

## *Supporting Information*

# Synthesis of Large-Scale Undoped and Nitrogen-Doped Amorphous Graphene on MgO Substrate by Chemical Vapor Deposition

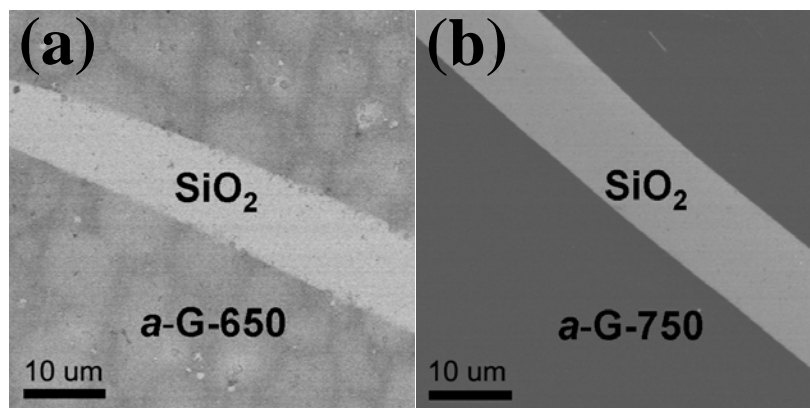
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### **S1. SEM images of *a*-graphene films**

Figure S1 shows the SEM images of *a*-G-650 and *a*-G-750. Both *a*-graphene films are continuous in large area. The cracks in the films should be generated during their transferring process. Judging from the contrast of *a*-graphene with respect of the SiO<sub>2</sub> substrate, we could easily deduce that the *a*-G-650 film is much thinner than *a*-G-750 film.



**Figure S1.** SEM images of a-G-650 (a) and a-G-750 films (b) on SiO<sub>2</sub>/Si substrate.

### S2. Nitrogen contents of N-*a*-graphene films measured by XPS

The nitrogen contents of N-a-G-650, N-a-G-700, N-a-G-750 and N-a-G-800 films analyzed by XPS are listed in Table S1.

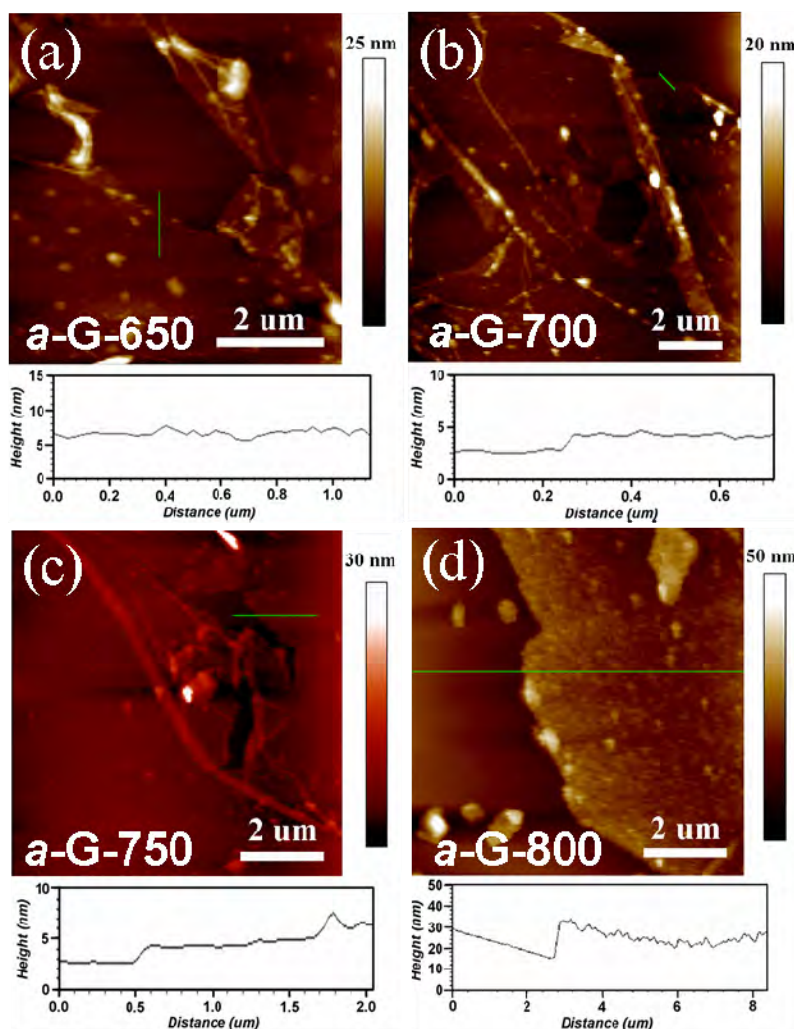
**Table S1.** Nitrogen to carbon atomic ratio of N-*a*-graphene films.

Sample	N- <i>a</i> -G-650	N- <i>a</i> -G-700	N- <i>a</i> -G-750	N- <i>a</i> -G-800
Nitrogen to carbon atomic ratio (N:C)	0.088	0.096	0.085	0.086

### S3. AFM images of *a*-graphene films

Figure S2 gives the AFM (Agilent 5500) images of *a*-graphene films. The heights of *a*-G-650, *a*-G-700, *a*-G-750 and *a*-G-800 films measured from the line profiles are about 0.8-1.0, 1.2-1.5, 1.8-2.2 and 5.0-5.5 nm, respectively. Which are corresponding to approximately 1-2, 2-3, 4-5, 13-15 layers, respectively.<sup>1-3</sup> As can be seen, there are some bright dots on the surface of

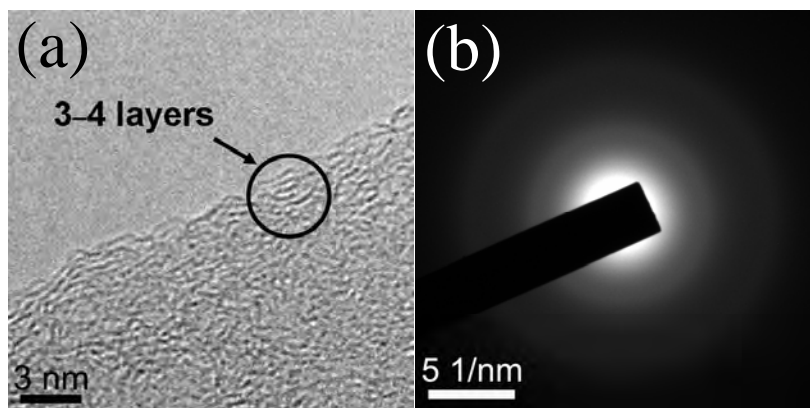
*a*-graphene films. These may be the residual PMMA or some adsorbed impurities during the transfer process.



**Figure S2.** AFM images and height profiles of *a*-G-650 (a), *a*-G-700 (b), *a*-G-750 (c) and *a*-G-800 film on SiO<sub>2</sub>/Si substrate (d).

#### S4. TEM image and SAED pattern of N-*a*-G-700 film

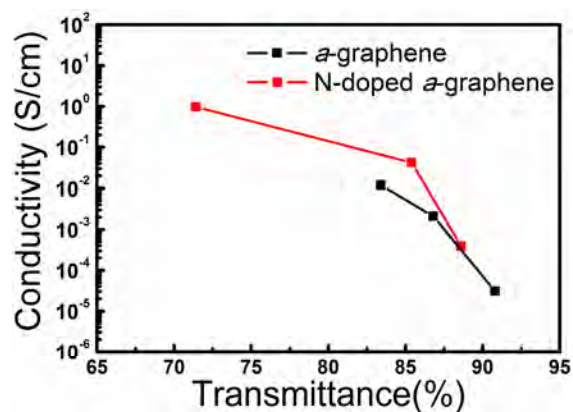
The typical TEM image of N-*a*-G-700 film is given in Figure S3a. The layer number of the film is 3-4, slightly more than that of *a*-G-700 film (2-3 layers). The SAED pattern of N-*a*-G-700 film in Figure S3b shows a halo ring, clearly suggesting its amorphous characteristics.



**Figure S3.** TEM image (a) and SAED pattern (b) of N-*a*-G-700 film.

#### S5. Plots of conductivity as a function of transmittance

Figure S4 gives the plots of conductivity as a function of transmittance (at 550 nm) for the undoped and N-doped *a*-graphene films. It's learnt that at a same transmittance, the conductivity of N-doped *a*-graphene film is higher than that of the undoped one, which should come from the contribution of additional electrons from the nitrogen dopants.



**Figure S4.** Plots of conductivity as a function of transmittance (at 550 nm) for the undoped and N-doped a-graphene films.

## References

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- 3 A. Reina, X. T. Jia, H. John, N. Daniel, S. Hyungbin, B. Bulovic, M. S. Dresselhaus, J. Kong, *Nano Lett.*, 2009, **9**, 30-35.