

Redox-active charge carriers of conducting polymers as a tuner of conductivity and its potential window

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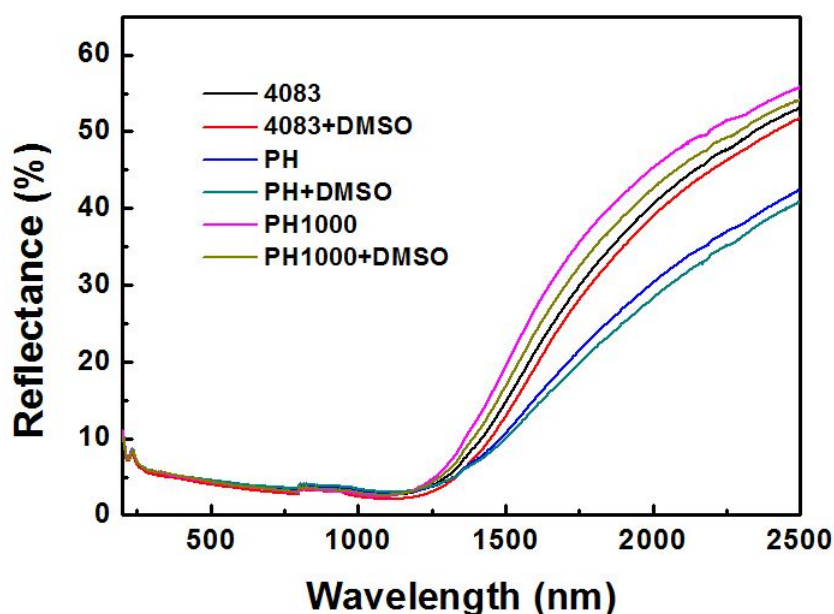


Fig. S1. Reflectance spectra of PEDOT:PSS measured by ultraviolet-visible spectroscopy (Varian Carry 5000).

Table S1. Plasma wavelength and carrier density of PEDOT:PSS

	4083	4083 +DMSO	PH	PH +DMSO	PH1000	PH1000 +DMSO
plasma wavelength (nm)	1102	1101.5	1103.5	1103	1084	1085
carrier density* (cm ⁻³)	2.195 x 10 ²⁰	2.197 x 10 ²⁰	2.189 x 10 ²⁰	2.191 x 10 ²⁰	2.268 x 10 ²⁰	2.264 x 10 ²⁰

Carrier density was calculated from plasma wavelength by: $n = \omega_p^2 m^ \epsilon / (4 \pi e^2)$ with $\omega_p = 2 \pi c / \lambda_p$, where λ_p and ω_p = free carrier plasma wavelength and frequency, n = charge carrier density, c = speed of light (3×10^8 m s⁻¹), $e = 1.602 \times 10^{-19}$ C, m^* = effective mass (9.109×10^{-31} kg), ϵ = dielectric constant ($3 \times 8.854 \times 10^{-12}$).

Table S2. Representative equivalent circuit parameters from fitting impedance data with corresponding equivalent circuit.

		-DMSO	+DMSO
+0.5 V	AI4083	* 0.03 mF	* 0.9 mF
	PH	* 1.50 nF	* 1.56 mF
	PH1000	* 1.49 mF	* 1.59 mF
-0.5 V	AI4083	** 35 k Ω	** 9.8 k Ω
	PH	*** 0.063x10 ⁻³ mF sec ^{-0.5}	** 0.34 k Ω
	PH1000	*** 0.053 x10 ⁻³ mF sec ^{-0.5}	** 0.91 k Ω

* Capacitance (C_{dl}) calculated from constant phase element (exponent > 0.75)

** Charge transfer resistance (R_{CT}) calculated from Randle circuit

*** Y_o from Warburg impedance: $Z_w^{-1} = Y_o (j\omega)^{0.5}$

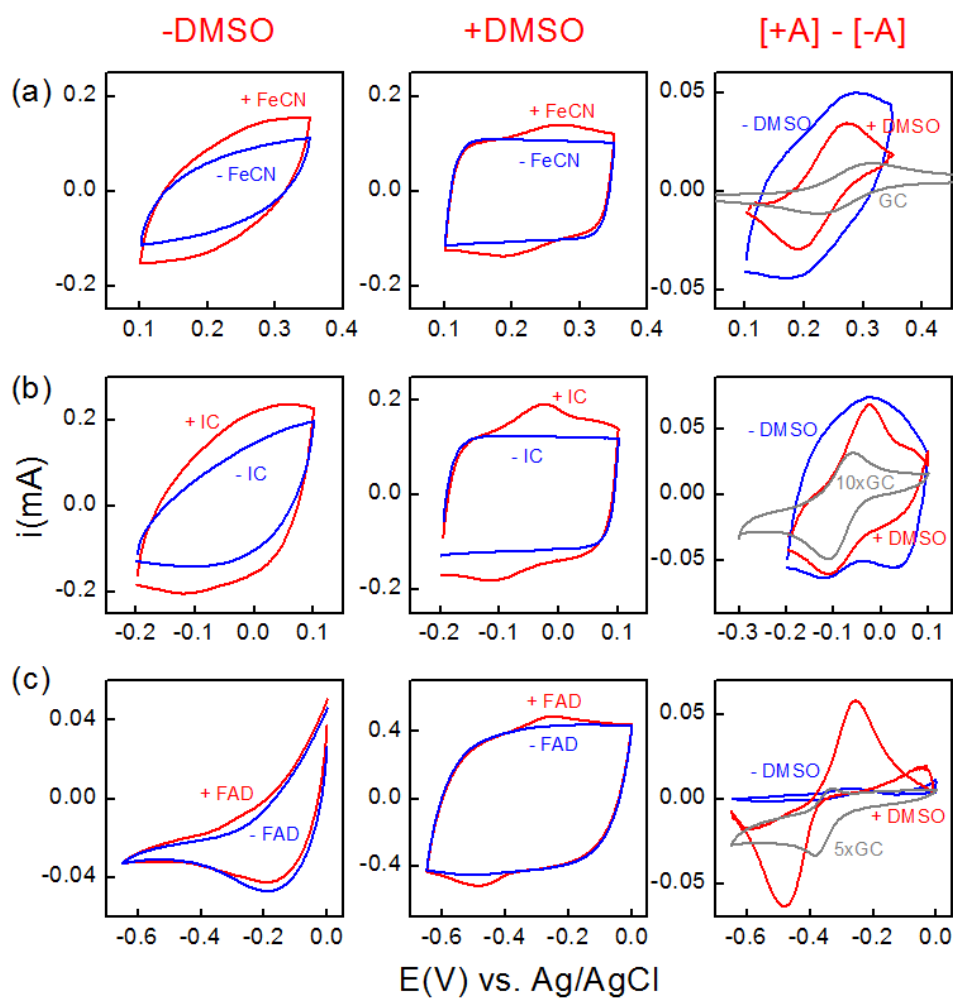


Fig. S2. Cyclic voltammograms of $K_3Fe(CN)_6$ (FeCN), indigo carmine (IC) and flavin adenine dinucleotide (FAD) on PH1000-filmed electrodes. (-DMSO and + DMSO).