precursor on commercially-available polycrystalline Cu foils. We explored the mechanism by studying the influences of different growth parameters such as pressure, flow rate and temperature. Low partial pressure and low flow rate of ethanol is essential in achieving low nucleation density over the metal surface and therefore large graphene grains can be obtained. We found that growth temperature dramatically affects the crystallinity and the growth rate of graphene grains. Moreover, this CVD growth of large graphene single crystals involves no electro-polishing or annealing treatments to the metal surface, presenting a significant simplification to the current graphene synthesis process.

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