Supporting Information

Probing the Photovoltaic Properties of Ga-Doped CdS–Cu_2S Core–Shell Heterostructured Nanowire Devices

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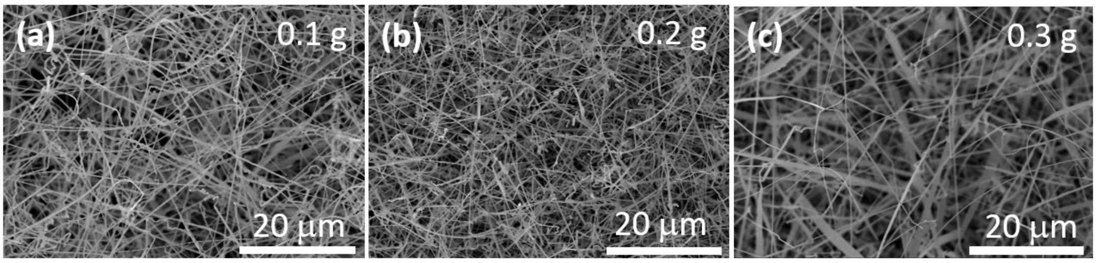

Figure S1 SEM images of CdS NWs grown using (a) 0.1, (b) 0.2, and (c) 0.3 g of the Ga source.

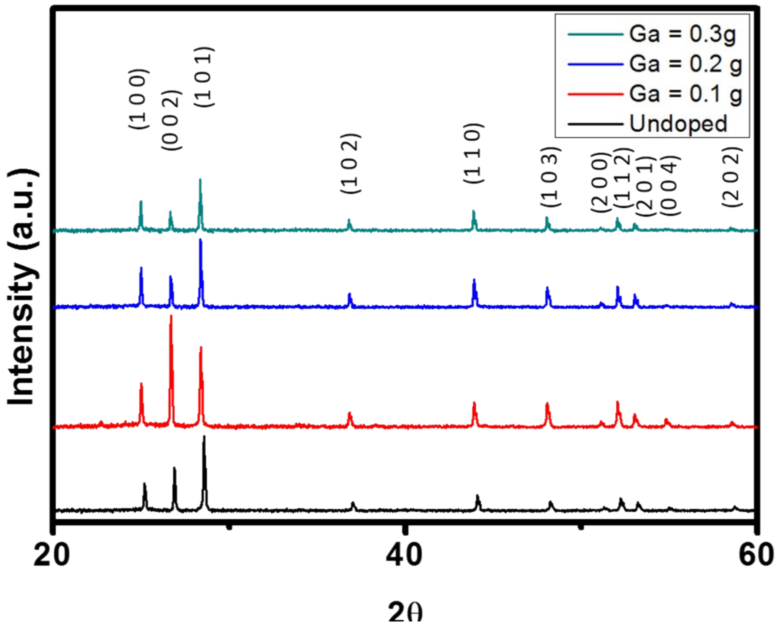

Figure S2 XRD patterns of the various samples.

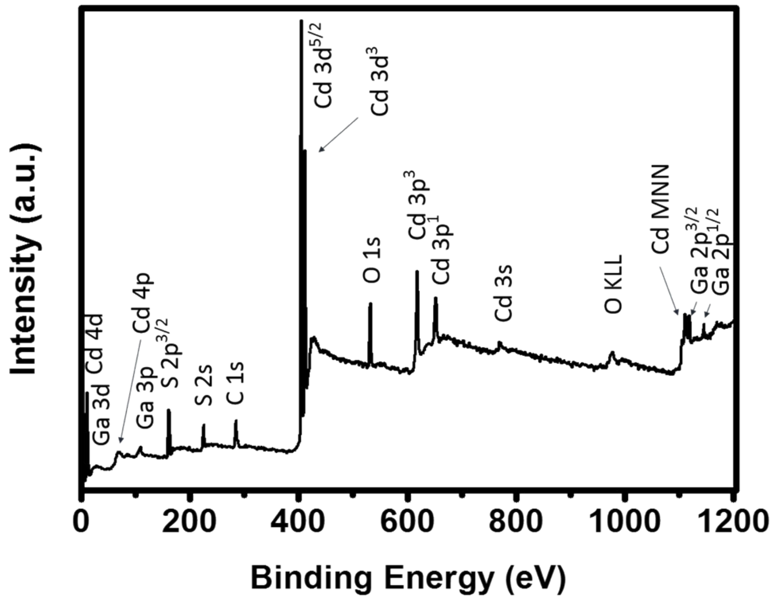

Figure S3 XPS survey scan of the Ga-doped CdS NWs.

- **Fabrication of heterostructured devices**

First, a Ga-doped NW was dispersed on a pre-patterned 300-nm SiO_2/Si substrate [Fig. S4(a)]; after EBL and a lift-off process, 120-nm Ti and 30-nm Au were deposited as the electrode on one side of the CdS NW [Fig. S4(b)]. The NW was then immersed in 5 M CuCl in MeOH at 50 °C for 10 s to form a Cu_2S shell on the CdS NW, through cation exchange [Fig. S4(c)]; the heterostructured NW device was obtained after deposition of a 120-nm Ni/30-nm Au electrode on the Cu_2S shell [Fig. S4(d)]. Ti and Ni served as contact metals for the CdS and Cu_2S, respectively, forming ohmic contacts at the interfaces.

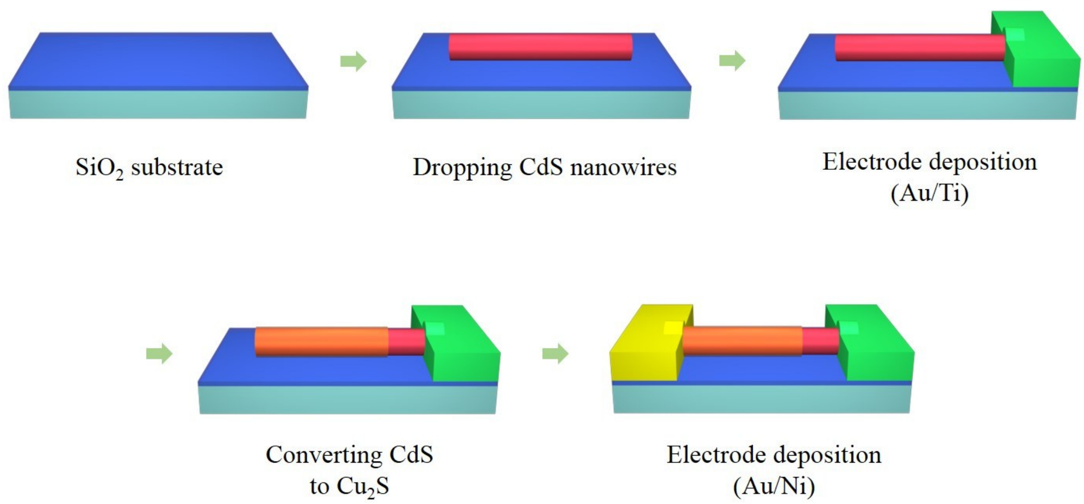

Figure S4 Schematic representation of the fabrication process flow of a CdS–Cu_2S core–shell heterostructure device.

- **The definitions of fill factor (FF) and the power conversion efficiency (*η*)**

The FF and the power conversion efficiency (*η*) are crucial parameters for gauging the performance of any solar cell; they are defined as,

$$FF = \frac{J_m \times V_m}{J_{sc} \times V_{oc}} \qquad (1)$$

and

$$\eta = \frac{J_{sc} \times V_{oc} \times FF}{P_{in}} \qquad (2)$$

where J_m and V_m are the current density and voltage, respectively, measured when the output power of the device was at its maximum value, and P_{in} is the power density of the incident light.