Effect of Ar on temperature and flow distribution in monocrystalline graphene growth: inert gas is active

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Fig. S1 showed the optical microscopy images under different Ar flow rates. the images were taken at lowest magnification of optical microscopy in our lab. Indeed, when the Ar flow rate was set to 500 sccm and 400 sccm, due to the lower nucleation density (Fig. 5b), only one graphene domain can be observed in the OM image even at the lowest magnification, as shown in Figure S1e-f.

Figure S1. OM images of Graphene domain under different Ar flow rates. (a-b): 200 sccm; (c-d): 300 sccm; (e-f): 400 sccm; (g-h): 500 sccm. Scale bars are 200 μm.

Fig. S2 showed the OM images at different locations under three Ar-regulation methods. Clearly, the morphology and size of graphene domains synthesized on copper substrates at various locations are uniformly consistent, and method M3 achieved a lower nucleation density and the highest crystal growth rate.

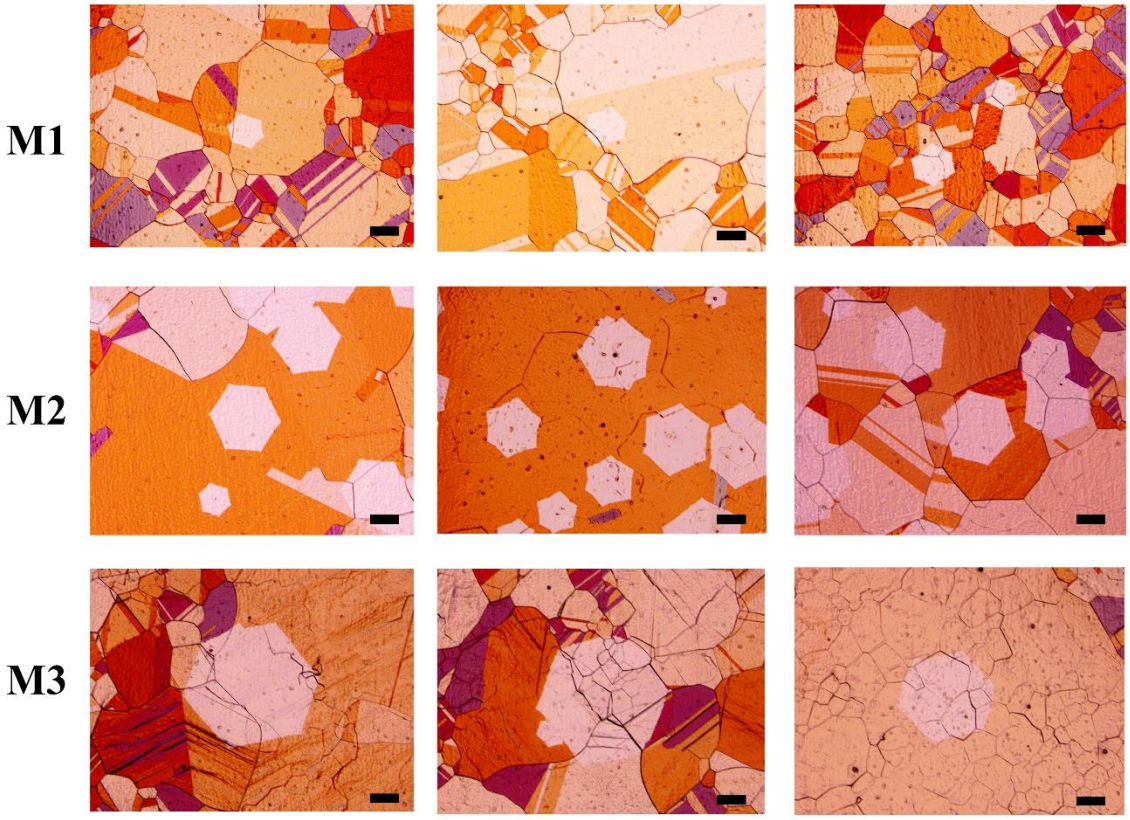

Figure S2. OM images of Graphene domain under different Ar-regulation methods. Scale bars are 200 μm.

Fig. S3 showed the SEM characterization of millimeter size domain of graphene. The enlarged detail image from the red square frame area as shown in Figure S3b, the angle between the domain edges is almost 120°, which is a typical morphological feature of monocrystalline graphene.

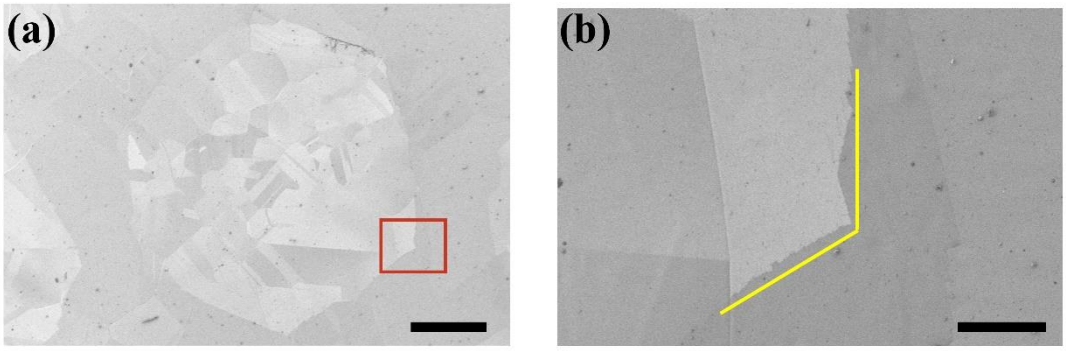

Figure S3. (a) SEM images of monocrystalline Graphene domain by M3, the growth time was 120 min. (b) Enlarged SEM image within the red square frame in (a). Scale bars are 400 μm and 100 μm, respectively.