

Electronic Supplementary Information

Large-scale preparation of highly conductive three dimensional graphene and its applications in CdTe solar cells

Hui Bi,^a Fuqiang Huang,^{*a} Jun Liang,^a Yufeng Tang,^a Xujie Lü,^a Xiaoming Xie,^b and
Mianheng Jiang^b

^a State Key Laboratory of High Performance Ceramics and Superfine Microstructure and CAS Key Laboratory of Materials for Energy Conversion, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China.

^b State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, Shanghai 200050, China.

TABLE S1. Large-scale graphene synthesized by varying different gas flow rates and growth time using Ni foam templates under APCVD conditions.

Sample	Methane (sccm)	Hydrogen (sccm)	Argon (sccm)	Temperature (°C)	Growth Time (min)
1	2	50	300	1000	10
2	5	50	300	1000	10
3	10	50	300	1000	10
4	20	50	300	1000	10
5	2	50	300	1000	15
6	2	50	300	1000	20
7	2	50	300	1000	30
8	2	10	300	1000	10
9	2	30	300	1000	10
10	2	100	300	1000	10

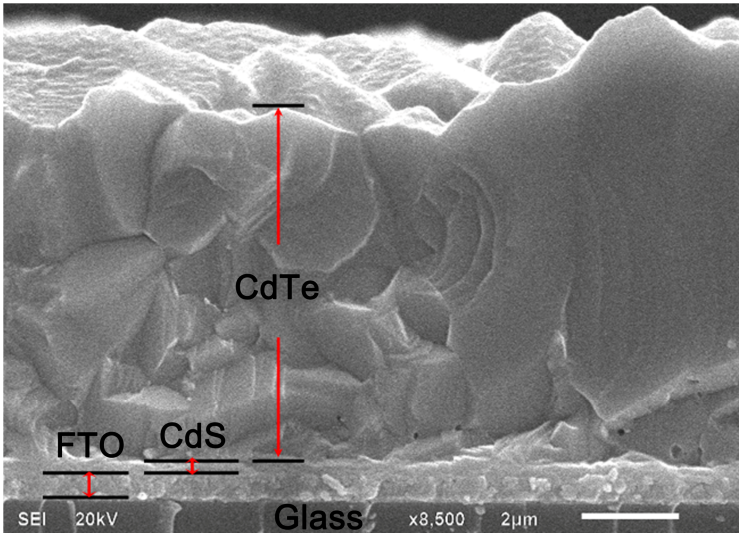


Figure S1. SEM image of cross-section of Glass/FTO/CdS/CdTe structure.

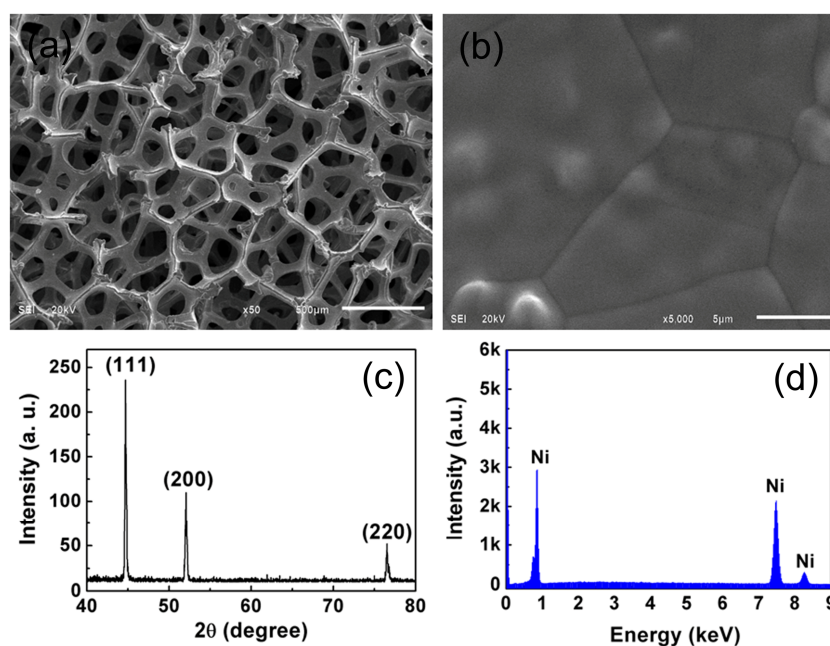


Figure S2. (a) Low- and (b) high-magnification SEM images, (c) XRD spectrum and (d) EDS spectrum of a Ni foam for graphene growth.

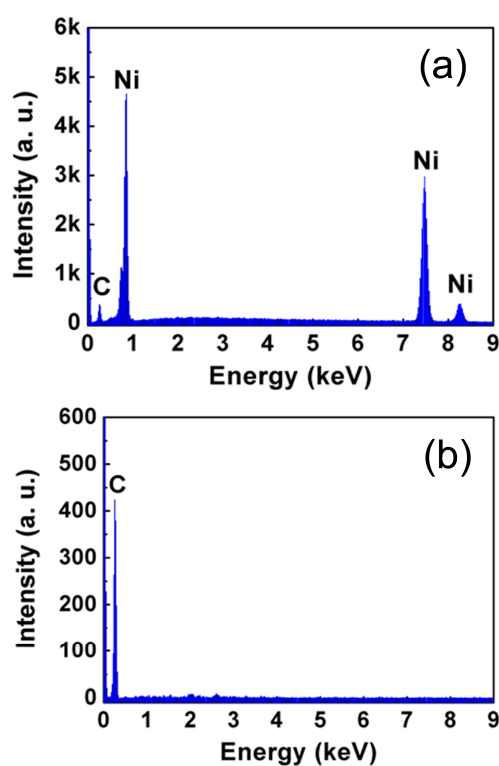


Figure S3. EDS spectra of a graphene network (a) before and (b) after etching Ni skeleton.

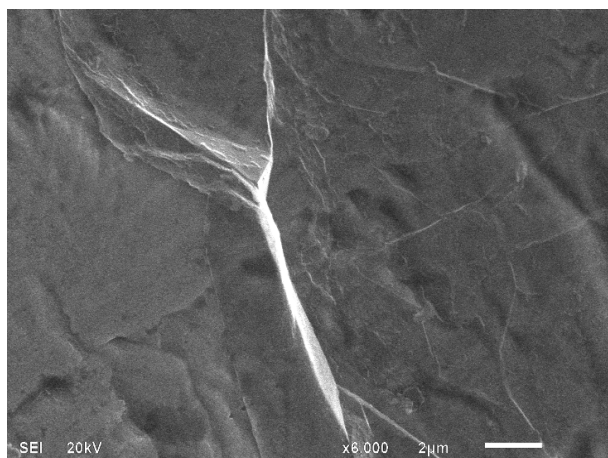


Figure S4. SEM image of a single graphene sheet transferred onto Cu net surface.

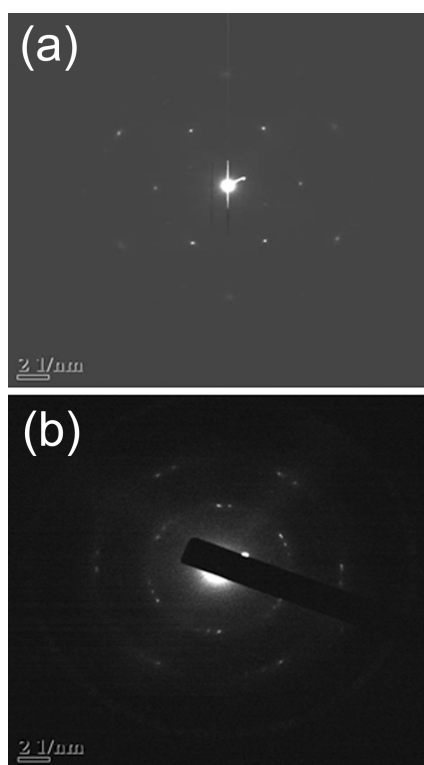


Figure S5. The SEAD patterns of (a) single- and (b) three-layer graphene sheets.

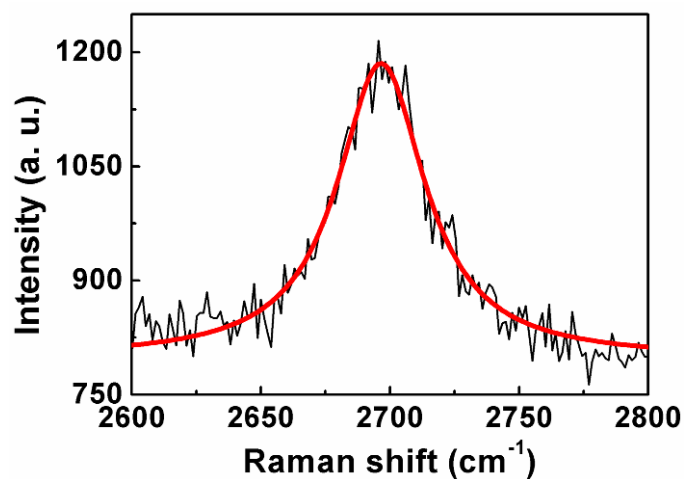


Figure S6. Raman 2D peak fittings of single-layer graphene with a single *Lorentz* peak. Black line is the original data, and the red line is the fittings.

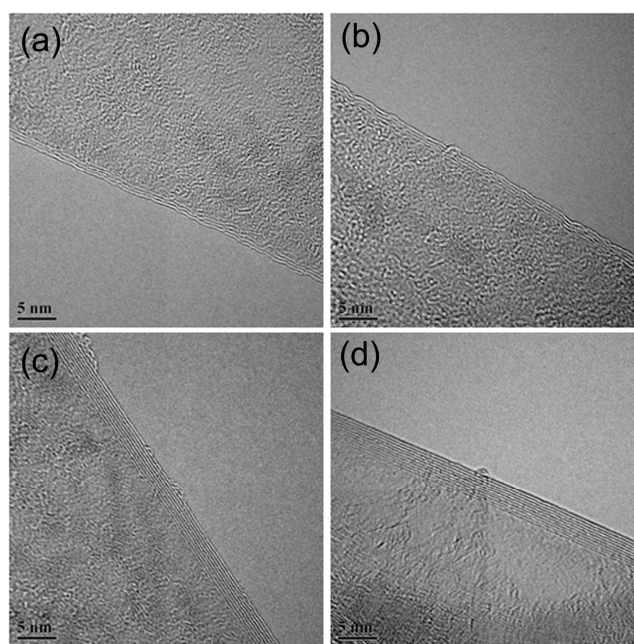


Figure S7. HRTEM images of the edges of the graphene sheets with the average layer-number of 3, 5, 8 and 10 by varying CH₄ gas flow rates of 2, 5, 10 and 20 sccm, respectively.

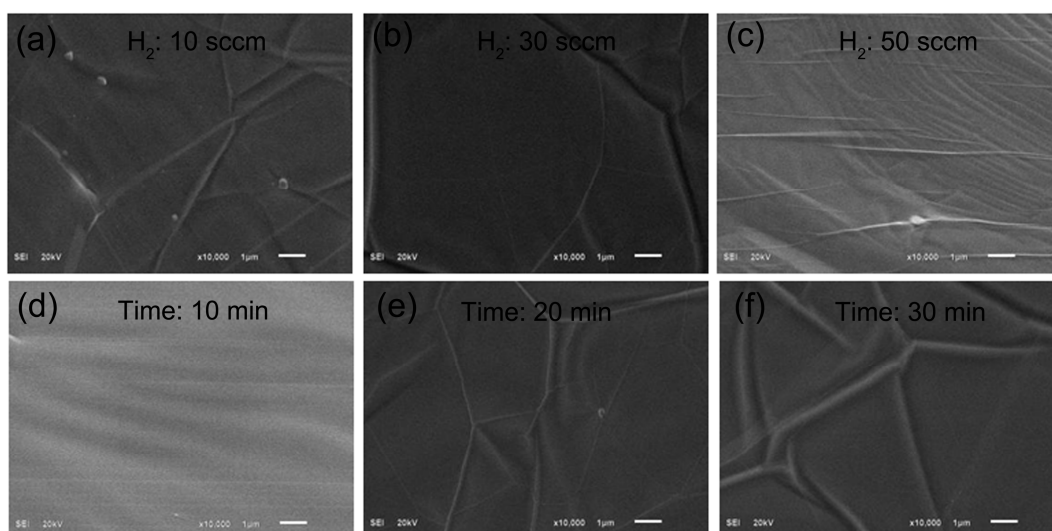


Figure S8. SEM images of graphene sheets grown on Ni foams by varying the H₂ gas flow rates of (a) 10, (b) 30 and (c) 50 sccm and the growth time of (d) 10, (e) 20 and (f) 30 min.