Supporting Information

Enhancing the Performance of Transparent Conductive Oxide-less Back Contact Dye-sensitized Solar Cells by Facile Diffusion of Cobalt Species through TiO_2 Nanopores

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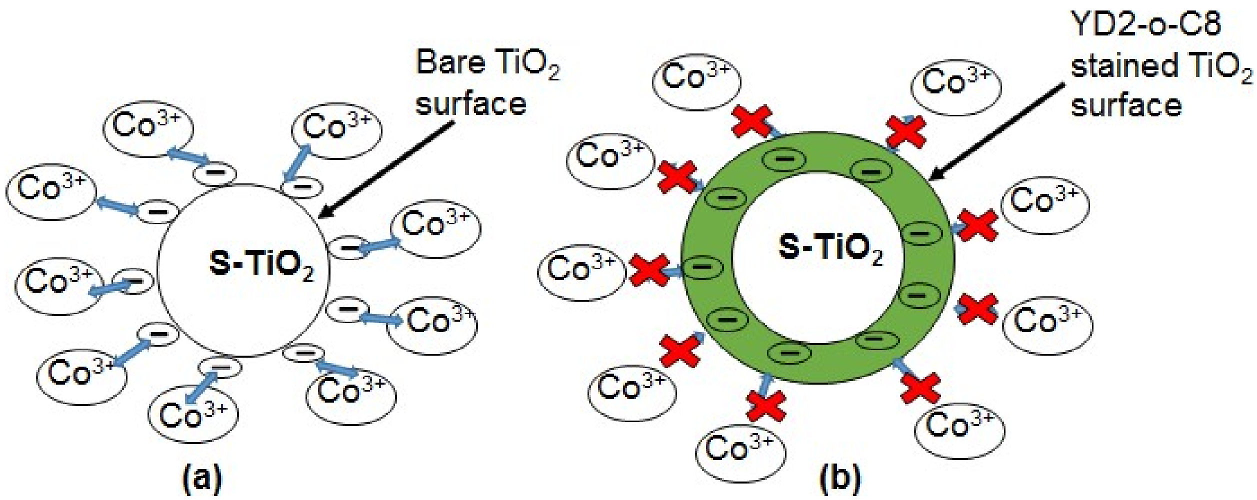

Figure S1: Schematic representation of (a) possible electrostatic interaction between the negatively charged bare TiO_2 surface and the oxidized Co^{3+} species, and (b) suppression of the electrostatic interaction by staining the TiO_2 surface by YD2-o-C8 dye.

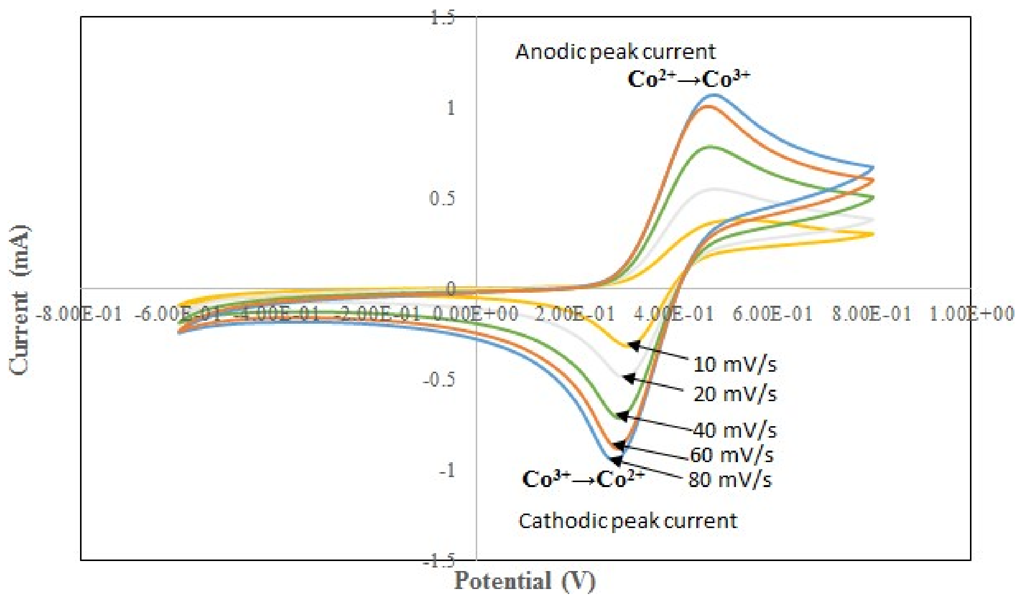

Figure S2: The cyclic voltammogram for 2.2 mM $Co(bpy)_3(PF6)_2$ and 0.1 M $TBAPF_6$ in acetonitrile solution emloying different scan rates of 10 mV/s, 20 mV/s, 40 mV/s, 60 mV/s, and 80 mV/s.

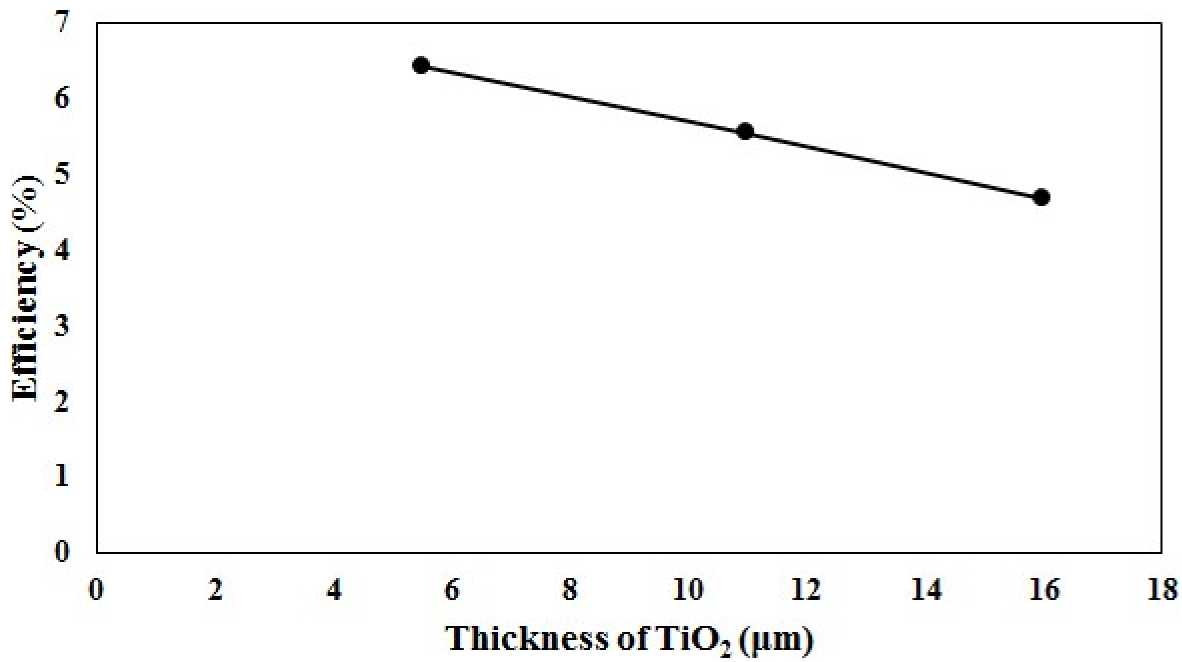

Figure S3: Relationship between photoconversion efficiency and thickness of nanoporous TiO_2 film stained with the YD2-o-C8 dye coated onto the Pt counter electrode.

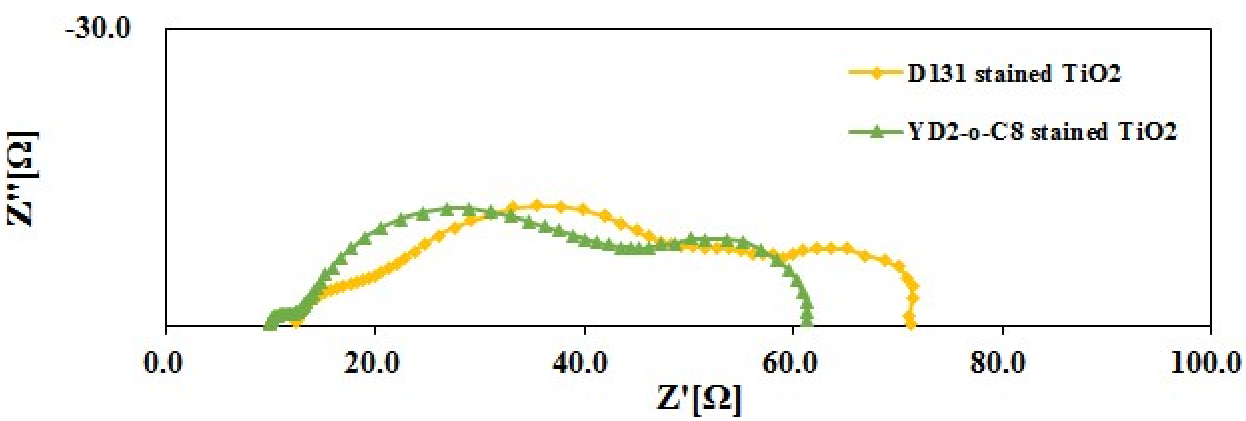

Figure S4: Niquist plots for TCO-less BC-DSSCs with YD2-o-C8, and D131 stained nanoporous TiO_2 layer coated onto the Pt counter electrode used as an electrolyte absorber.

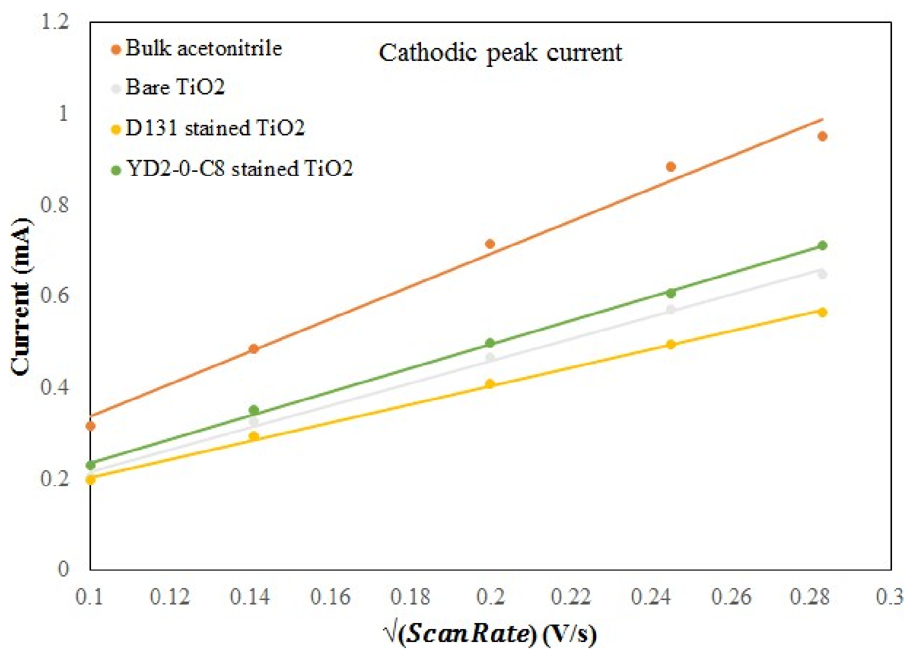

Figure S5. Cathodic peak current, i_p versus square root of scan rate, $\nu^{1/2}$ graph in bulk acetonitrile and through YD2-o-C8 stained TN spacer, bare TN spacer, and D131 stained TN spacer measured at different scan rates of 10 mV/s, 20 mV/s, 40 mV/s, 60 mV/s, and 80 mV/s, respectively.

The diffusion coefficient was calculated using the Randles-Sevcik equation at 25˚C

$i_p = 2.68{\times}10^5\ n^{3/2}\ AD^{1/2}Cv^{1/2}$

where i_p is the cathodic peak current, n the number of electrons transferred in the redox event, A the electrode area, D the diffusion coefficient, C the concentration of the redox specie and v the scan rate.

Table S1 Diffusion coefficient of $[Co(bpy)]^{3+}$ specie in bulk acetonitrile and through YD2-o-C8 stained TN spacer, bare TN spacer and D131 stained TN spacer.

Diffusion medium	Diffusion Coefficient
Bulk acetonitrile	9.13×10^{-6} cm^2s^{-1}
YD2-o-C8 stained TiO_2	5.11×10^{-6} cm^2s^{-1}
Bare TiO_2	4.24×10^{-6} cm^2s^{-1}
D131 stained TiO_2	3.24×10^{-6} cm^2s^{-1}