Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

PEDOT-reinforced exfoliated graphite composite as a Pt- and TCO-free flexible counter electrode for polymer electrolyte dye-sensitized solar cells

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S1. Electropolymerization of PEDOT:

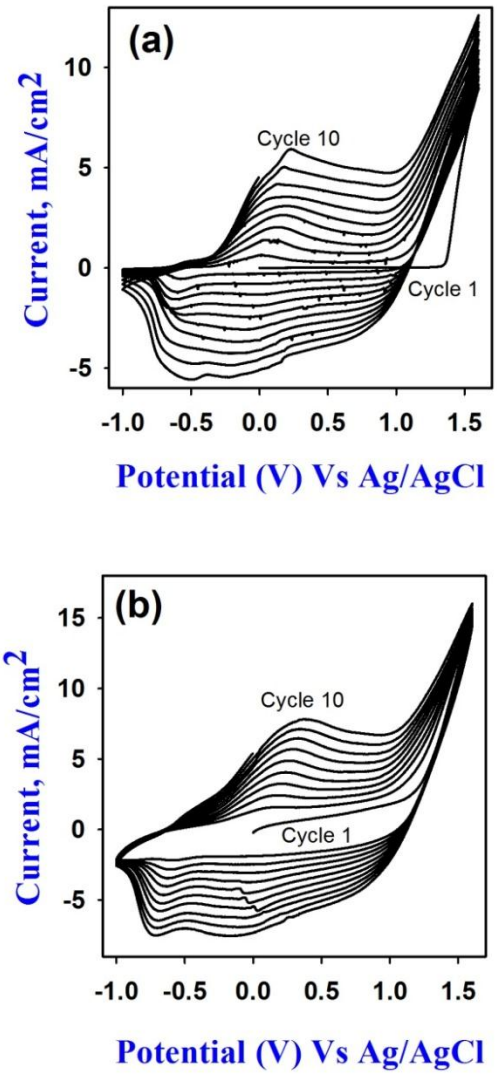

Figure S1. Cyclic voltammograms (CVs) at potential scan rates of 50 mV s^{-1}: electropolymerized PEDOT films on (a) FTO substrate and (b) EXFG sheets

Fig.S1 shows the CV plots of electropolymerized PEDOT films on FTO and EXFG sheet using Pt foil, Ag/AgCl as counter and reference electrode with a scan rate of -1V to 1.6V. During electropolymerization reaction the oxidation of monomer (first potential cycle) starts at 1.3V and 1V for the FTO substrate and EFG sheet, respectively. After the first potential cycle, the oxidation potentials shifted towards cathodic direction, which reveals that the electropolymerized oligomers can easily oxidized at lower potential than the monomer.[1] It is found that anodic and cathodic current peaks gradually increase with the number of scans, and this indicates the growth electropolymerized PEDOT on desired substrate. Further the cyclic voltammograms revealed a broad quasiriversible peak maximum at 0.43V (anodic) and -0.54V (cathodic) which corresponds to the redox activity of the PEDOT polymer.

S2. Structural analysis

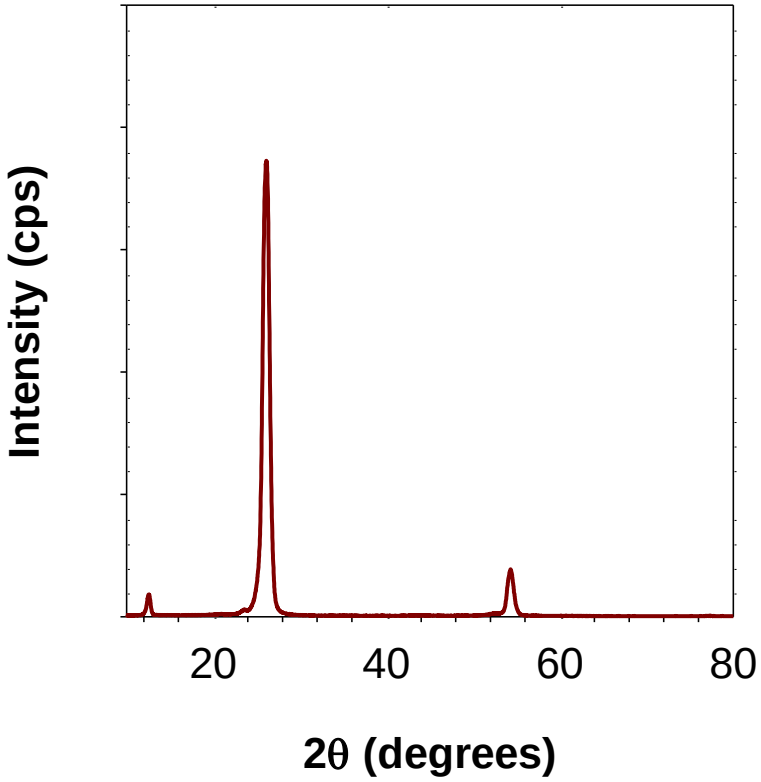

Fig S2. XRD spectra of EFG.

The XRD pattern (**Fig. S2 (a)**) of the EXFG shows the predominant peak at 2θ at 26.02 corresponding to (002) diffraction plane of graphite lattice.[2]

S3. Equivalent circuit

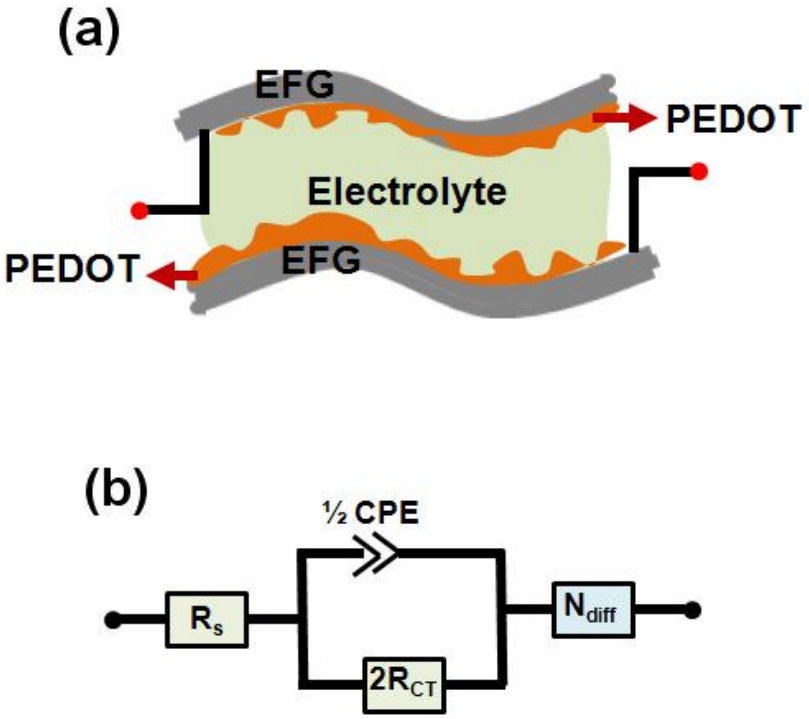

Fig. S3. (a) Schematic of symmetric cells using PEDOT/EFG electrodes and (b) equivalent circuit for analyzing Nyquist plots presented in Fig.5.

References

1. C. P. Andrieux, P. Audebert, P. Hapiot and J. M. Saveant, *J Phys Chem-Us*, 1991, **95**, 10158-10164.
2. I. M. Afanasov, O. N. Shornikova, D. A. Kirilenko, I. I. Vlasov, L. Zhang, J. Verbeeck, V. V. Avdeev and G. Tendeloo, *Carbon*, 2010, **48**, 1862-1865.