

# All-Carbon Electrodes for Flexible Solar Cells

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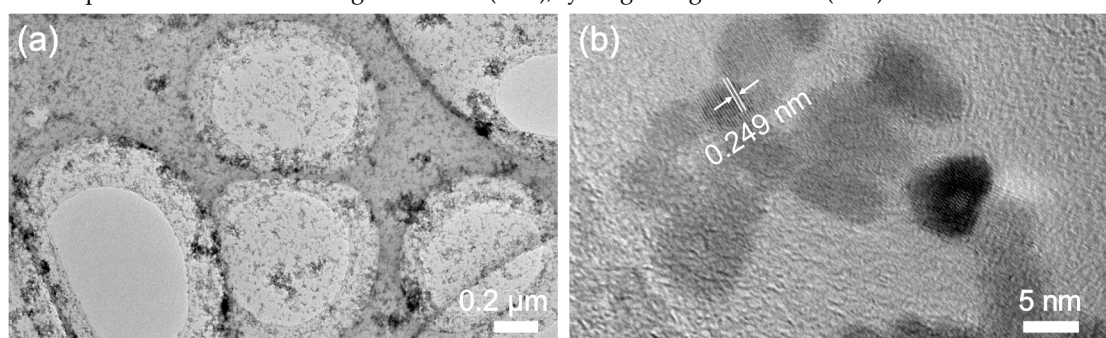
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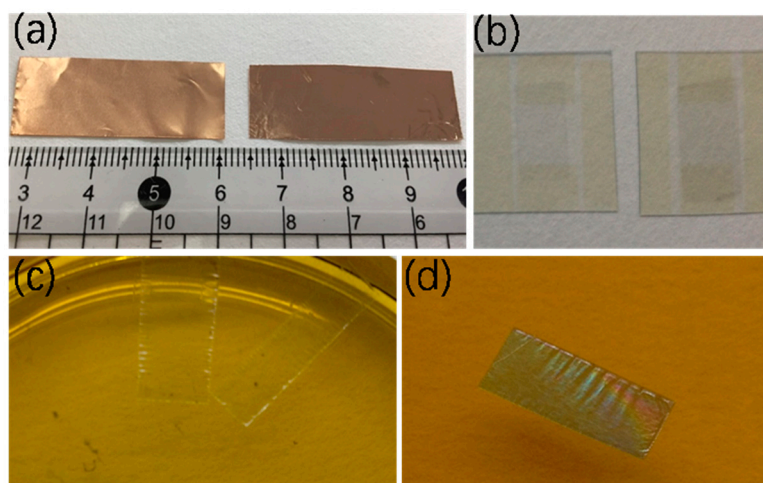
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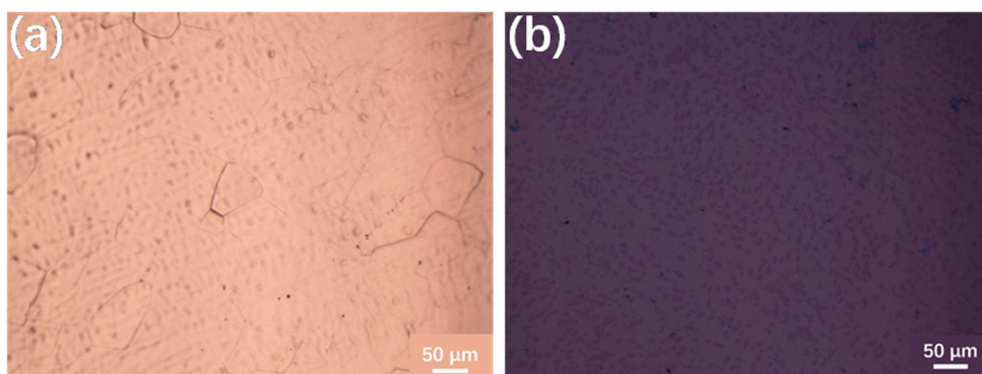
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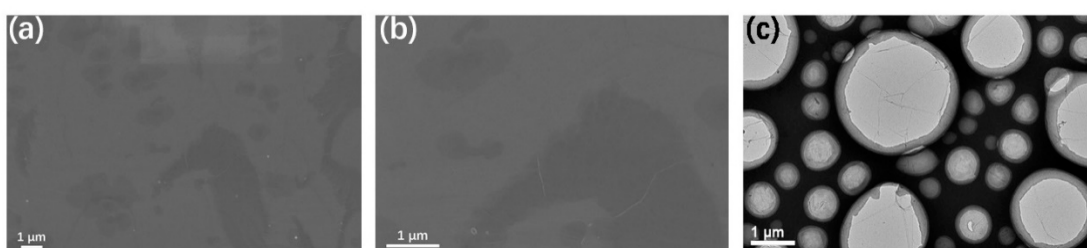
**Figure S1** TEM images of ZnO nanoparticles. (a) Uniform distribution of ZnO nanoparticles. (b) Homogenous ZnO grains with size range of ~5-10 nm (interplanar distance of 0.249 nm is consistent with the interlayer spacing of hexagonal ZnO (101) planes (0.247 nm)).



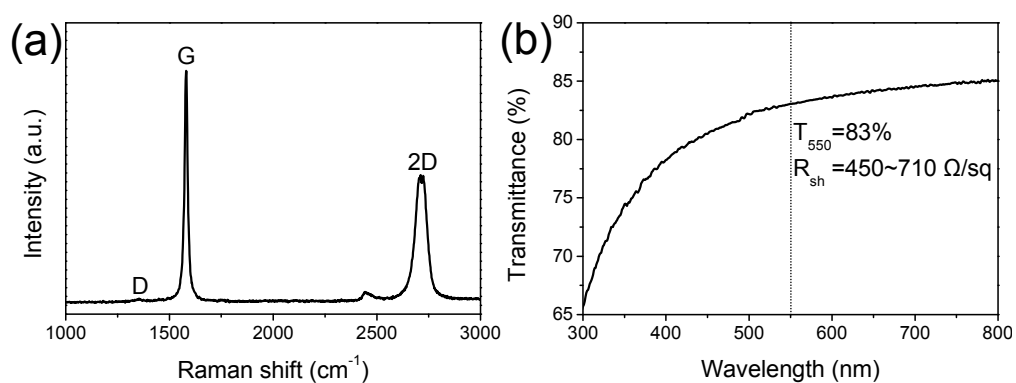
**Figure S2** (a) Photograph of copper foil (left) and as-grown graphene film on copper foil (right). (b) Photograph of few-layer (left) and multi-layer (right) graphene films transferred onto polyethylene naphthalate (PEN) substrates. Photographs of (c) few-layer and (d) multi-layer graphene films covered with polymethyl methacrylate (PMMA) floating on the etchant solution.



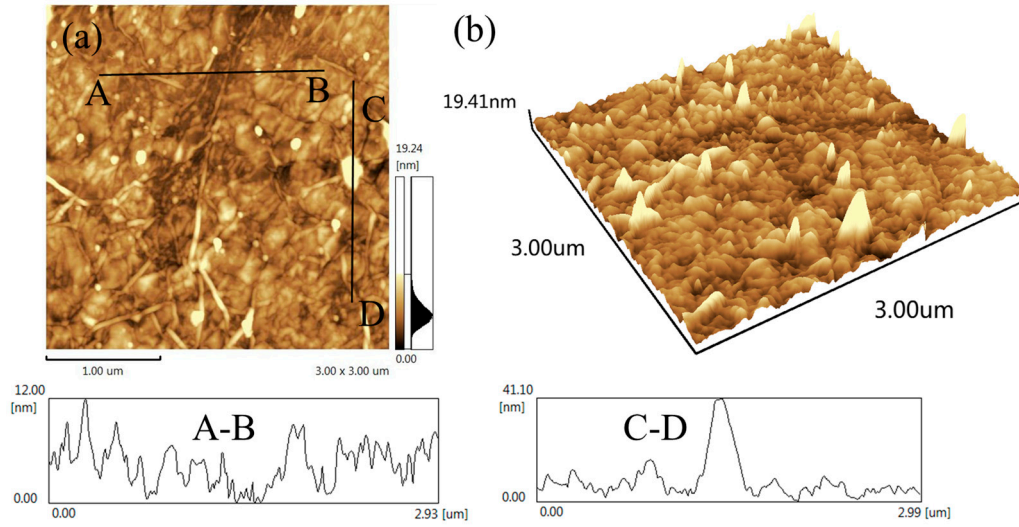
**Figure S3** Optical images of (a) as-grown graphene on copper foil and (b) graphene film transferred onto a SiO<sub>2</sub>/Si wafer.



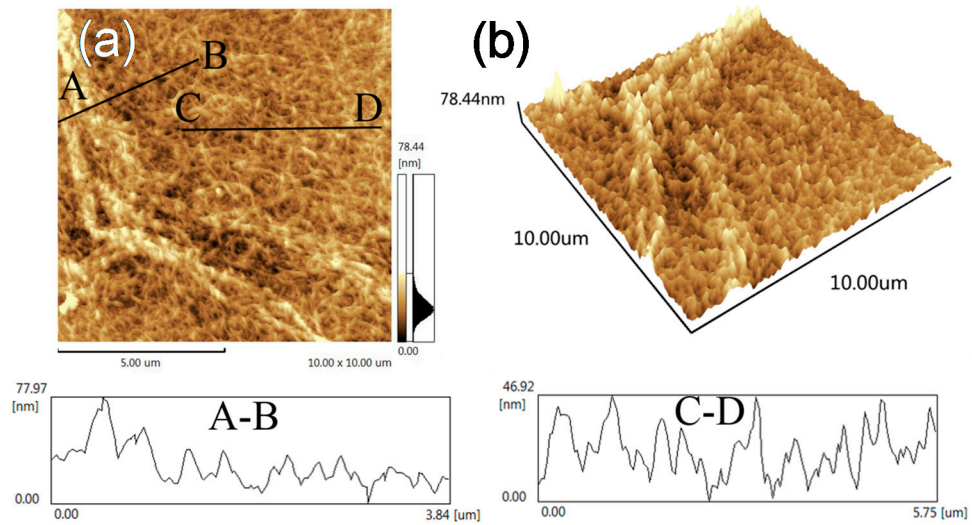
**Figure S4** (a,b) SEM images of as-grown few-layer graphene films on copper foil with different magnifications. (c) TEM image of the few-layer graphene film.



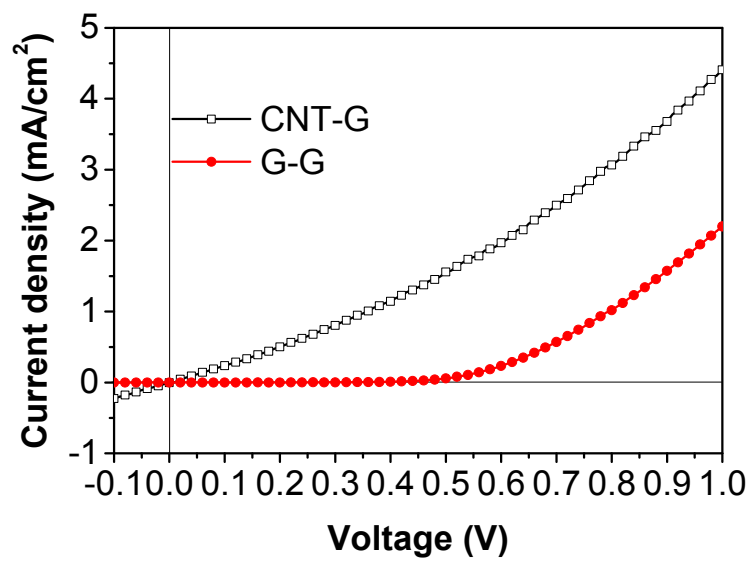
**Figure S5** (a) Raman spectrum and (b) transmittance spectrum of multi-layer graphene films.



**Figure S6** Atomic force microscopy (AFM) topography images of the few-layer graphene film on a SiO<sub>2</sub>/Si wafer. (a, b) show the two-dimensional and three-dimensional surface roughness, respectively.



**Figure S7** AFM topography images of CNT films on a SiO<sub>2</sub>/Si wafer. (a, b) show the two-dimensional and three-dimensional surface roughness.



**Figure S8** Dark  $J$ - $V$  characteristics of solar cells with CNT (or G) as anodes and G as cathodes.