Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Supporting information

Porous rGO/ZnSe/$CoSe_2$ dispersed in PEDOT:PSS as Efficient Counter Electrode for Dye-Sensitized Solar Cells

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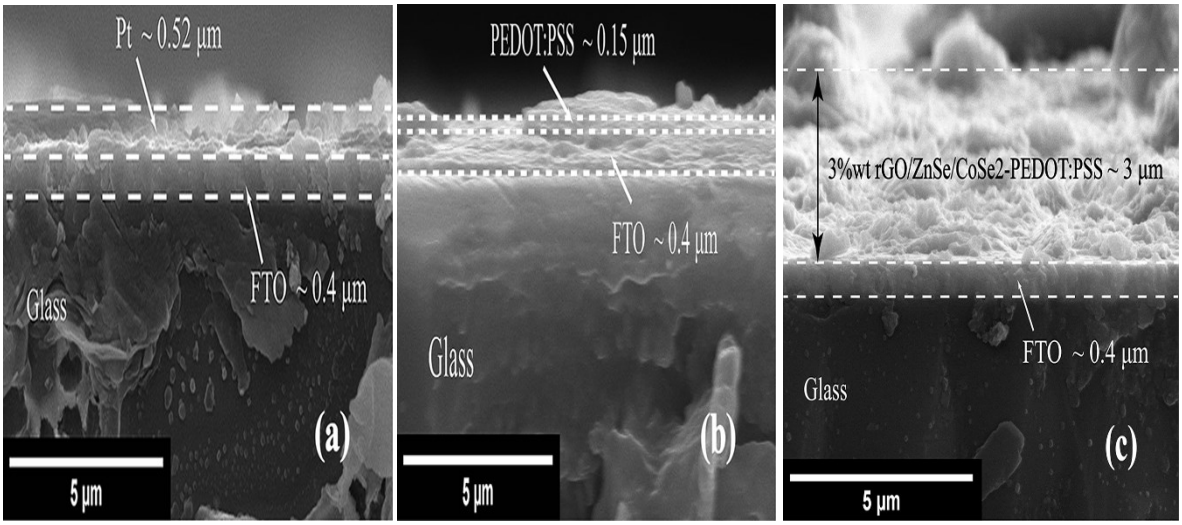

Fig. S 1 FESEM Cross sectional images of: (a) Pt; (b) PEDOT:PSS; and (c) 3% wt rGO/ZnSe/$CoSe_2$–PEDOT:PSS composite.

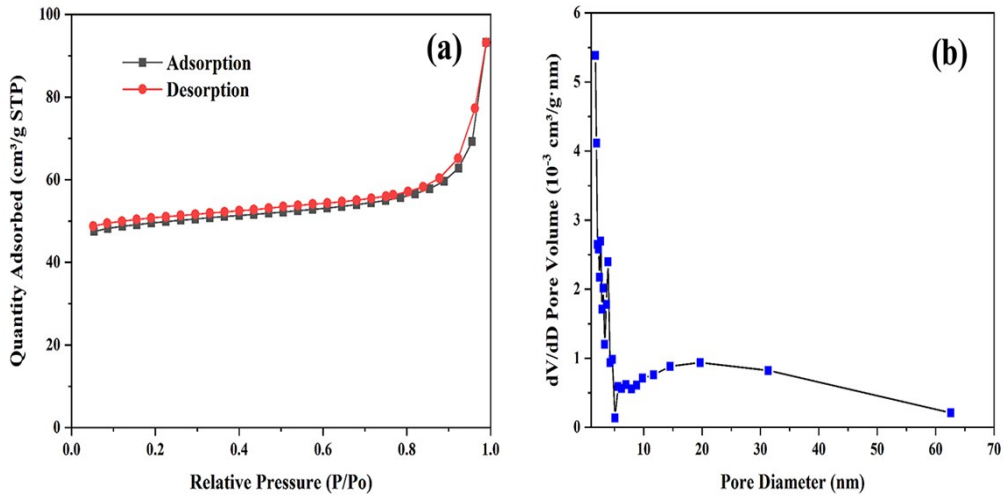

Fig. S 2 (a) N_2 adsorption-desorption isotherms, and (b) pore-size distributions of rGO/ZnSe/$CoSe_2$ composite.

Table S 1 BET parameters for rGO/ZnSe/$CoSe_2$ composite.

BET	BJH Desorption cumulative surface area of pores	BJH Desorption cumulative volume of pores	BJH Desorption average pore diameter (4V/A)
169.30 $m^2 . g^{-1}$	20.10 $m^2 . g^{-1}$	0.07 $cm^3 . g^{-1}$	14.70 nm

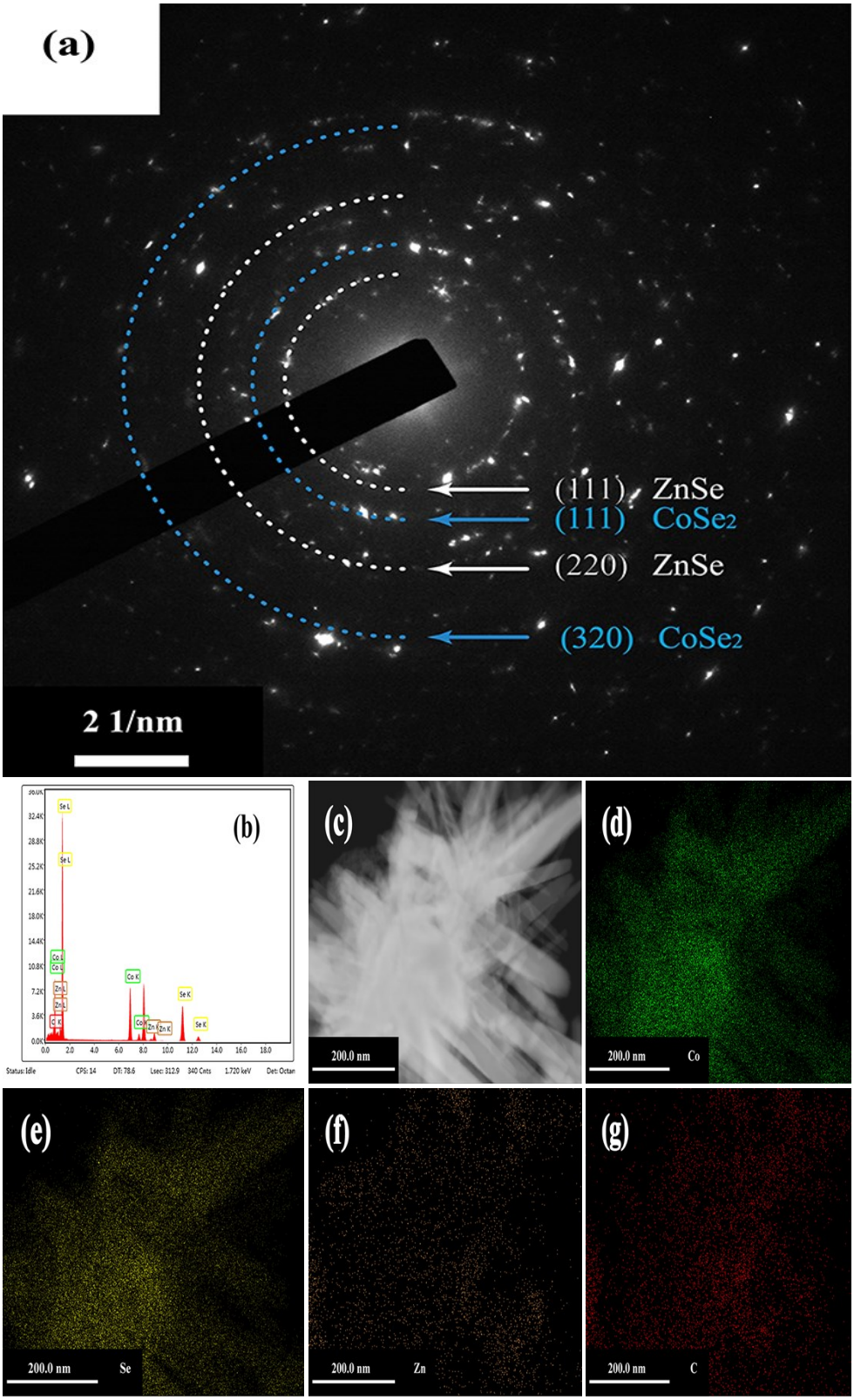

Fig. S 3 (a) SAED pattern; and (b, c, d, e, f, g) corresponding EDS mapping of porous rGO/ZnSe/$CoSe_2$.

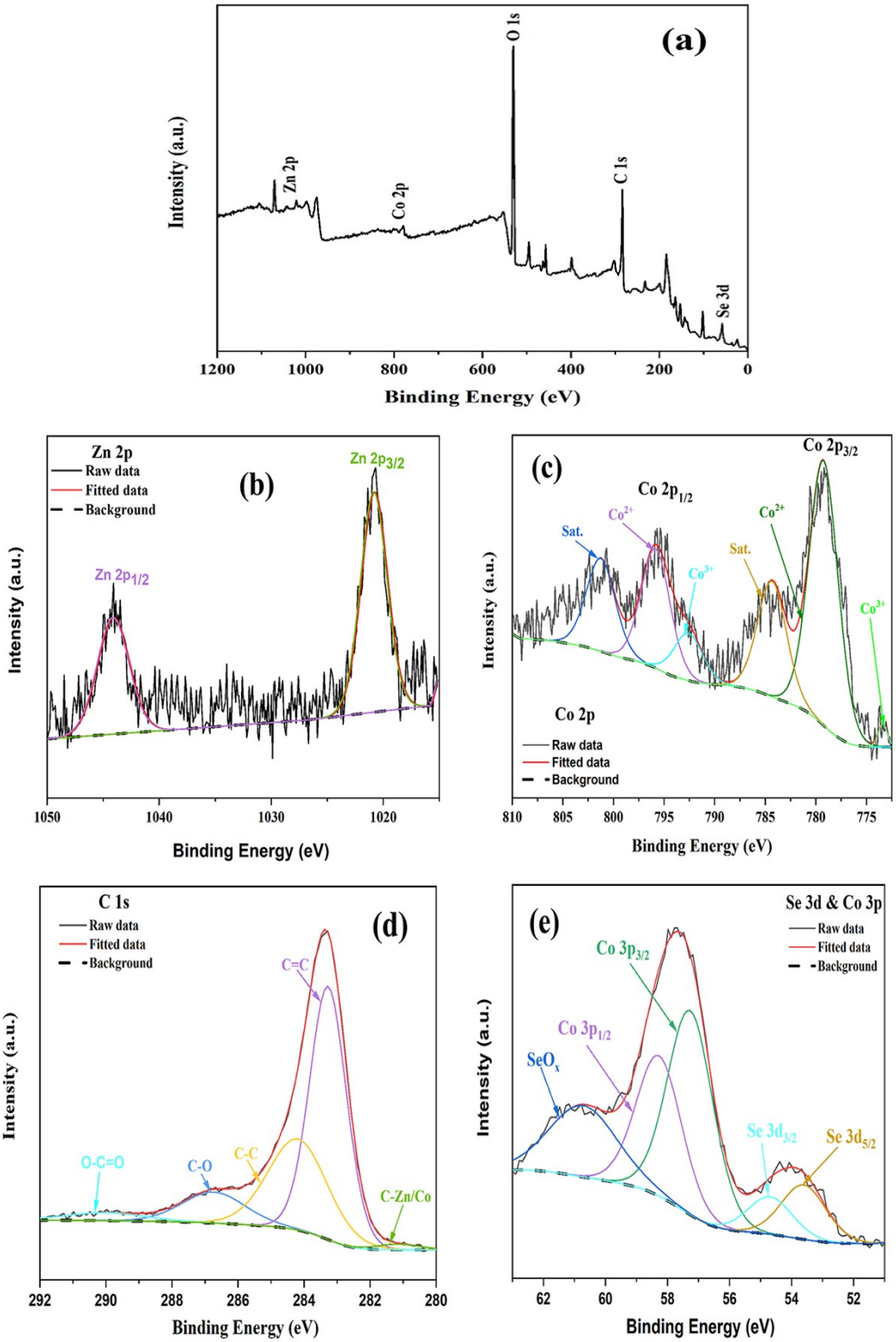

Fig. S 4 XPS spectra of porous rGO/ZnSe/$CoSe_2$: (a) Survey XPS spectra; (b) Zn 2p XPS spectra; (c) Co 2p XPS spectra; (d) C 1s XPS spectra and (e) Se 3d and Co 3p XPS spectra.

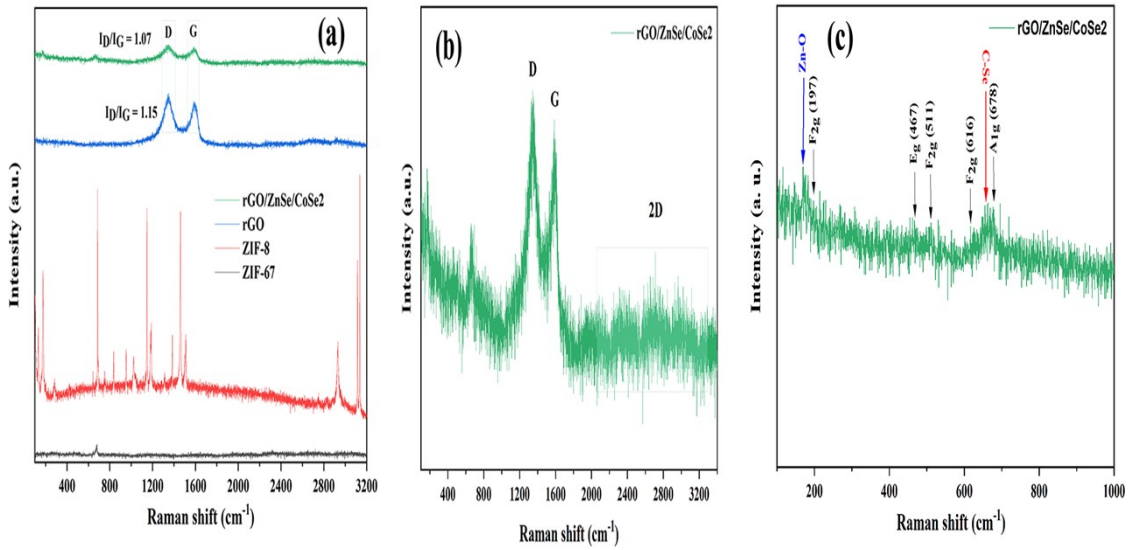

Fig. S 5 Raman spectra of ZIF-8, ZIF-67, rGO, and rGO/ZnSe/$CoSe_2$.

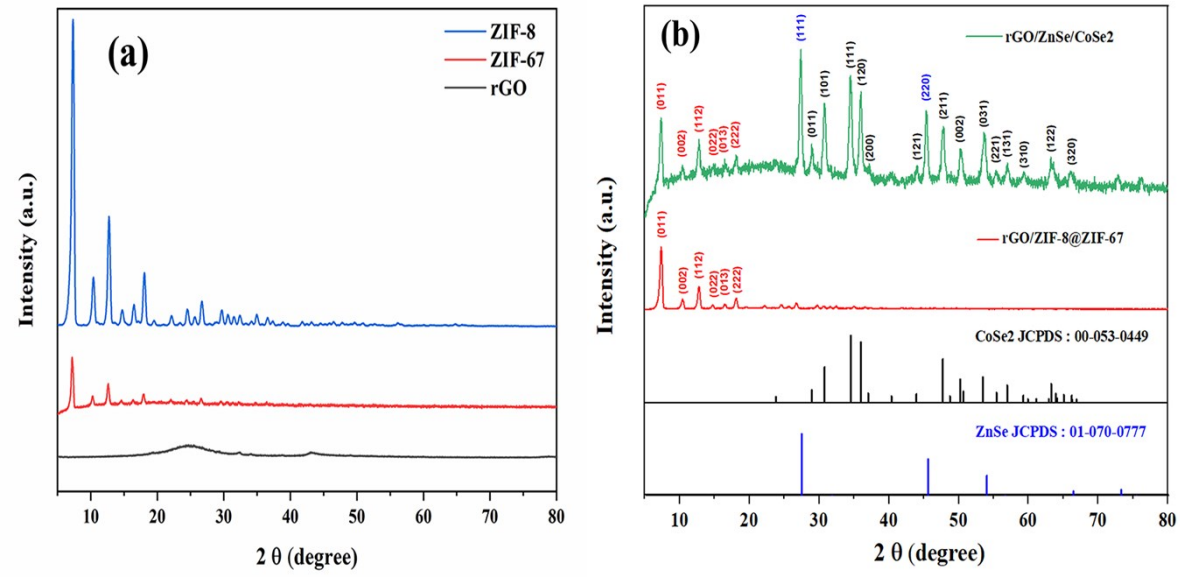

Fig. S 6 XRD patterns of : (a) ZIF-8, ZIF-67 and rGO; (b) rGO/ZIF-8@ZIF-67 and rGO/ZnSe/$CoSe_2$.

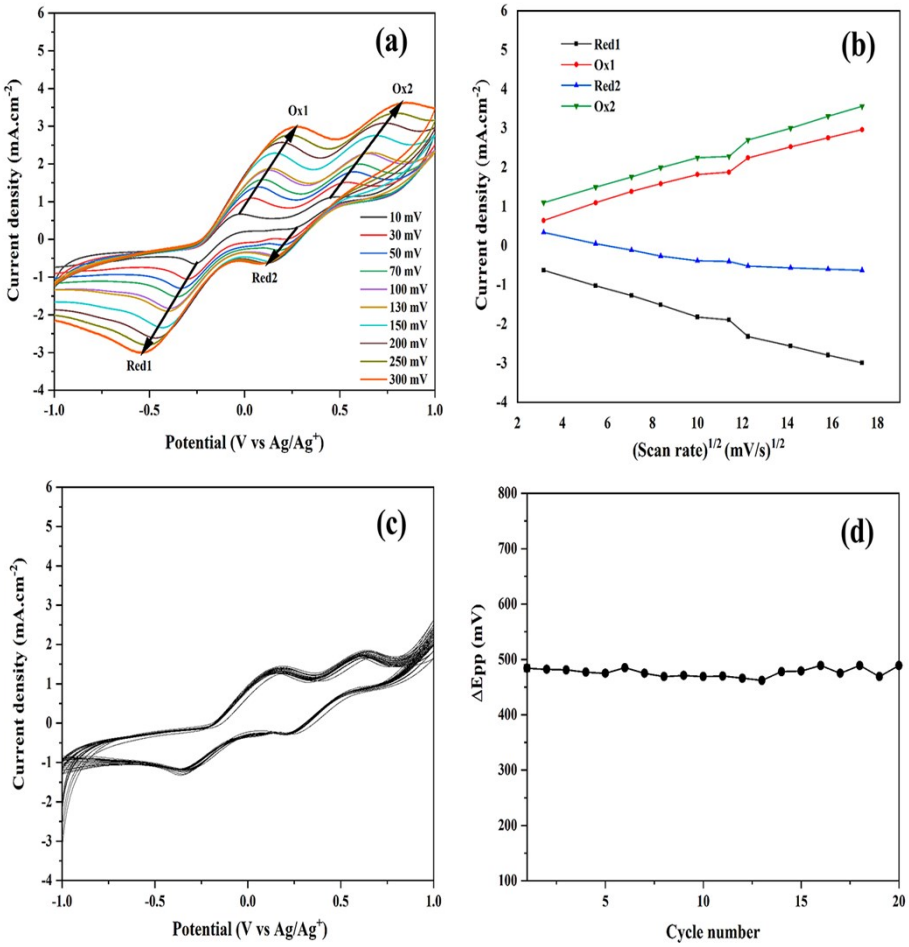

Fig. S 7 (a) CV curves of 3% wt rGO/ZnSe/$CoSe_2$–PEDOT:PSS CE at different scan rates; (b) Corresponding relationship between peak current densities and the square root of scan rates of 3% wt rGO/ZnSe/$CoSe_2$–PEDOT:PSS CE; (c) 20 times consecutive CV curves of 3% wt rGO/ZnSe/$CoSe_2$–PEDOT:PSS CE at the 50 $mV.s^{-1}$ scan rate in iodine based electrolyte; (d) Corresponding ΔE_{pp} values for the 20 times consecutive CV curves of 3% wt rGO/ZnSe/$CoSe_2$–PEDOT:PSS CE.

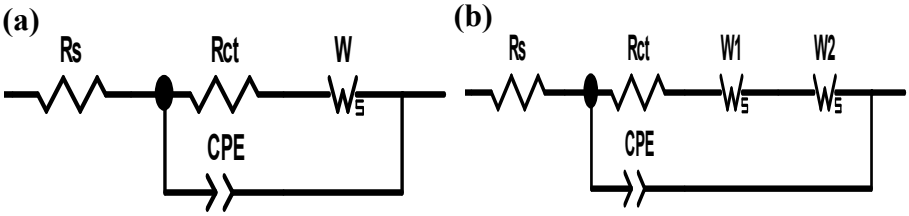

Fig. S 8 Equivalent circuit models for : (a) Pt and rGO/ZnSe/$CoSe_2$ symmetric cells; (b) PEDOT:PSS and rGO/ZnSe/$CoSe_2$–PEDOT:PSS: PSS composites based symmetric cells.