

Supporting information

One-dimension Graphene Nanoribbons Hybridized with Carbon Nanotubes as Cathode and Anode Interfacial Layers for High Performance Solar Cells

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Instrument and Characteristics: The thermogravimetric analysis (TGA) was carried out in N₂ on a TA instrument with a heating rate of 10 °C/min. The work functions of the modified cathode were investigated using a Kelvin probe (KP 6500 Digital Kelvin probe, McAllister Technical Services. Co., Ltd.). The samples were measured in a conditioned chamber where the O₂ level is < 25 ppm. The actual work function of the samples can be obtained through the equation:

$$WF = WF_0 + \Delta WF$$

Where WF is the sample work function, WF₀ is standard gold probe work function (5.1 eV), and Δ WF is the work function gap between samples and standard gold.

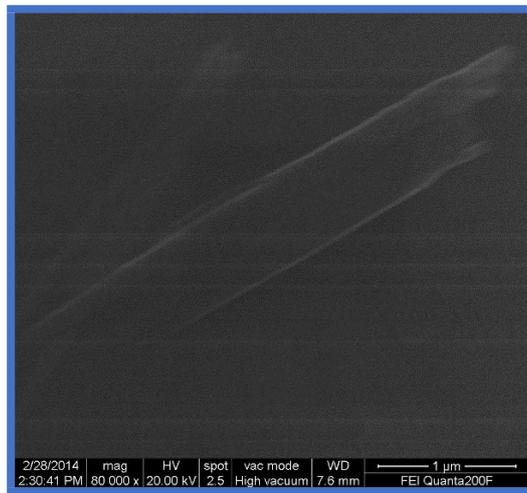


Figure S1. SEM image of GONR.

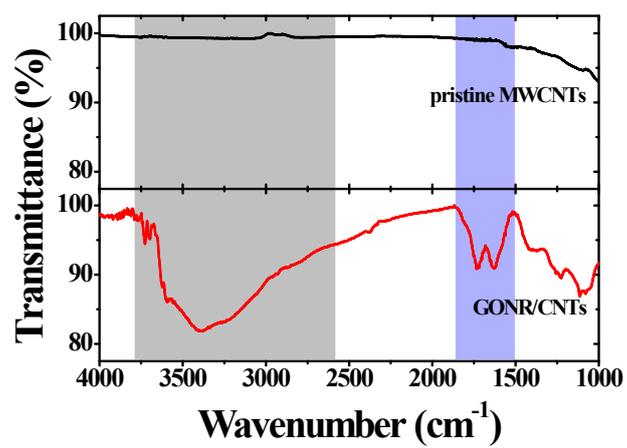


Figure S2. ATR-IR spectroscopy of the pristine MWCNTs and GONR/CNT.

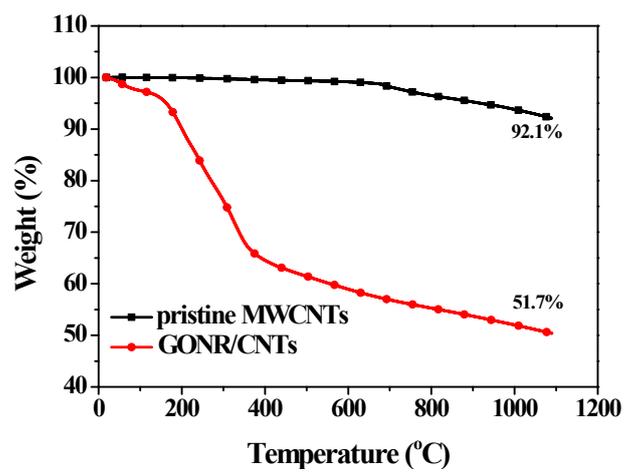


Figure S3. TGA weight loss of the pristine MWCNTs and GONR/CNT.

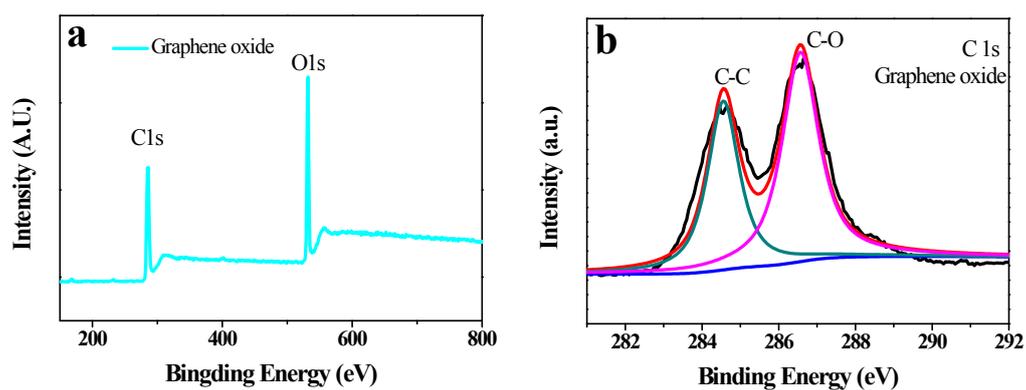


Figure S4. (a) XPS survey spectra of Graphene oxide. (b) XPS carbon 1s spectra of Graphene oxide.

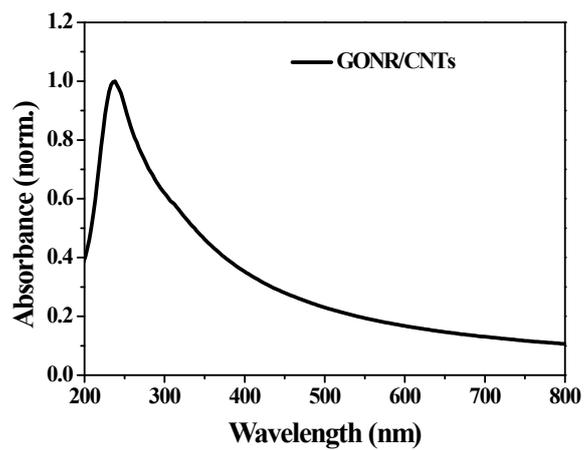


Figure S5. UV/Vis absorption spectrum of GONR/CNTs.

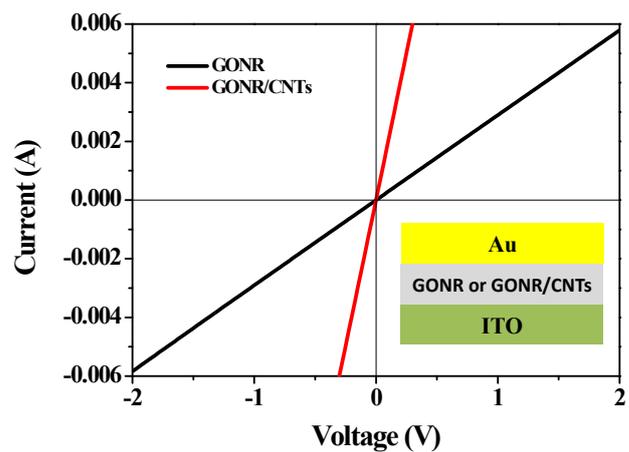


Figure S6. Electrical characteristics of ITO/GONR or GONR/CNTs (50 nm)/Au device.