

Supplementary Information for:

**Fabrication of water-dispersible and highly
conductive PSS-doped PANI/graphene
nanocomposites using high-molecular weight
PSS dopant and their application to H₂S
detection**

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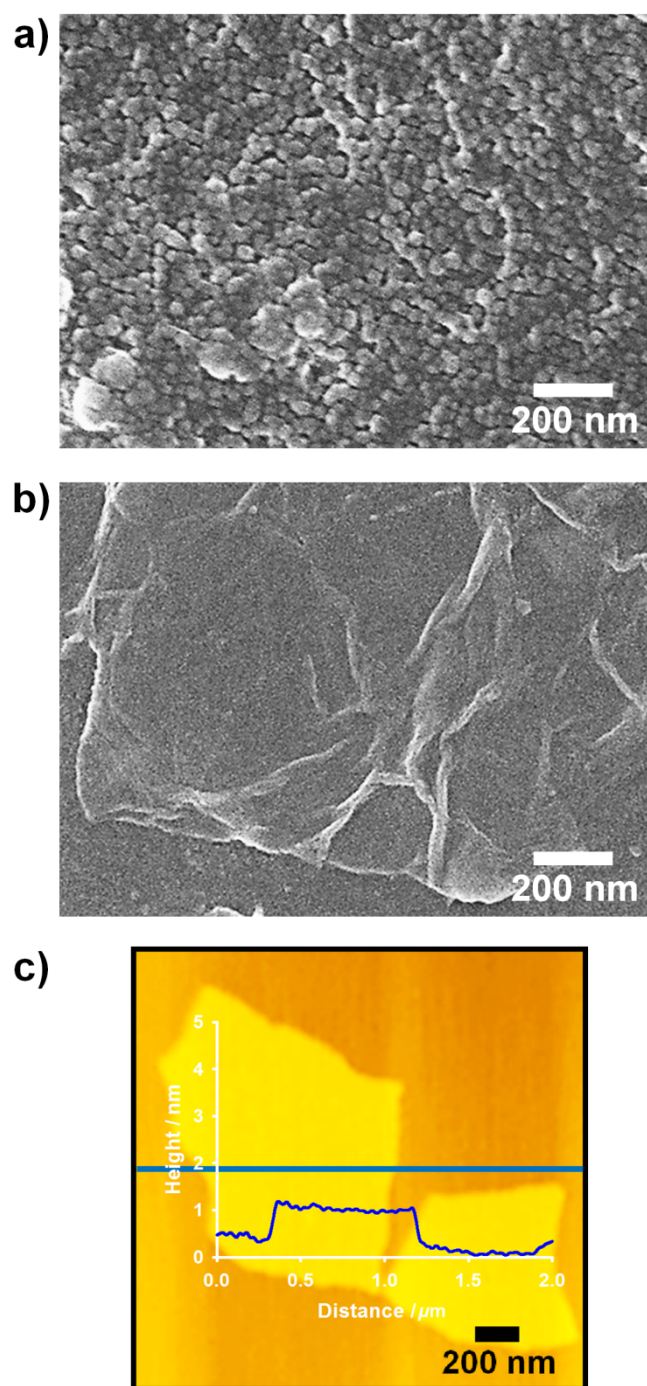


Figure S1. FE-SEM images of (a) PSS-doped PANI/graphene nanocomposite with 30 wt% graphene and (b) graphene sheet. Magnifications: $\times 80\text{k}$ (a, b). (c) AFM image of graphene sheet.

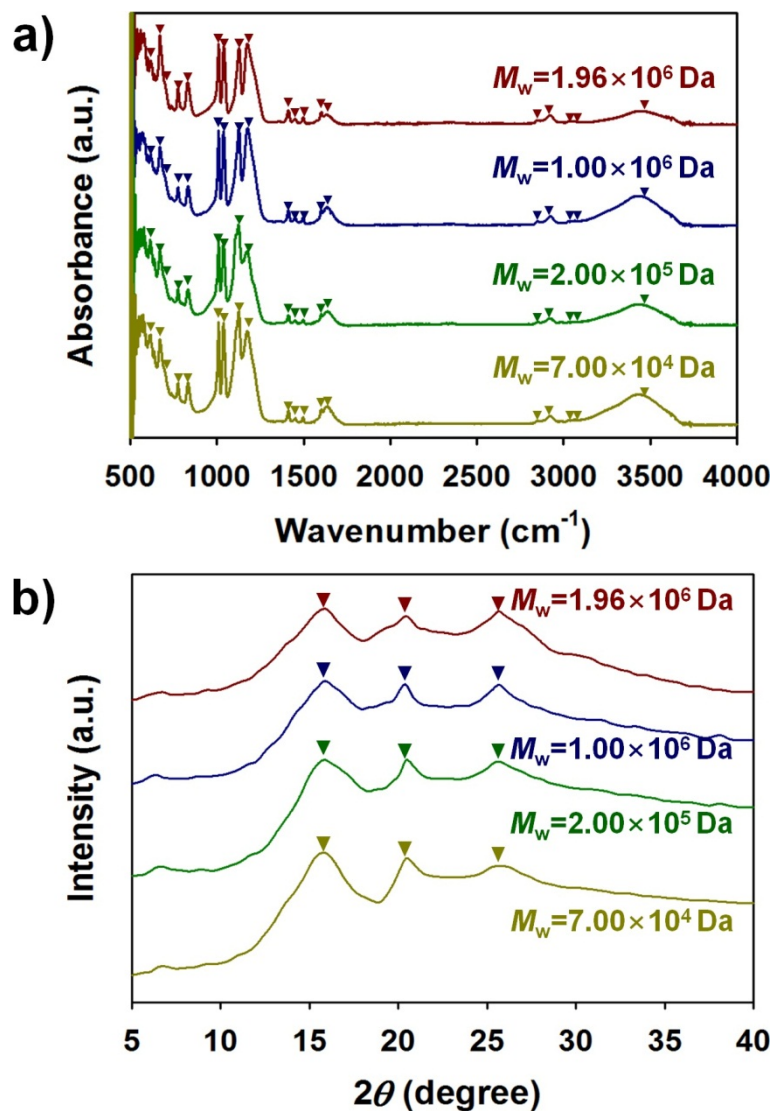


Figure S2. (a) FT-IR spectra of PSS having different M_w . (b) XRD spectra of PSS-doped PANI polymerized with different M_w of PSS at a polymerization temperature of -50°C . All samples were polymerized at the $w_{\text{PSS}}/w_{\text{ANI}}$ ratio of 10.

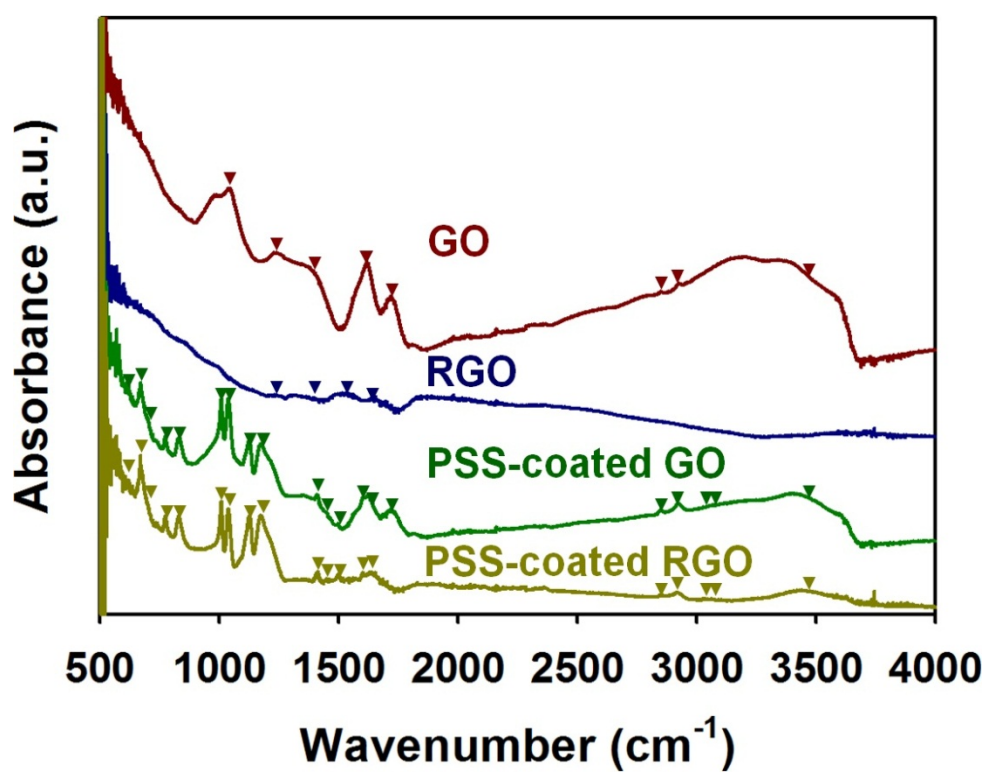


Figure S3. (a) FT-IR spectra of GO, RGO, PSS-coated GO, and PSS-coated RGO.

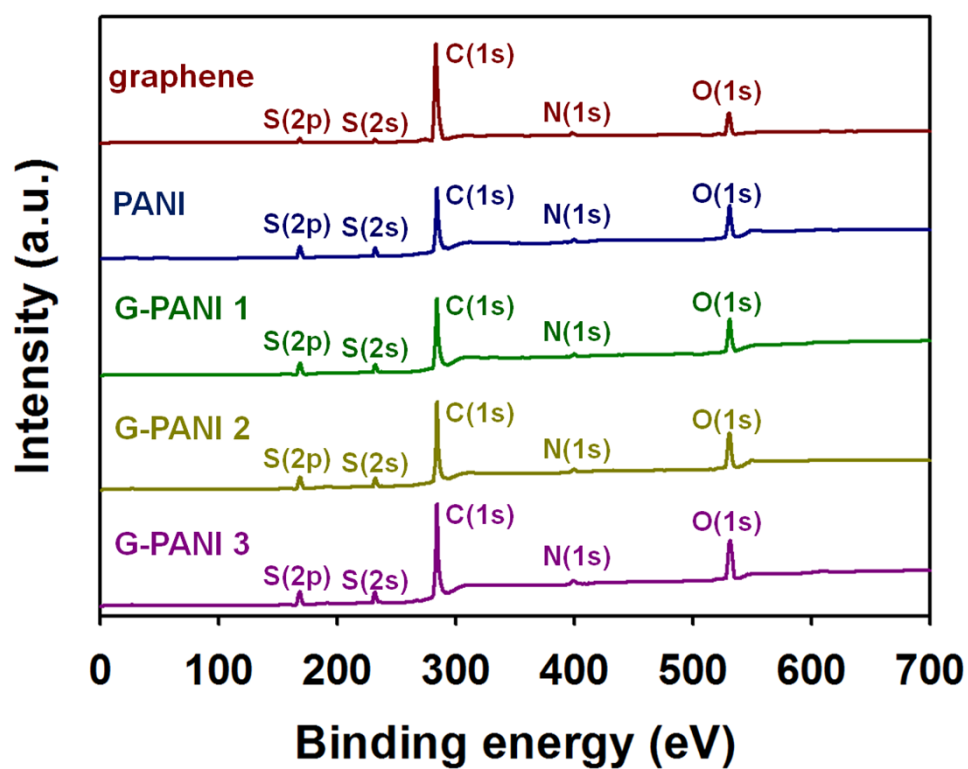


Figure S4. Fully scanned spectra of PSS-doped PANI/graphene nanocomposites.

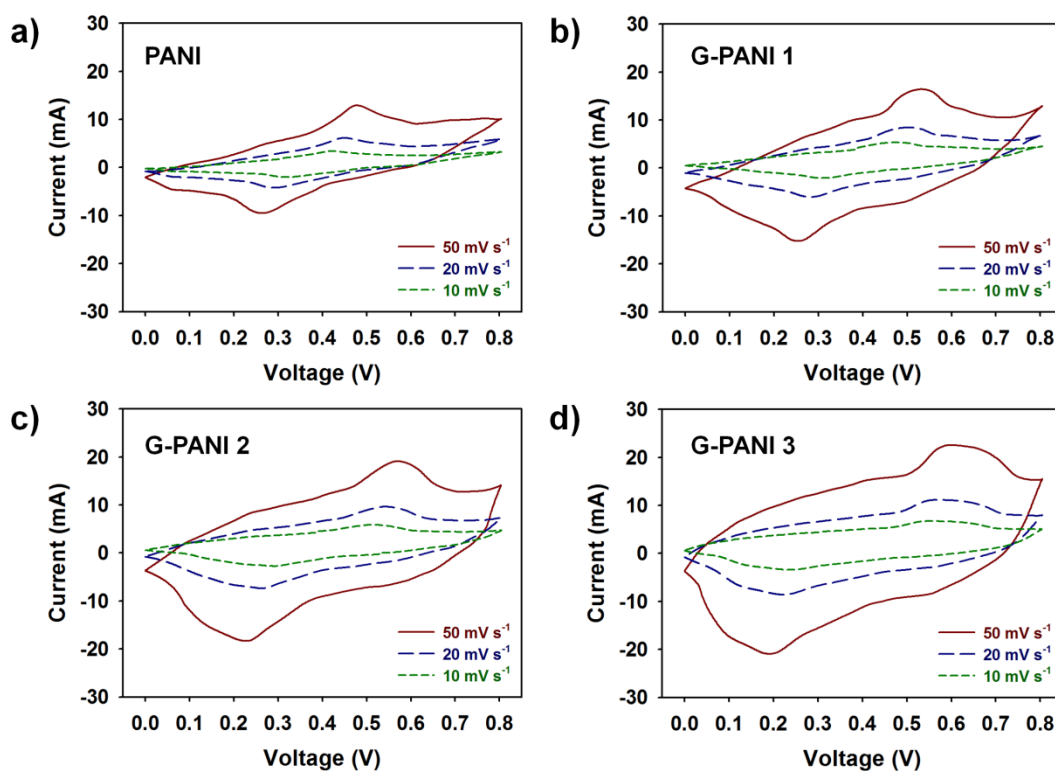


Figure S5. Cyclic voltammograms of (a) pristine PSS-doped PANI, (b) G-PANI 1 (with 10 wt% graphene), (c) G-PANI 2 (with 20 wt% graphene), and (d) G-PANI 3 (with 30 wt% graphene) in a 0.5M H₂SO₄ electrolyte at different scan rates (10, 20, and 50 mV s⁻¹).

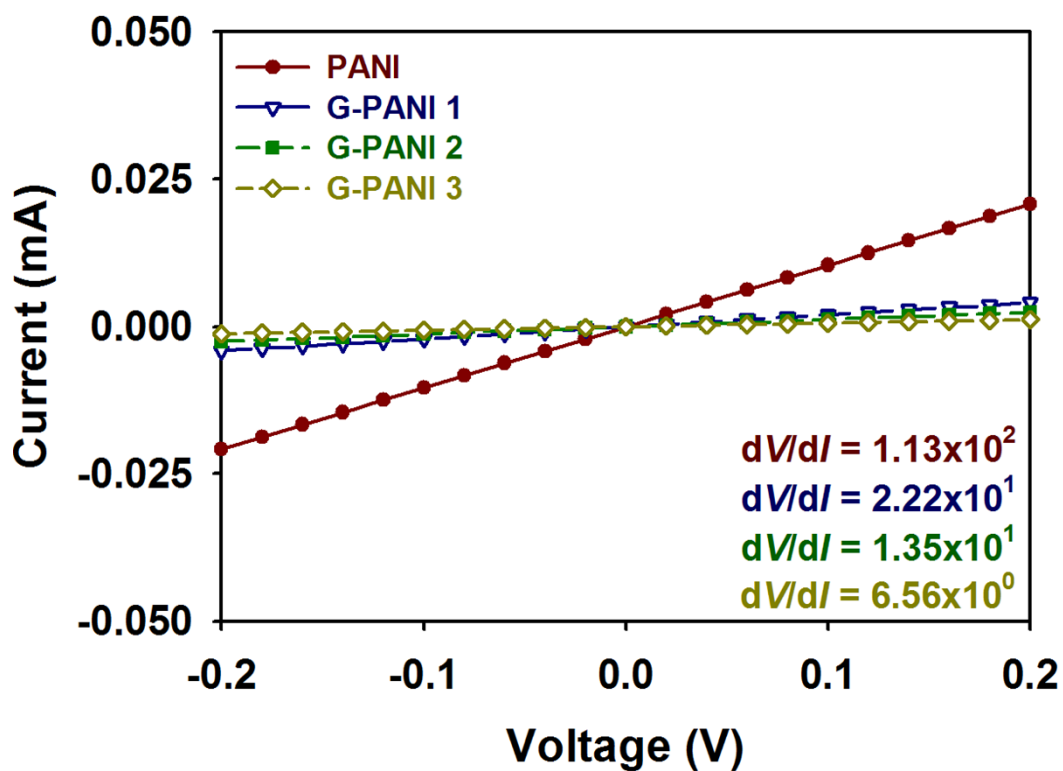


Figure S6. I - V characteristics of PSS-doped PANI/graphene nanocomposites with thickness of 5 μm integrated in the sensor substrate at a scan rate of 20 mV s^{-1} .