Swift Synthesis of CVD–graphene Utilizing
Conduction Heat Transfer

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The conventional thermal chemical vapor deposition (CVD) setup for the graphene synthesis has
mainly used convective heat transfer in order to heat a catalyst (e.g. Cu) up to 1,000°C. Although the
conventional CVD has been so far widely accepted as the most appropriate candidate enabling
mass-production of high-quality graphene, this method has still remained under the standard for the
commercialization largely due to the poor productivity arisen out of the required long processing time.
Here, we introduced a fast and efficient synthetic route toward CVD-graphene. Unlike the conventional
CVD using convection heat transfer, we adopted a CVD setup utilizing conduction heat transfer
between Cu catalyst and rapid heating source. The high thermal conductive nature of Cu and the
employed rapid heating source led to the remarkable reduction in processing time as compared to the
conventional convection based CVD (Fig. 1A), moreover, the synthesized graphene was turned out to
have comparable quality to that synthesized by the conventional CVD (Fig. 1B). For the optimization
of the conduction based CVD process, the parametric studies were thoroughly performed using through
Raman spectroscopy and electrical sheet resistance measurement. Our approach is thought to be worth
considerable in order to enhance productivity of the CVD graphene in the industry.

Keywords: CVD-graphene, Growth, Heating Source, Conduction, Convection

Fig. 1. (a) Comparison of temperature profiles related with CVD with conduction and CVD with
convention. (b) Representative Raman spectra of the transferred graphene film onto
SiO2/Si substrate.