

Supporting Information

for

Highly stable semitransparent solar cell employing graphene/WS₂/LaVO₃ vertical-heterostructure

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Table S1. Photovoltaic parameters of pristine-Gr/WS₂/LaVO₃ device as a function of t .

t (nm)	V _{oc} (V)	J _{sc} (mA/cm ²)	FF (%)	PCE (%)	Integrated J _{sc} (mA/cm ²)
70	0.41	4.89	55.87	1.12	4.80
150	0.40	9.89	54.86	2.17	9.55
200	0.39	12.39	53.71	2.59	11.96
300	0.38	14.21	52.87	2.85	13.71

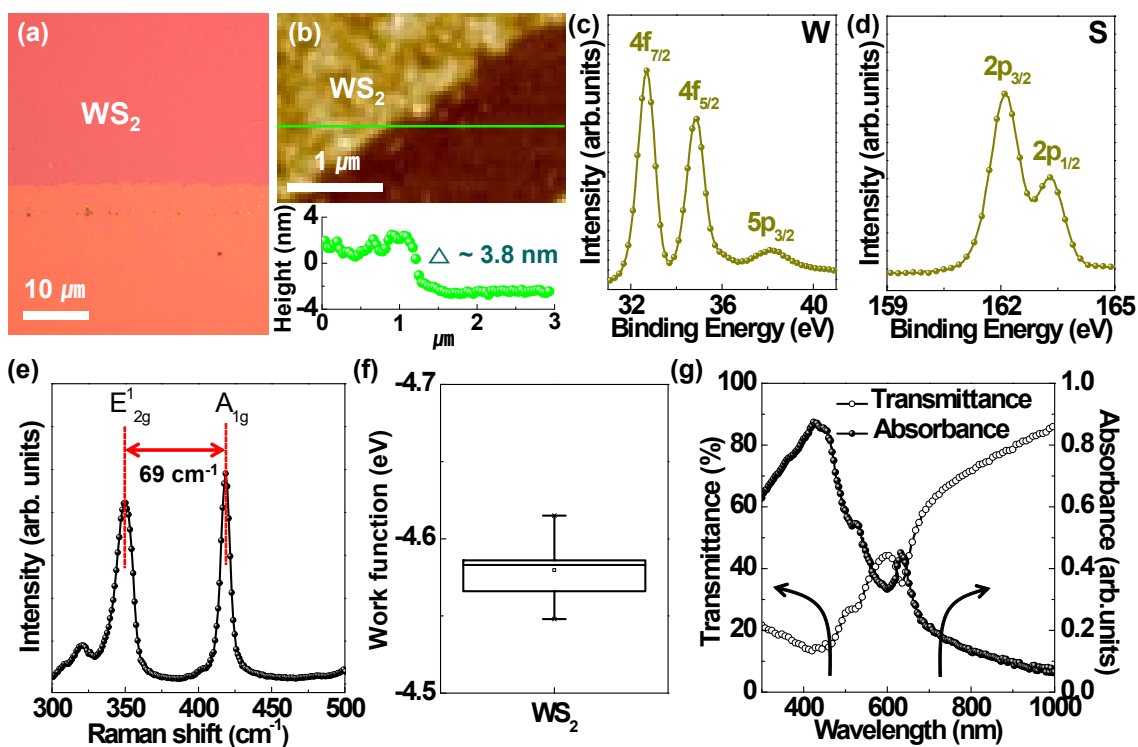


Fig. S1. (a) Optical image, (b) AFM topographic image/height profile, (c)-(d) XPS spectra, (e) Raman spectra, (f) work functions, and (g) transmittance/ absorbance spectra of WS₂ films.

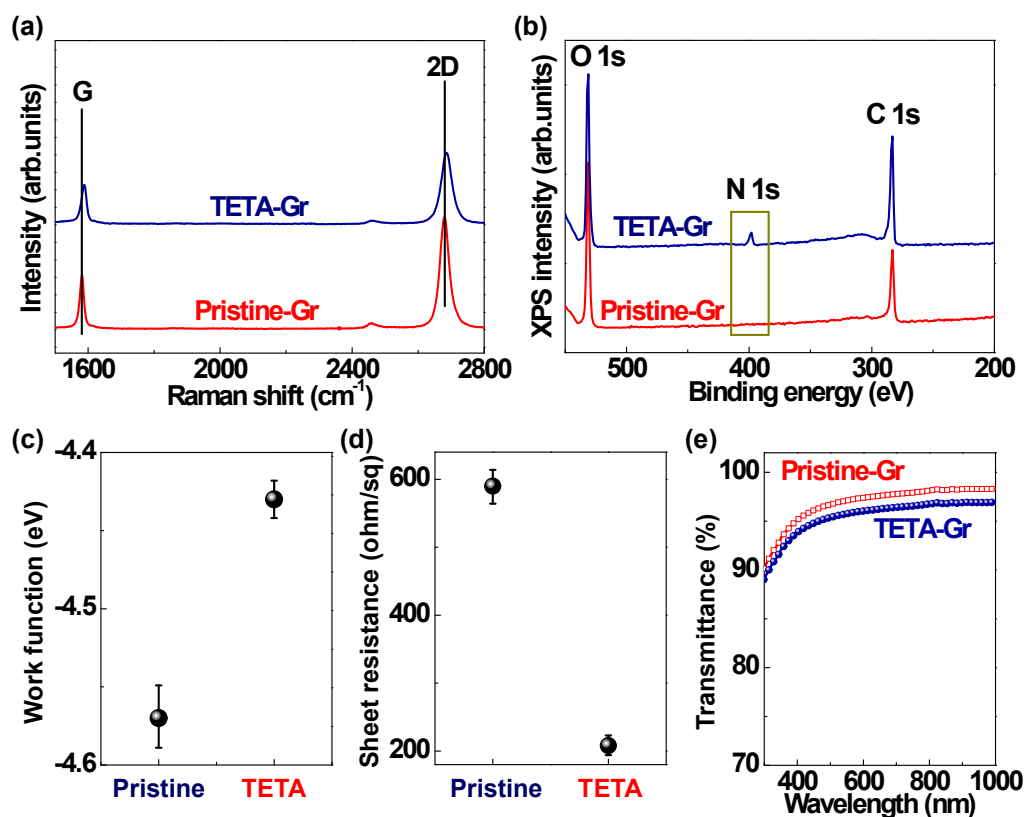


Fig. S2. (a) Raman spectra, (b) XPS spectra, (c) Work functions, (d) sheet resistance, and (e) transmittance of pristine-Gr and TETA-Gr.

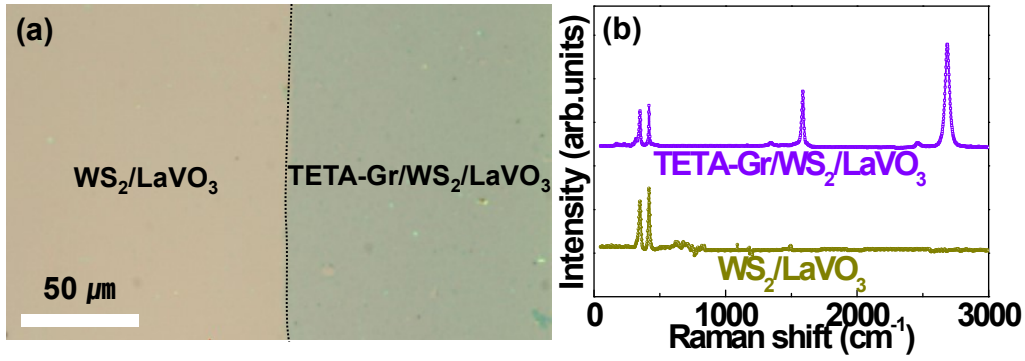


Fig. S3. (a) Optical image of $\text{WS}_2/\text{LaVO}_3$ partially covered with TETA-Gr sheet, indicating the uniformly-transfer of TETA-Gr on $\text{WS}_2/\text{LaVO}_3$. (b) Raman spectra for the regions of $\text{WS}_2/\text{LaVO}_3$ and TETA-Gr/ $\text{WS}_2/\text{LaVO}_3$.

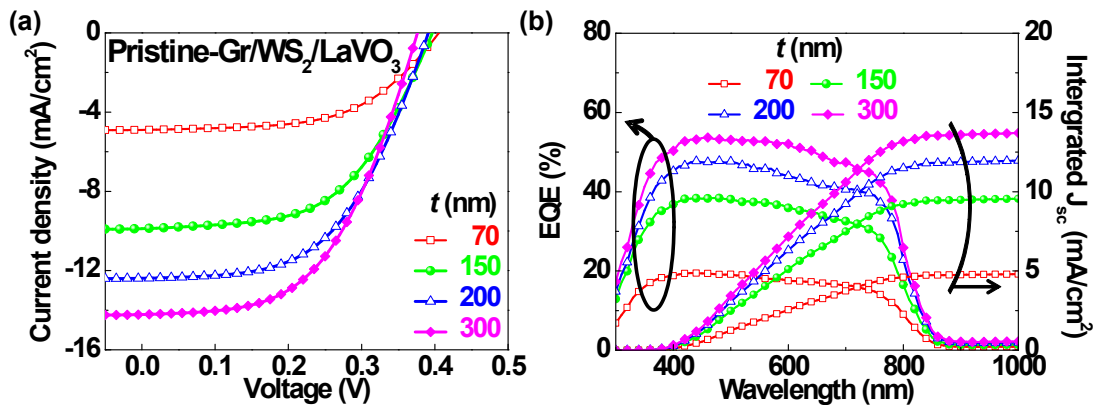


Fig. S4. J - V behaviors under 1sun illumination and (b) EQE spectra/integrated J_{sc} of pristine-Gr/ $\text{WS}_2/\text{LaVO}_3$ solar cells for different t .

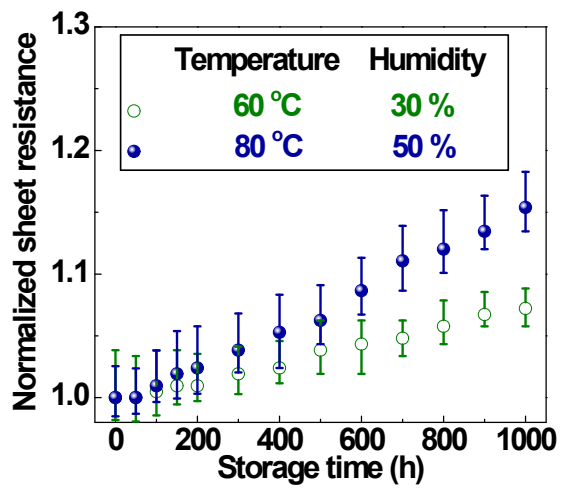


Fig. S5. Normalized changes of sheet resistance as functions of light soaking time for 60 °C temperature (T_a)/30% relative-humidity (RH) and 80 °C T_a /50% RH.