

Electronic Supplementary Information

Betanin dye extracted from ayrampo (*Opuntia soehrensii*) seeds to develop dye-sensitized solar cells

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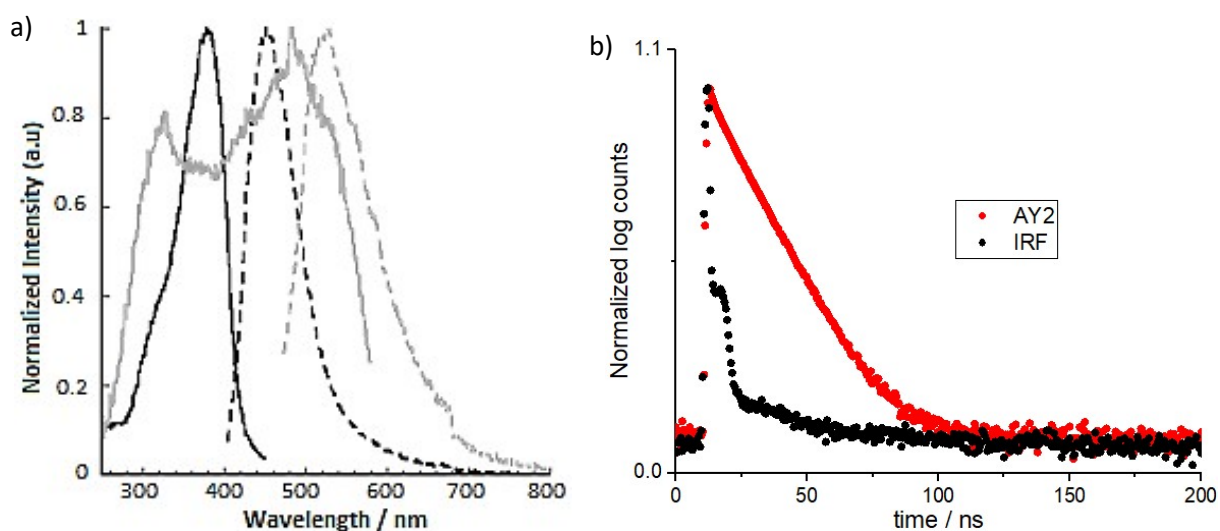


Fig. S1 (a) Normalized excitation and emission spectra for AY2 (λ_{em} = 470 nm, λ_{ex} = 380 nm) (solid and dotted black line) and AY3 (λ_{em} = 600 nm, λ_{ex} = 450 nm) (solid and dotted gray line) in water. (b) Decay of the emission from the yellow band solution probed at 375 nm.

Table S1. Table of calculated principle electronic transitions and associated wavelengths and oscillator strengths within the betanin derivative.

Excited State	Transition	Contribution (%)	Absorbance /nm	Energy / eV	Oscillator strength
1	HOMO to LUMO	100	532	2.3302	1.1172
2	HOMO-1 to LUMO	98	447	2.7717	0.0645
	HOMO-3 to LUMO	2			
3	HOMO-2 to LUMO	100	430	2.8838	0.0054

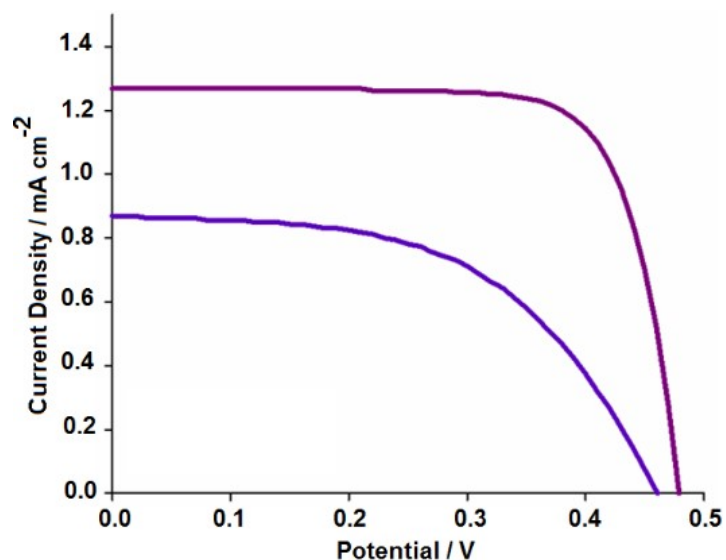


Fig. S2 Plot of current density against voltage for illuminated devices containing AY1 (purple) and AY2 (light purple).

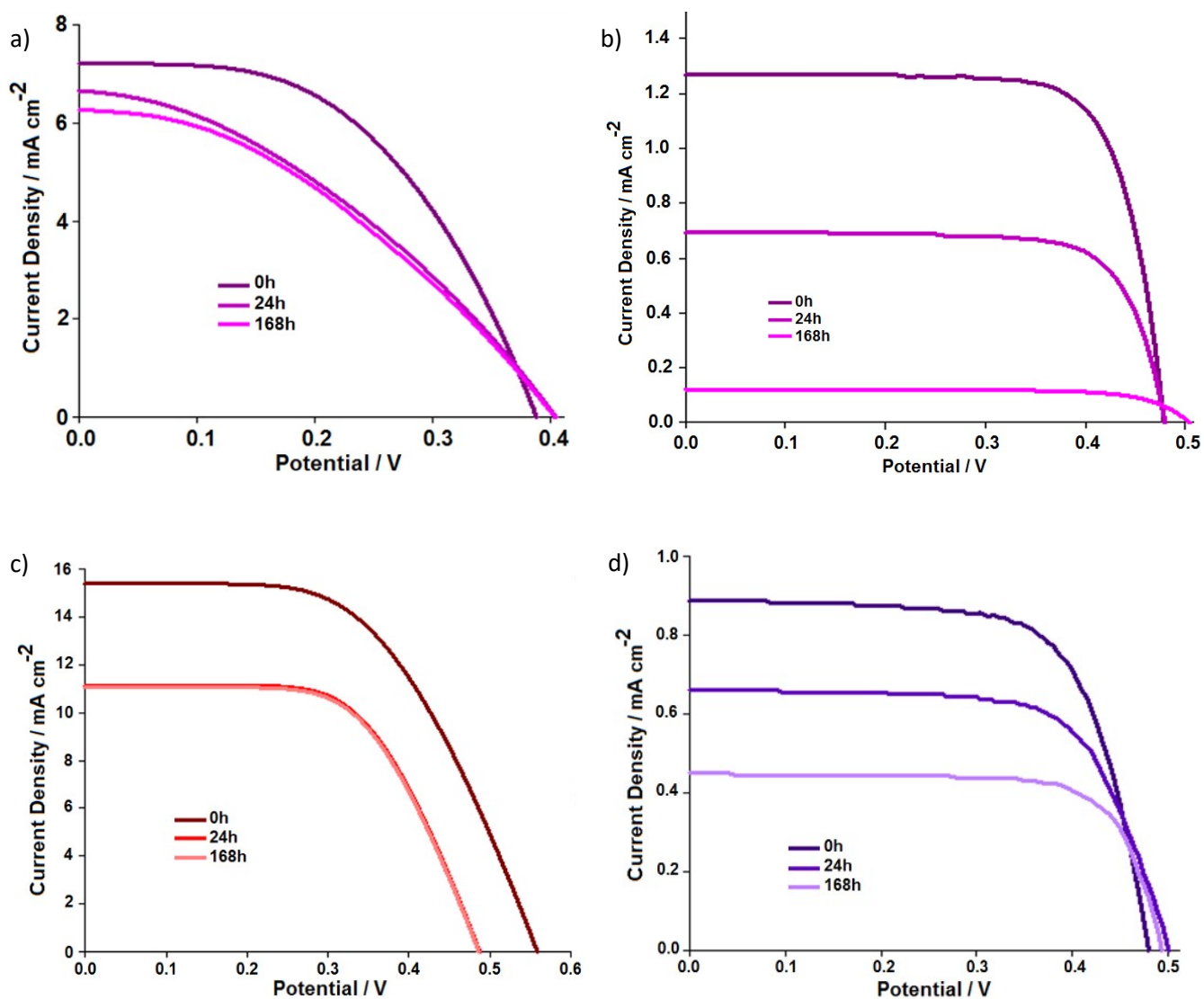


Fig. S3 Plots of current density against voltage for devices containing (a) citric acid stabilized AY1, (b) non-stabilized AY1, (c) N719 dye, (d) AY2 tested repeatedly over several days.

