Electronic Supplementary Information

Dye-Sensitized Solar Cells Based on Cobalt-containing Room Temperature Ionic Liquid Redox Shuttles

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Table S1. Photovoltaic performance of Cell A' and Cell B' under simulated AM 1.5 solar spectrum illumination at 100 mM cm^{-2}. The DSSCs were characterized immediately after fabrication and the average performance of three devices (with standard deviations in parentheses) is provided.

Cell	Composition	V_{oc} (mV)	J_{sc} (mA cm^{-2})	*FF* (%)	η (%)
A'	0.5M PMII, 0.05M I_2, 0.2M $LiClO_4$, 0.8M TBP in 1-butyl-3-methylimidazolium tetrafluoroborate ($BMIBF_4$)	634(±4)	8.62(±0.3)	63.8(±1.0)	3.5(±0.3)
B'	0.5M PMII, 0.2M $[BMI]_2[Co(NCS)_4]$, 0.02M $NOBF_4$, 0.8M TBP, 0.2 M $LiClO_4$ in $BMIBF_4$	684(±3)	6.26(±0.2)	55.6(±1.1)	2.4(±0.1)

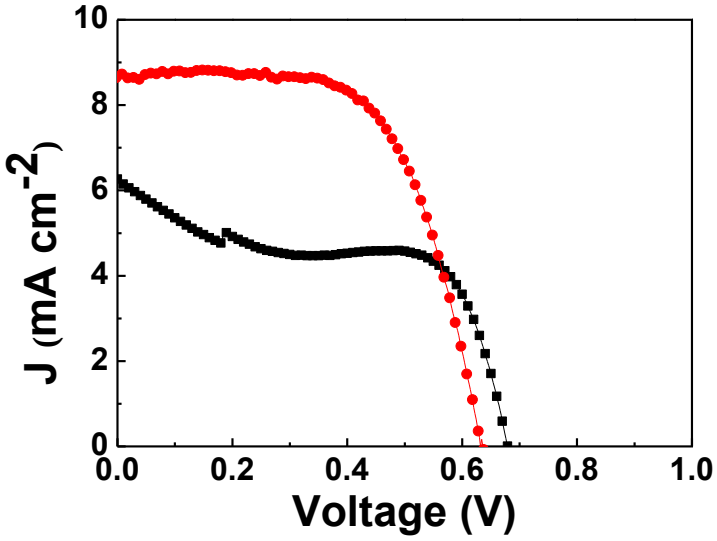


Fig. S1 The *J-V* curves of Cell A' (—■—) and Cell B' (—●—) under the simulated AM 1.5 solar spectrum irradiation at 100 mW cm^{-2}. Cells were tested using an aluminum foil mask with an aperture area of 0.1 cm^2. Poor fill factor (FF) and low efficiency of the devices were obtained.

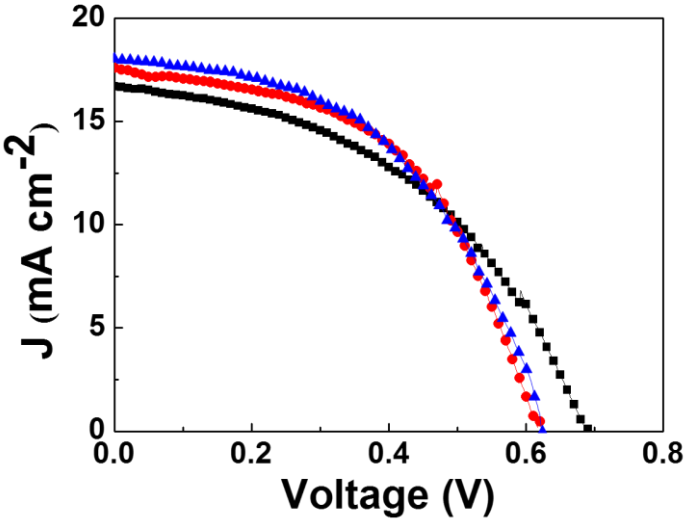


Fig. S2 The *J-V* curves of Cell C (—■—), Cell D (—●—) and Cell E (—▲—)under the simulated AM 1.5 solar spectrum irradiation at 100 mW cm^{-2}. Cells were tested using an aluminum foil mask with an aperture area of 0.1 cm^2.

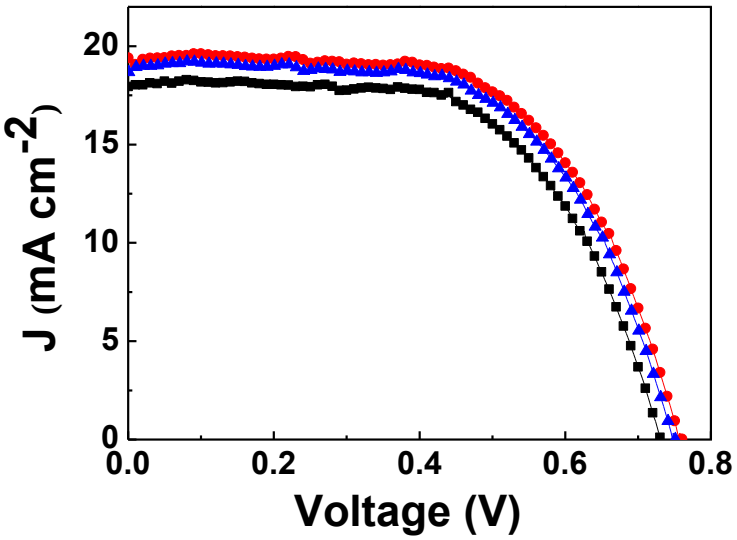
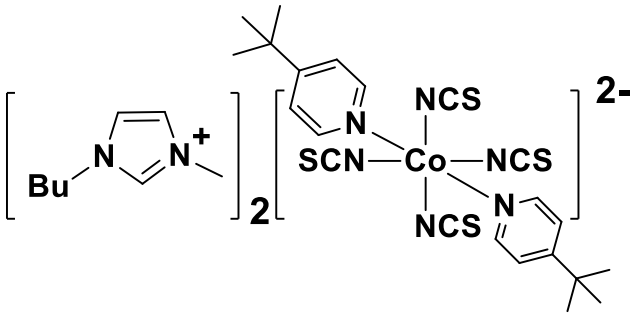


Fig. S3 J-V curve of Cell B on the 1st day (—■—), 30th day (—●—) and 120th day (—▲—) testing under the simulated AM 1.5 solar spectrum irradiation at 100 mW cm^{-2}. The Cell was tested using an aluminum foil mask with an aperture area of 0.1 cm^2.



Scheme S1 Chemical structure of $[BMI]_2[Co(NCS)_4(TBP)_2]$

$[BMI]_2[Co(NCS)_4(TBP)_2]$: FTIR (KBr) ($cm^{-1}$): 3140, 3086, 2952, 2925, 2866, 2063, 1613, 1569, 1494, 1456, 1411, 1384, 1158, 1102, 1012, 959, 825, 740, 645, 622. Elemental analysis Calcd.: C, 54.33%; H, 6.72%; N, 16.67%. Found: C, 53.11%; H, 6.39%; N, 17.26%.