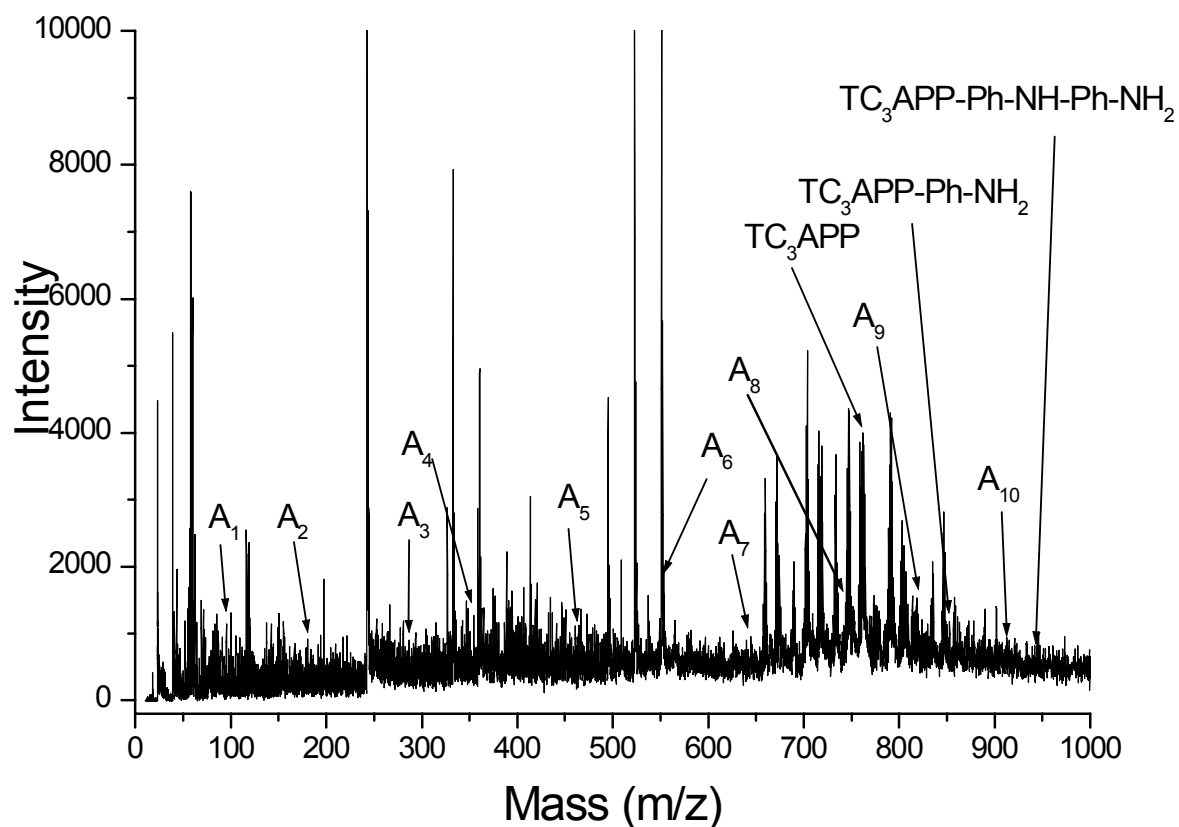


Supplementary Material (ESI) for Photochemical & Photobiological Sciences
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Electronic Supplementary Information

Photoelectropolymerization of Aniline in a Dye-Sensitized Solar Cell

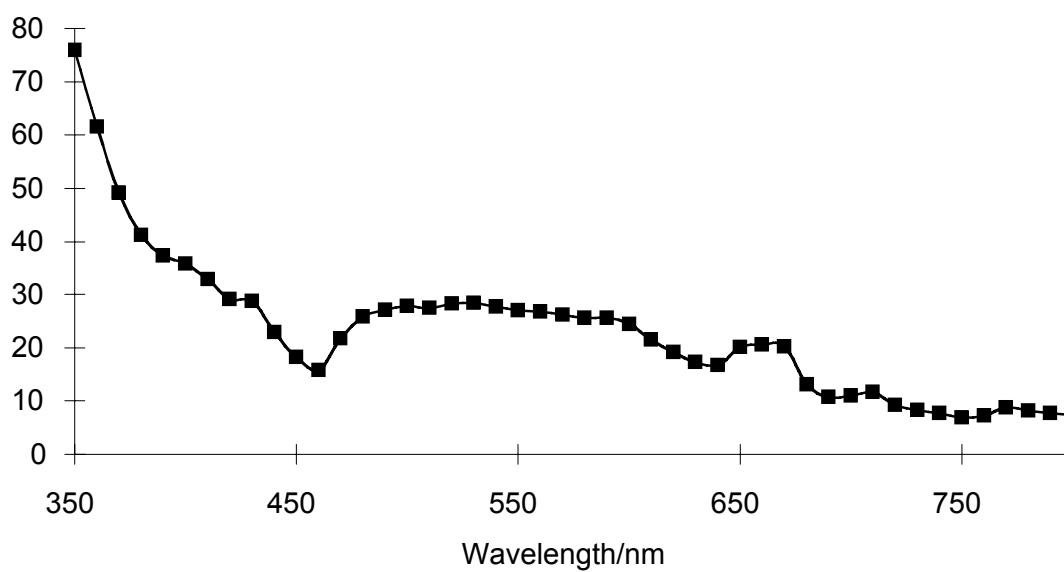
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ESI Figure 1. Mass spectrum of photoproduct isolated from finished cells after 2.5 hours irradiation.

A_n = aniline oligomers (m/z = 93, 183, 275, 366, 457, 548, 639, 730, 821, 912)

TAC₃PP (m/z = 761.8); TC₃APP-Ph-NH₂ (m/z = 852.9); TC₃APP-Ph-NH-Ph-NH₂ (m/z = 944.0)



ESI Figure 2. Action spectrum of incident photon-to-current conversion efficiency for a typical TAC₃PP/PAni cell.

ESI Table 1. Effect of irradiation time for photoelectropolymerization

Time (hour)	V _{oc} (V)	J _{sc} (μA/cm ²)	FF	η (%)
0.8	0.35	107	0.58	0.20
2.5	0.36	96.7	0.64	0.21
4.2	0.37	93	0.69	0.22
22	0.41	93	0.81	0.29

ESI Table 2. Effect of adsorption time of TiO₂ electrode in 100 μM TC₃APP solution

Adsorption Time (hour)	Absorbance at Q ₄ band	Concentration of TC ₃ APP on TiO ₂ (nmol/cm ²)	V _{oc} (V)	J _{sc} (μA/cm ²)	FF	η (%)
1	0.82	55	0.43	86	0.80	0.26
6	1.6	107	0.44	163	0.78	0.43
12	-	-	0.44	210	0.70	0.47
24	1.7	113	0.47	150	0.84	0.53

ESI Table 3. Effect of different concentrations of TC₃APP solution on adsorption

TC ₃ APP solution (μM)	Absorbance at Q ₄ band	TC ₃ APP on TiO ₂ (nmol/cm ²)	V _{oc} (V)	J _{sc} (μA/cm ²)	FF	η (%)
1	-	-	0.39	99	0.72	0.27
10	0.16	10.6	0.37	104	0.67	0.23
25	0.82	54.7	0.39	120	0.84	0.38
50	1.1	73.3	-	-	-	-
100	1.7	113	0.47	150	0.84	0.53

ESI Table 4. Effect of the amount of CSA in aniline (100 mmol)

CSA (mmol)	V_{oc} (V)	J_{sc} ($\mu A/cm^2$)	FF	η (%)
1	0.31	31	0.49	0.04
5	0.34	61	0.58	0.11
10	0.37	104	0.67	0.23

ESI Table 5. Effect of the amount of LiClO₄ in aniline (100 mmol)

LiClO ₄ (mmol)	V _{oc} (V)	J _{sc} (μA/cm ²)	FF	η (%)
1	0.15	18	0.31	0.008
3	0.26	19	0.32	0.017
5	0.33	83	0.59	0.14
10	0.37	104	0.67	0.23

ESI Table 6. Effect of the amount of polyethylene oxide in aniline (100 mmol)

PEO ^a (mmol)	V _{oc} (V)	J _{sc} ($\mu\text{A}/\text{cm}^2$)	FF	η (%)
0	0.32	180	0.62	0.31
25	0.30	175	0.61	0.29
38	0.33	166	0.70	0.33
50	0.47	150	0.84	0.53

^a Molar content of ethylene oxide units

ESI Table 7. Solvent effects and DCA effects

Solvent	DCA	Adsorbed TC ₃ APP (nmol/cm ²)	V _{oc} (V)	J _{sc} (μA/cm ²)	FF	η (%)
Ethanol	DCA	216	0.47	150	0.84	0.53
	none	-	0.62	46	0.80	0.23
THF	DCA	37.5	0.75	75	0.88	0.49
	none	-	0.65	91	0.41	0.41

ESI Table 8. Effect of applied bias voltage during photopolymerization

Applied Voltage (V)	V _{oc} (V)	J _{sc} (μA/cm ²)	FF	η (%)
0.5	0.42	82	0.82	0.28
0.3	0.42	84	0.86	0.30
0.1	0.49	100	0.76	0.37
0	0.47	150	0.84	0.53
-0.1	0.42	82	0.82	0.28
-0.5	0.36	88	0.66	0.21