Supporting Information

Microwave Synthesized Cu_xS and Graphene Oxide Nanoribbon Composite as Highly Efficient Counter Electrode for Quantum Dot Sensitized Solar Cells

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S1. EDAX Spectra and Elemental Mapping of Cu_xS Nanostructures

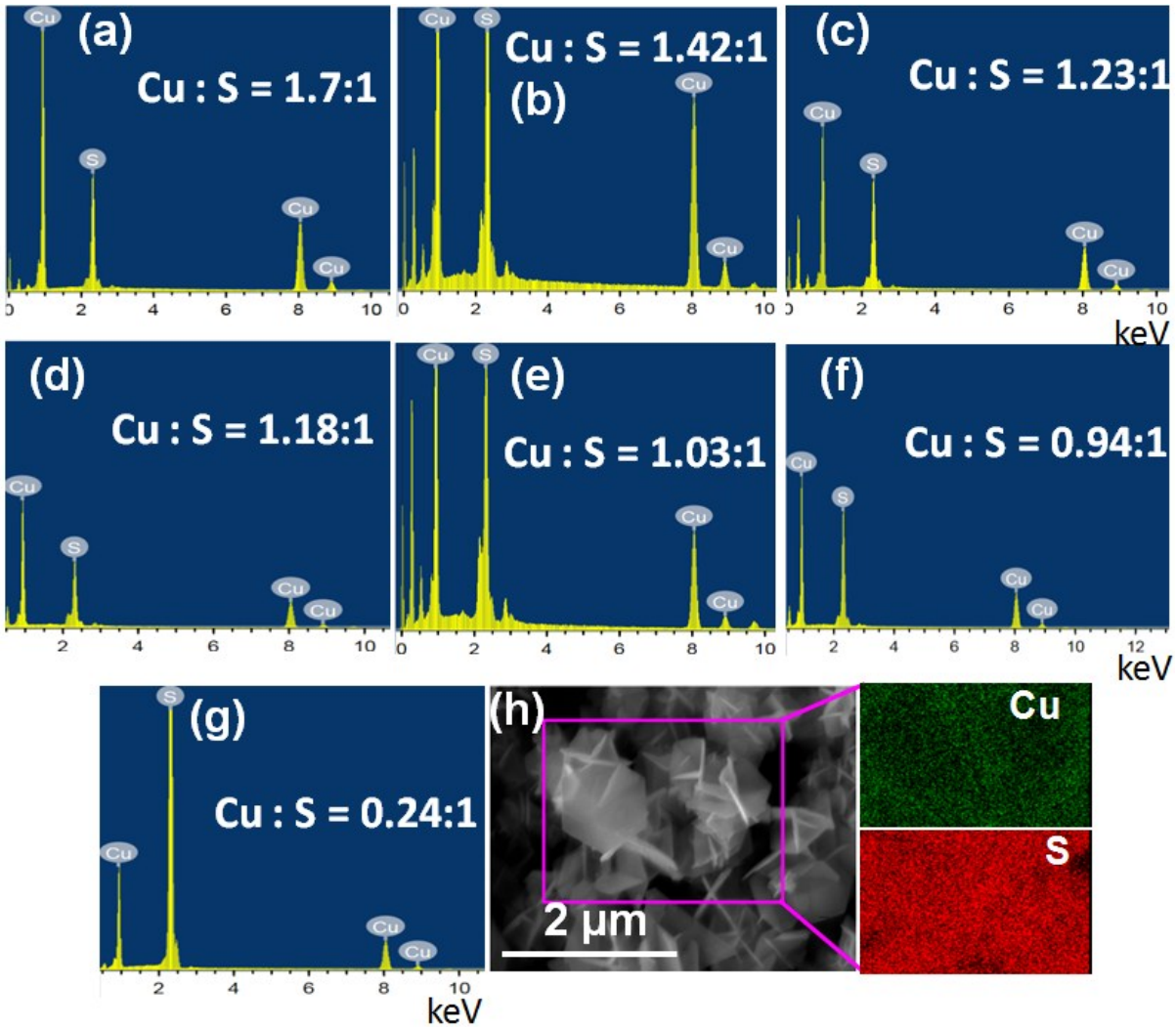

Fig. S1 EDAX spectra of Cu_xS for different Cu/S ratios, (a) 1.7, (b) 1.42, (c) 1.23, (d) 1.18, (e) 1.03, (f) 0.94 and (g) 0.24. (h) EDAX mapping of a representative Cu_xS with Cu/S ratio of 1.03.

S2. FESEM Images of Cu_xS Nanostructures

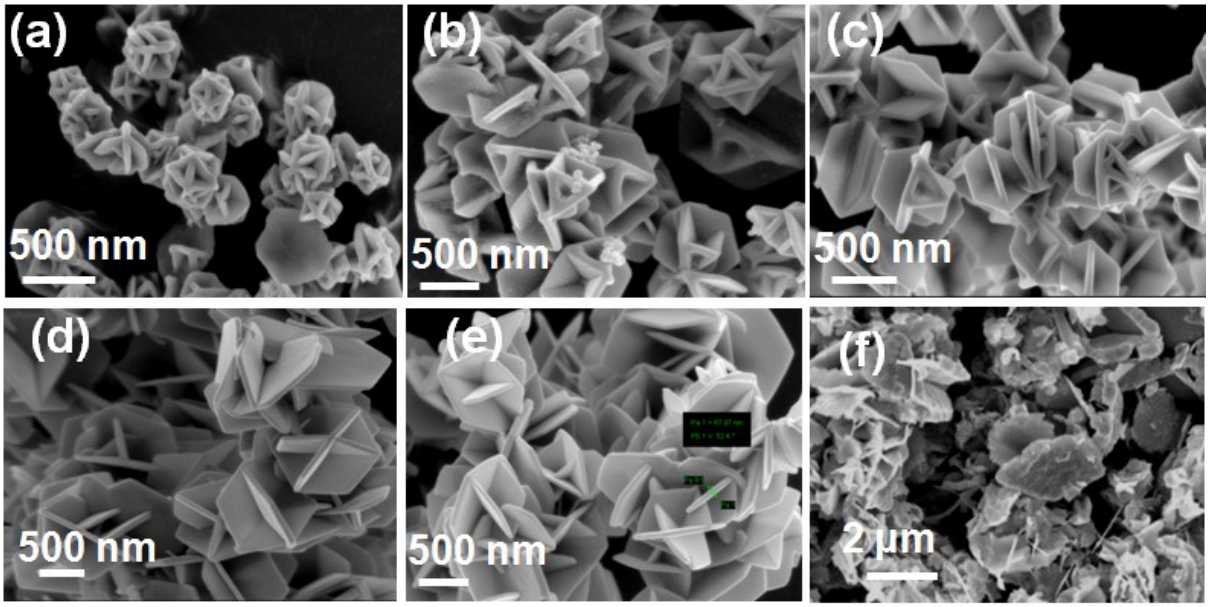

Fig. S2 FESEM micrograph of Cu_xS for *x* values of (a) 1.7, (b) 1.42, (c) 1.23, (d) 1.03, (e) 0.94 and (f) 0.24.

S3. FTIR Spectra of CNT, GOR and GO

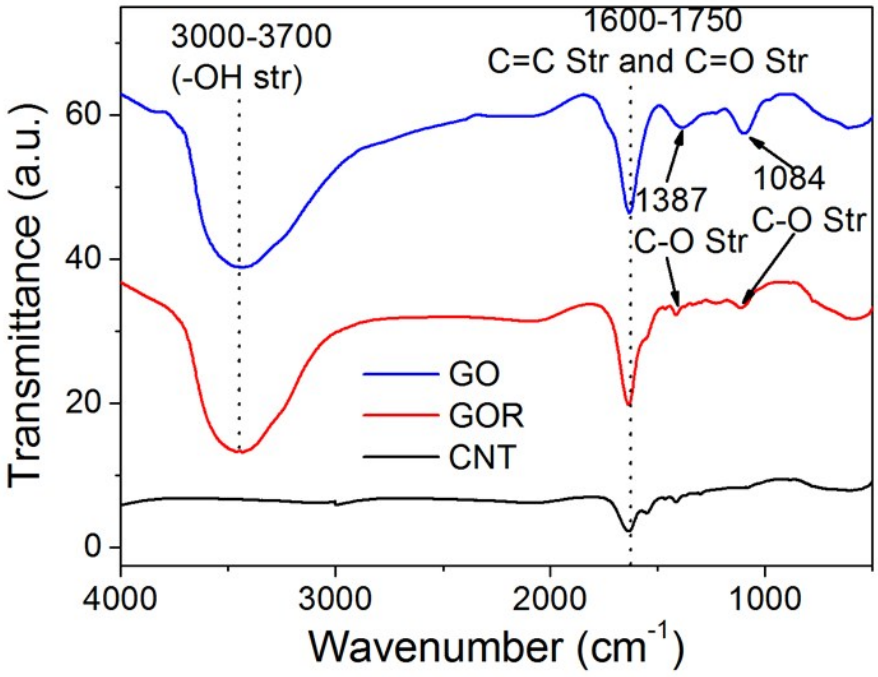

Fig. S3 FTIR spectra of CNT, GOR and GO.

S4. Band Gap Estimation of GOR

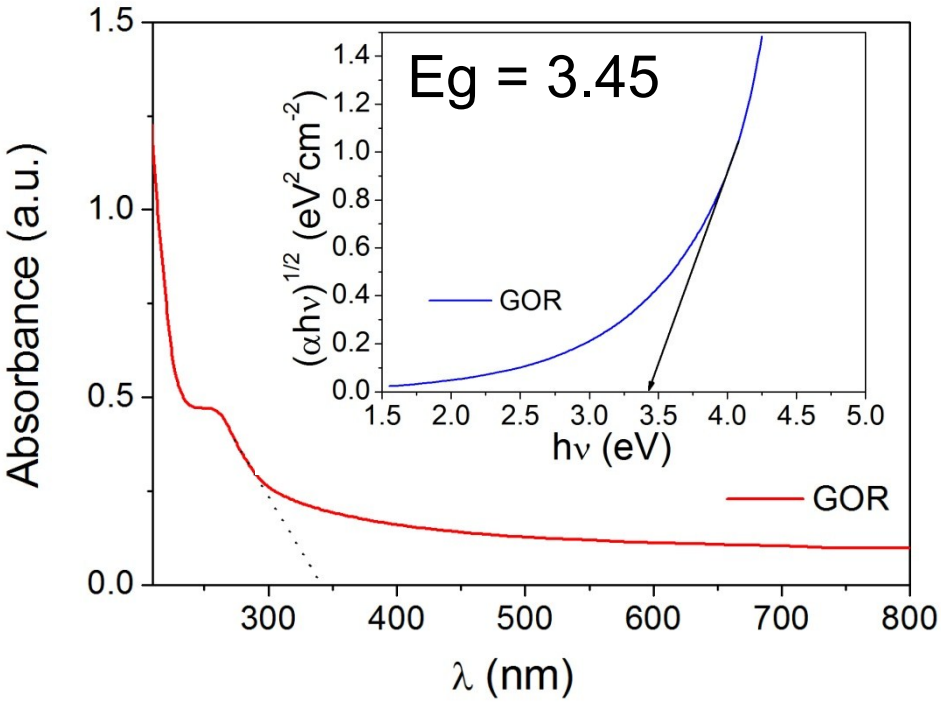

Fig. S4 Absorption spectrum of GOR. (Inset) Corresponding Tauc plot.

The UV-vis absorption spectrum shows the absorption peak at ~260 nm and the optical band gap calculated from absorption onset is ~3.45 eV which also matches well with the Tauc plot.

S5. Cu_xS Films Deposited on FTO Glass

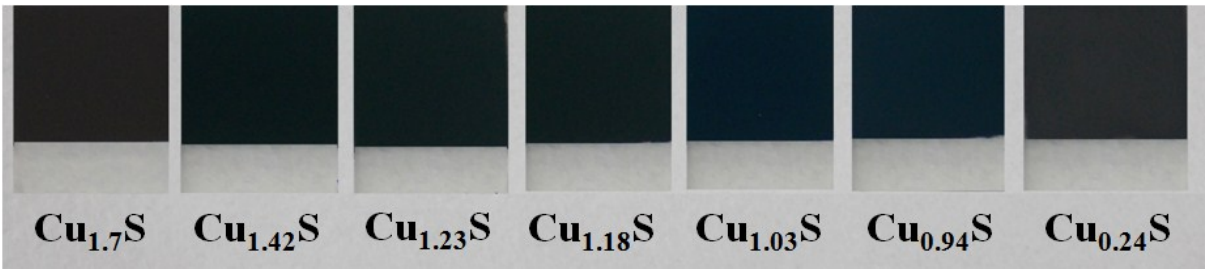

Fig. S5 Digital photographs of the Cu_xS films deposited on FTO glass.

S6. Structural Characterization of $Cu_{1.18}$S-CNT, $Cu_{1.18}$S-GO and $Cu_{1.18}$S-GOR

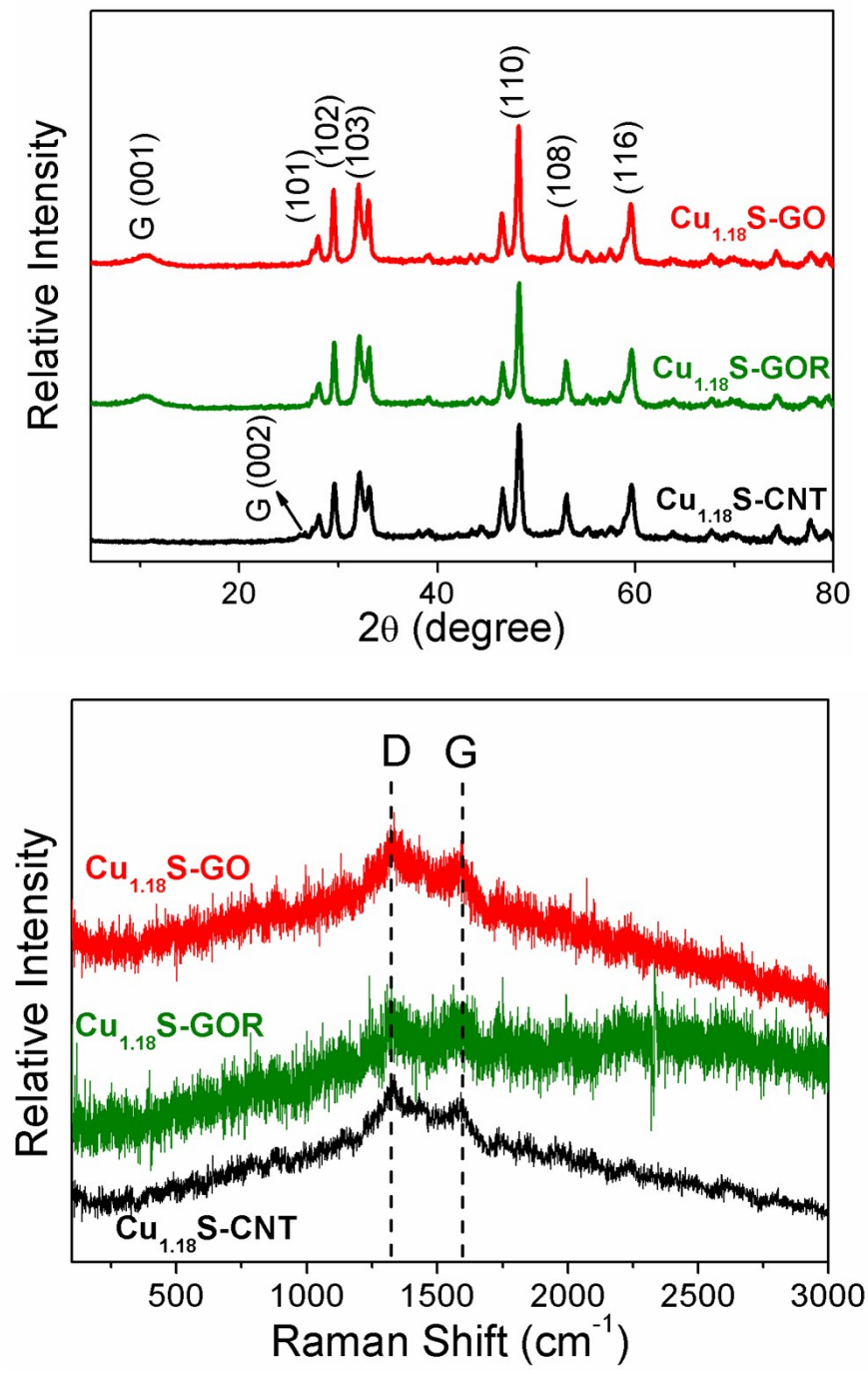

Fig. S6 (Top panel) XRD patterns and (bottom panel) Raman spectra of $Cu_{1.18}$S-CNT, $Cu_{1.18}$S-GO and $Cu_{1.18}$S-GOR composites.

Table S7: The catalytic parameters of the CEs: Pt, $Cu_{1.18}S$ composite with 15 wt% CNT, GOR and GO.

Samples	$J_{reduction}$ (mA/cm^2)	Area under CV curve	ECSA (cm^2/mg)
$Cu_{1.18}S$-CNT	-9.75	4.41	420.2
$Cu_{1.18}S$-GOR	-25.35	6.04	575.2
$Cu_{1.18}S$-GO	-21.12	5.65	538.0
Pt	-0.124	2.74	264.7

S8. Band Gap Estimation of GO

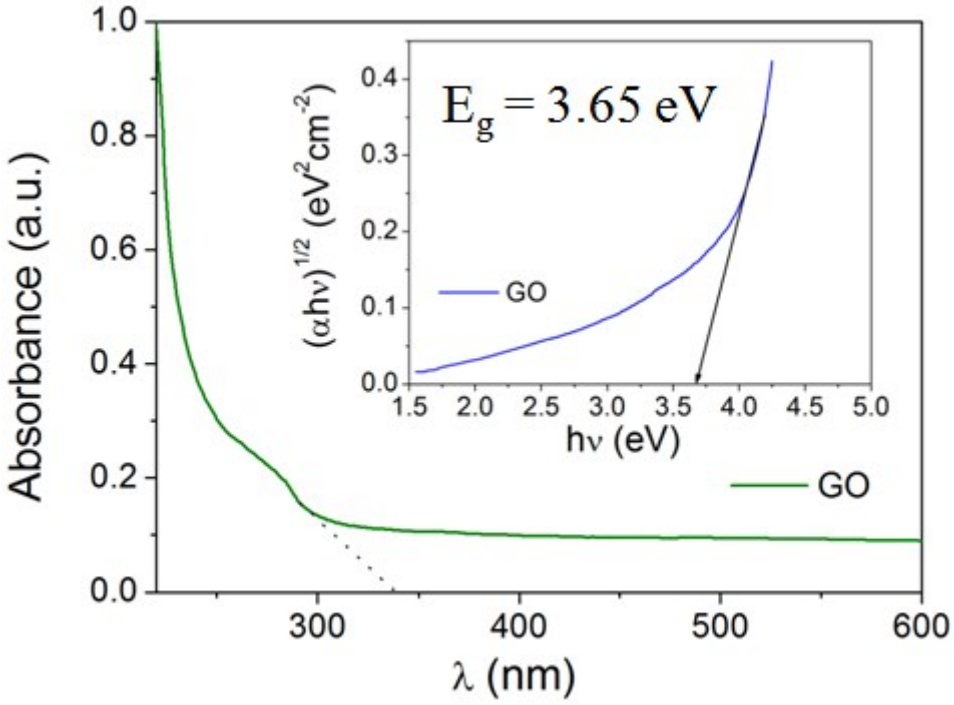

Fig. S8 Absorption spectrum of GO. (Inset) Corresponding Tauc plot.

S9. Open Circuit Voltage (V_{oc}) Decay Profiles

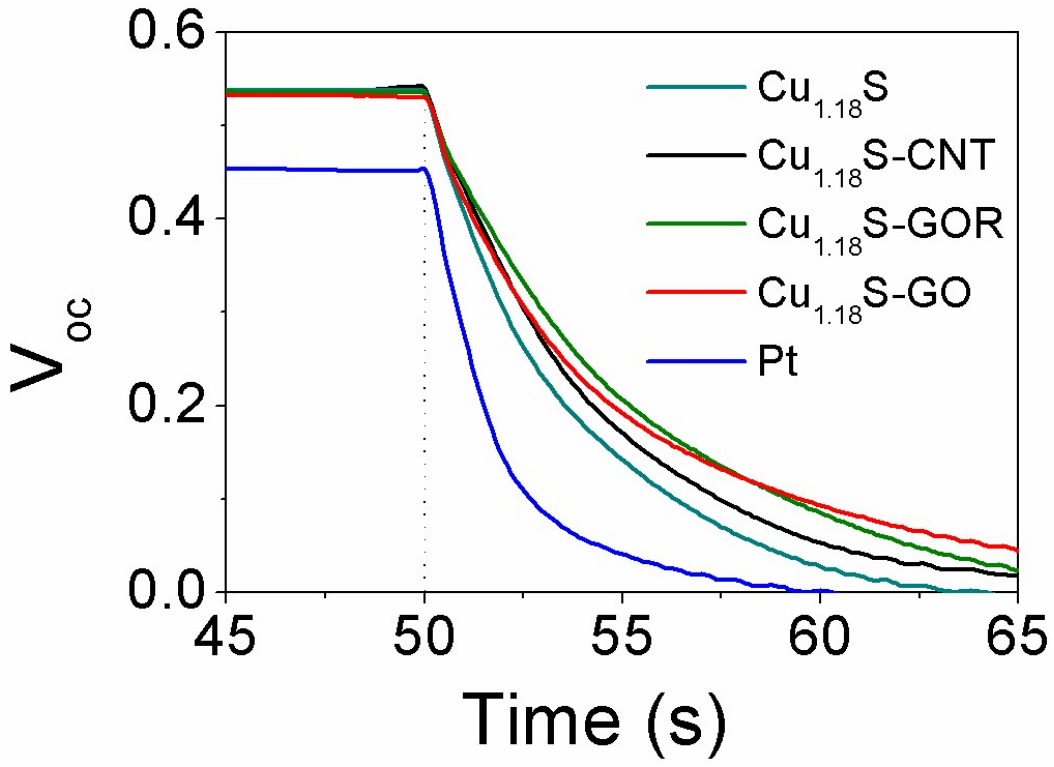

Fig. S9 V_{oc} decay with the CEs: Pt, $Cu_{1.18}S$ and its composites with 15 wt% of CNT, GOR and GO.