

Electronic Supplementary Information (ESI)

Roles of H₂ in annealing and growth times of graphene CVD synthesis over copper foil

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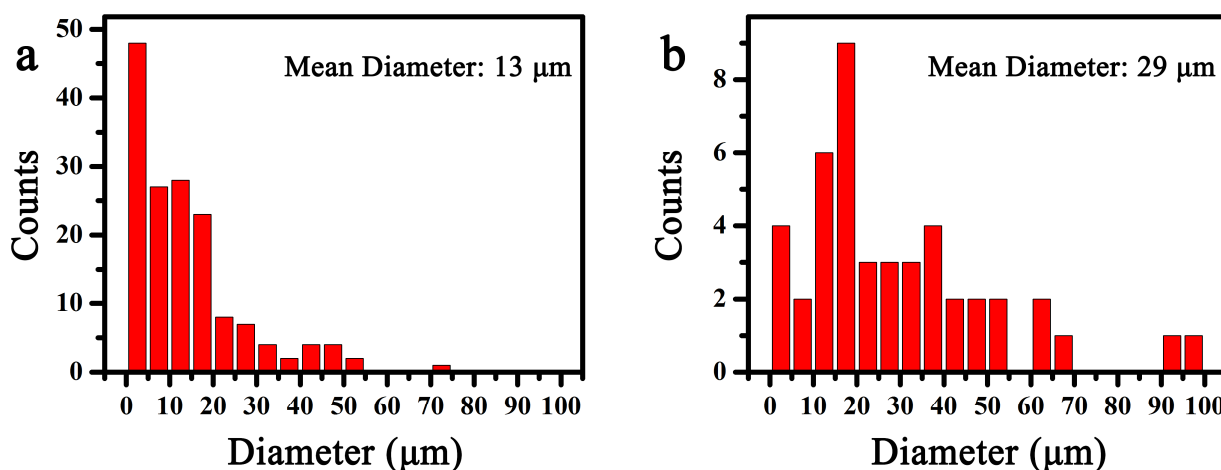


Fig. S-1 Statistical histograms for grain sizes of Cu foils after CVD growth with the H₂ flow rates of (a) 0 sccm, and (b) 50 sccm in the growth time. The values are calculated from the EBSD patterns of Cu foils shown in Fig. 2.

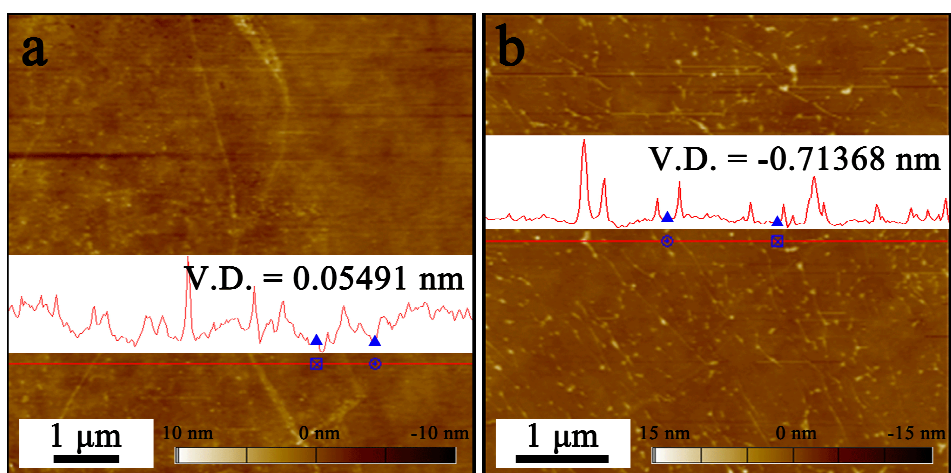


Fig. S-2 Two typical AFM images of transferred graphene films on the SiO₂/Si substrate. (a) and (b) were measured from the different samples. The graphene films were grown under the optimal conditions described in the text.

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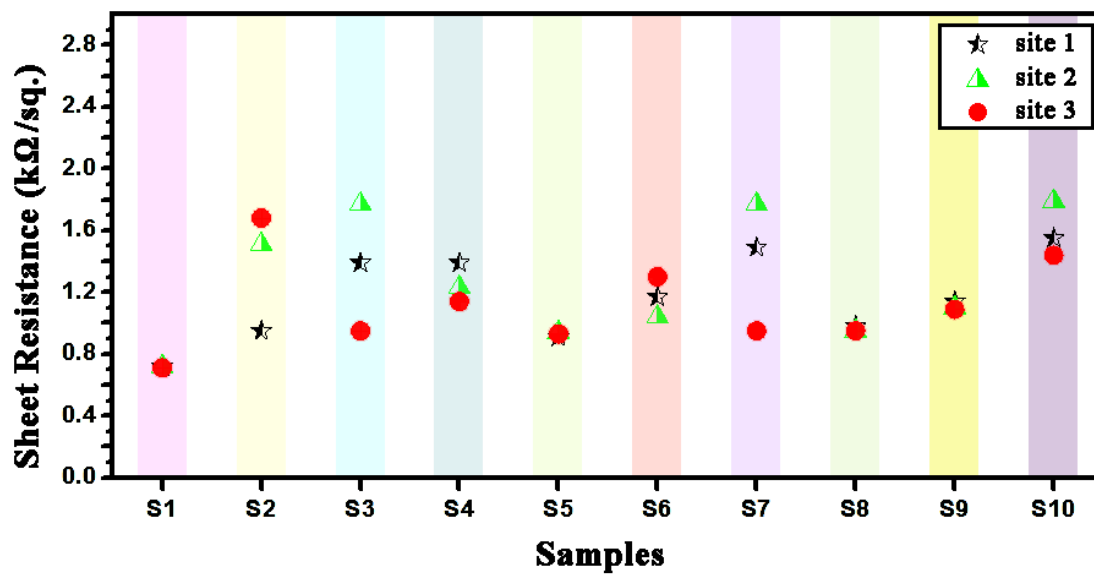


Fig. S-3 The sheet resistance data for 10 graphene samples on the SiO₂/Si substrates measured with a four-probe method. For each sample, 3 different sites were measured. The graphene films were grown under the optimal conditions described in the text.

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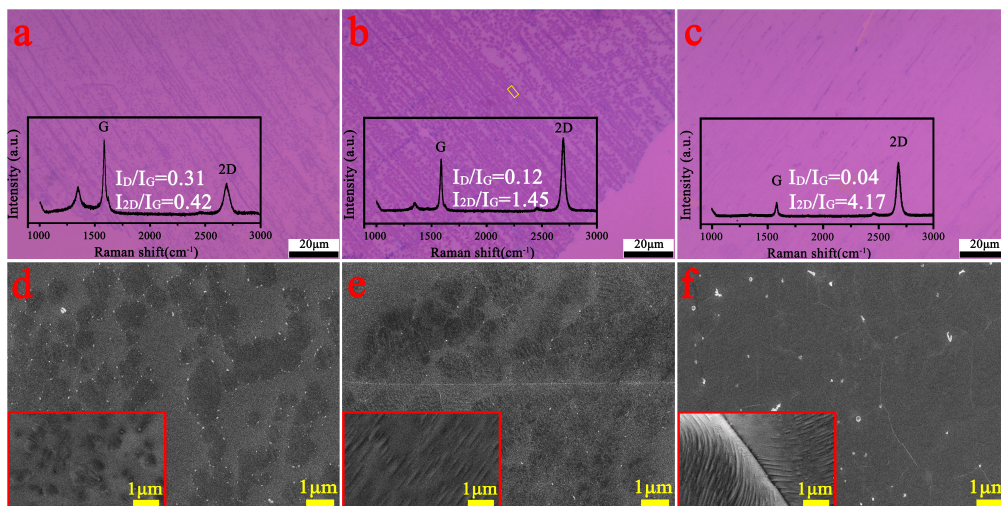


Fig. S-4 Optical microscope images and representative Raman spectra of transferred graphene films grown with different Ar/ H₂ flow rates at 1000 °C: (a) 450 sccm/ 50 sccm, (b) 450 sccm/ 10 sccm, and (c) 450 sccm/ 0 sccm. The yellow square in (b) indicates the Raman measurement point. (d)-(f) show the SEM images of as-grown CVD graphene on Cu foil corresponding to (a)-(c). The insets in (d-f) are the SEM images under the UED measure modes for roughly reflecting the rough surfaces.

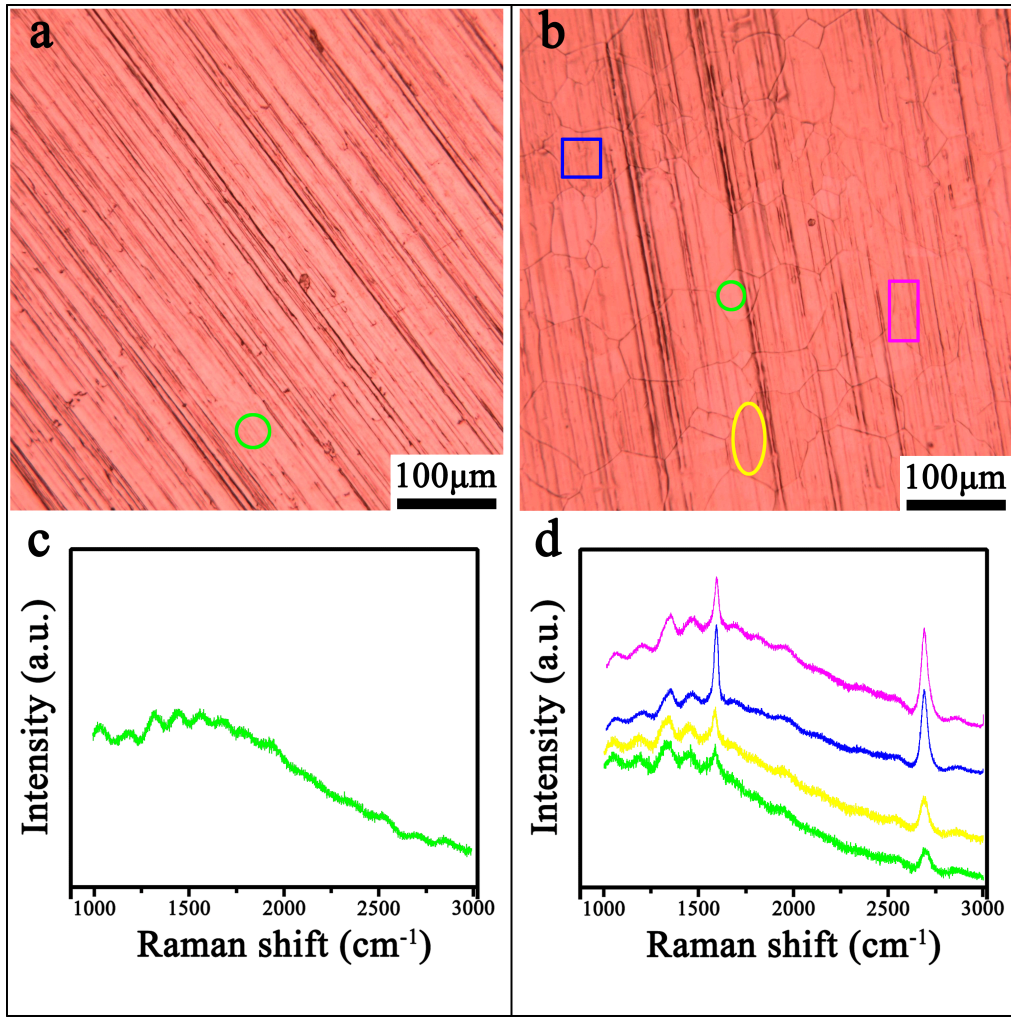


Fig. S-5 Optical microscope images of Cu foils and representative Raman spectra measured for the Cu foils before transfer. (a) and (c) are measured from the pure Cu foil; (b) and (d) are measured for the Cu foil under the standard CVD growth conditions without H_2 in the growth time. The Raman spectra measured for the as-grown Cu foil show typical Raman bands of graphene (D band at $\sim 1350 \text{ cm}^{-1}$, G band at $\sim 1600 \text{ cm}^{-1}$, and 2D band at $\sim 2700 \text{ cm}^{-1}$).