

Supporting information
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Efficient p-Type Dye-Sensitized Solar Cells based on Disulfide/Thiolate Electrolytes

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Experimental section

Counter electrode preparation: The PEDOT counter electrode was obtained by electrochemical deposition on FTO glass (3 mm thickness, 7 Ω /square, Nippon Sheet Glass) with 0.1 M EDOT in acetonitrile solution with 0.1 M LiTFSI (lithium bis(trifluoro- methanesulfonyl)amide) as supporting electrolyte. A large area Pt foil was used as counter electrode and Ag/AgCl (3M in KCl) was used as reference electrode. The electrochemical deposition was achieved by multi-potential steps (first step, 0.8V for 20s, second step, 1.05 V for 60s).

The CoS loaded ITO/glass electrodes were prepared by using a one-step electrochemical deposition method.^[1] The deposition bath was an alkaline (pH=10) aqueous solution (40 ml) containing 5 mM cobalt (II) chloride hexahydrate, $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ (Sigma-Aldrich, 98%) and 150 mM thiourea, $\text{CH}_4\text{N}_2\text{S}$ (Sigma-Aldrich). The depositions were performed at room temperature (22 °C) in a one-compartment glass cell using a three-electrode configuration. The substrate was a 4 cm² flexible ITO/glass film previously cleaned with acetone. A 1.5 cm² Pt foil served as the counter electrode and an Ag/AgCl in 3M KCl as reference electrode. The deposition potential was kept at -0.8 V vs. Ag/AgCl with a width of 5 s.

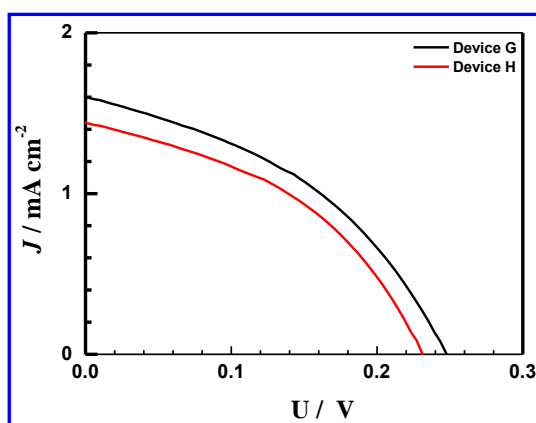


Figure S1. Optimization of electrolyte concentration and the solvent used in experiment.

Table S1 Photovoltaic parameters of various devices under AM 1.5G illumination.

	Thickness [μm]	Counter electrode	V_{OC} [V]	J_{sc} [mA cm ⁻²]	FF [%]	PCE [%]
Device G ^[a]	1.8	Pt	0.247	1.60	40	0.16
Device H ^[b]	1.8	Pt	0.231	1.44	42	0.14

^[a] 0.9M T₂/0.3M T₁ and 0.1M LiTFSI in the mixture of CH₃CN and PC (v:v,7:3);

^[b] 0.9M T₂/0.3M T₁ and 0.1M LiTFSI in CH₃CN.

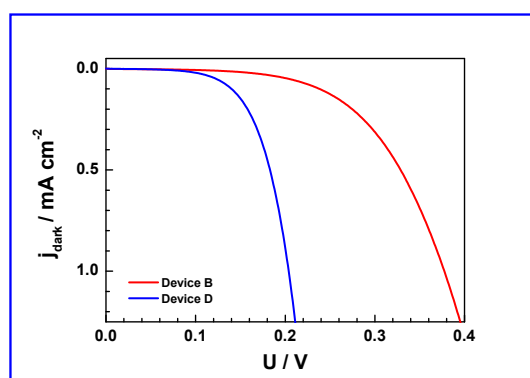


Figure S2. The effect from different redox couples and counter electrode on the dark current.

R1. M. Wang, A. Anghel, B. Marsan, N. Cevey Ha, N. Pootrakulchote, S. Zakeeruddin, M. Grätzel, J. Am. Chem. Soc., 2009, 131, 15976.