Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Electronic Supplementaly Information (ESI)

The cause for the low efficiency of dye sensitized solar cells with the combination of Ruthenium dyes and Cobalt redox

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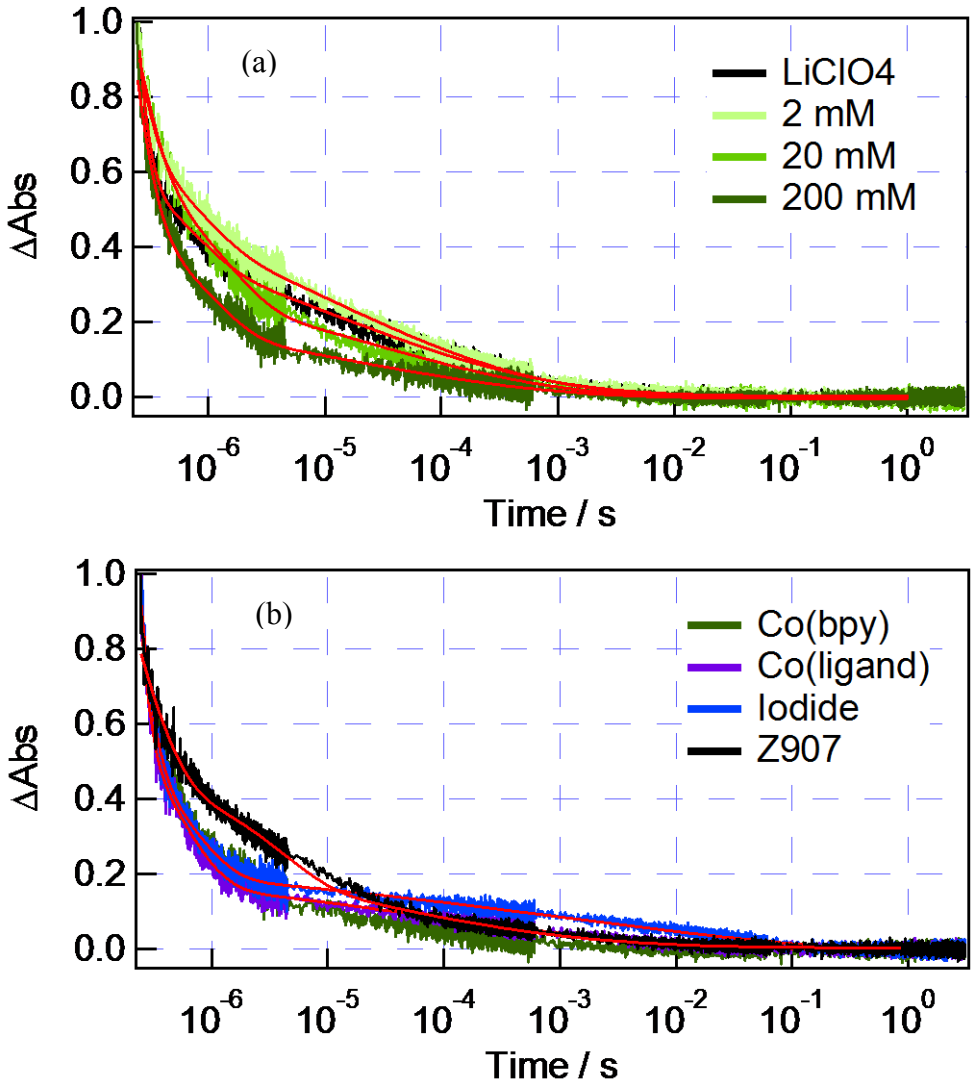


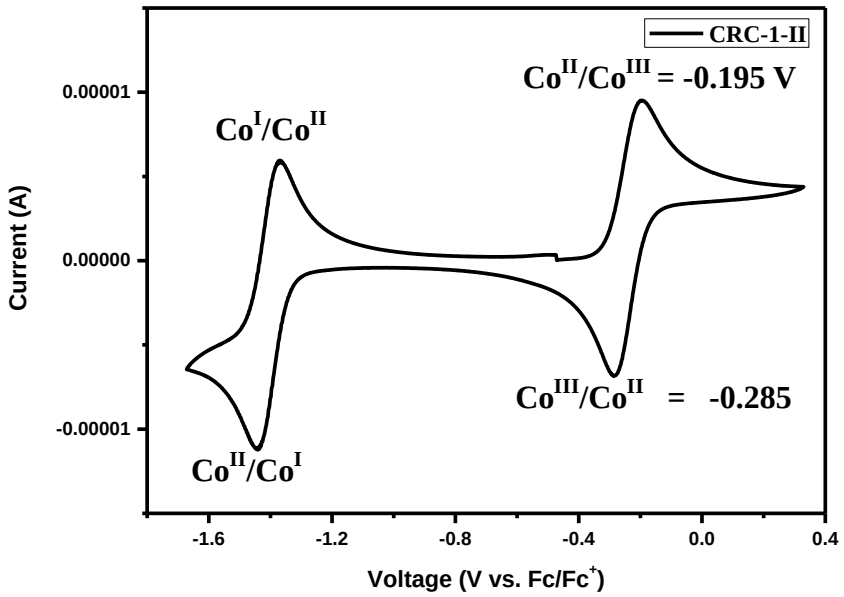
	τ_{dye+} / 10^{-6} s	τ_{e-} / 10^{-5} s	β
$LiClO_4$/ACN	9.1±0.9	-	0.22
Co(bpy) 2 mM	9.7±1	-	0.24
Co(bpy) 20 mM	1.3±0.1	1.9±0.2	0.25
Co(bpy) 200 mM	9.6±1× 10^{-1}	9.6±1× 10^{-1}	0.22
Co(ligand)	4.7±0.5× 10^{-1}	6.5±0.7	0.20
Iodine	5.7±0.6× 10^{-1}	1.1±0.1 × 10^{2}	0.17
Z907	4.3±0.4	2.6±0.3× 10^{-1}	0.17

Fig.S1 The transient absorption responses at 785 nm for various electrolytes and the corresponding fitting curves. (a) is for the data in Fig.4, corresponding for LiClO4 in acetnitrile, and 2, 20 and 200 mM Co(bpy)

electrolytes and (b) is for the data in Fig.5, corresponding for the electrolytes, Co(bpy), Co(ligand), iodine, and in Fig.6, corresponding for the dye, Z907. The responses were fitted with

$$y = y_0 + A_1 \exp(-x/\tau_1) + A_2 \exp(-x/\tau_2) + A_3 \exp(-(x/\tau_3)^{\beta})$$

The constant and first exponential terms are added to adjust the baseline and the initial peak including the laser noise, and the second represents the decay of the dye cation, and the third stretched exponential term corresponds to the electron decay in TiO_2. The chart summarized the fitting result for each response.



$$E_{redox} = [-0.195+(-0.285)]/2 + 0.64 = 0.400 \text{ V } vs. \text{ }^{1}NHE$$

Fig.S2 Cyclic voltammogram for the Co(ligand) electrolyte.

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