## **Electronic Supplementary Information**

Highly Efficient Dye-Sensitized Solar Cells Based on Low

Concentration Organic Thiolate/Disulfide Redox Couples

Ye Zhang, Zhe Sun, Chengzhen Shi and Feng Yan\*

Jiangsu Key Laboratory of Advanced Functional Polymer Design and Application,

Department of Polymer Science and Engineering, College of Chemistry, Chemical

Engineering and Materials Science, Soochow University, Suzhou, 215123, PR China

E-mail: fyan@suda.edu.cn

**Table S1**. The component of the electrolytes and photovoltaic performances of DSSCs with different electrolyte under simulated AM 1.5 solar spectrum illumination at 100 mM cm<sup>-2</sup> (average of four cells).

Cell	<b>Composition</b> *	$J_{sc}$ (mA cm <sup>-2</sup> )	$V_{OC}(V)$	FF	PCE (%)
В	0.1 M BMIT, 0.1 M BMIDT	16.11 (±0.22)	0.77 (±0.01)	0.54 (±0.02)	6.70 (±0.28)
G	0.4 M BMIT, 0.4 M BMIDT	6.36 (±0.21)	0.78 (±0.02)	0.62 (±0.01)	3.06 (±0.12)
Н	0.2 M BMIT, 0.2 M BMIDT	12.79 (±0.18)	0.76 (±0.01)	0.53 (±0.03)	5.19 (±0.22)
Ι	0.05 M BMIT, 0.05 M BMIDT	12.18 (±0.17)	0.75 (±0.01)	0.60 (±0.02)	5.50 (±0.17)

\* with 0.5 M TBP in acetonitrile solution.





Fig. S1. The  $^{13}$ C-NMR (a, c) and MS (b, d) of BMIT (a, b) and BMIDT (c, d).



Fig. S2. Cyclic voltammogram of cells A-E based on BMIT/BMIDT in acetonitrile solution containing 0.05 M LiClO<sub>4</sub> as the supporting electrolyte.



**Fig. S3.** The J-V curves of DSSCs assembled with electrolytes G, H, and I, under simulated AM 1.5 solar spectrum irradiation at  $100 \text{ mW cm}^{-2}$ .



Fig. S4. The IPCE vs. wavelength profiles for the DSCCs with electrolytes G-I.





**Fig. S5.** Nyquist plots of the electrochemical impedance spectra measured for DSSCs based on electrolytes G–I (Top); and fitted Bode phase plots of each device. The bias voltage for the impedance measurement was -0.70 V and the frequency ranged from  $0.01-10^5$ Hz in dark (bottom).