

High-Performance Organic Thin-Film Phototransistors Based on Stacked *p-n* Heterojunctions for Enhanced Optoelectronic Response

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Table S1. XRD diffraction analysis parameters of different semiconductor devices.

	Device_N	Device_P	Device_T
2θ (degree)	3.368	5.672	3.33
FWHM (degree)	0.377	0.379	0.466
d -spacing (Å)	26.48	15.58	26.53

Table S2. Performances of OTFTs with different semiconducting materials and light irradiance.

Device	on/off ratio	<i>S.S.</i> (V/dec)	V_{TH} (V)	Mobility (cm²/Vs)
Device_N (Nonirradiated)	2.74×10^4	0.66	0.93	3.35×10^{-2}
Device_N (red light)	4.43×10^4	0.35	1.09	3.92×10^{-2}
Device_N (Nonirradiated)	1.74×10^4	0.93	0.62	2.24×10^{-2}
Device_N (green light)	9.77×10^2	1.95	-0.04	2.84×10^{-2}
Device_N (Nonirradiated)	3.28×10^3	1.32	0.42	1.90×10^{-2}
Device_N (blue light)	7.19×10^3	1.08	0.41	2.55×10^{-2}
Device_P (Nonirradiated)	1.70×10^2	2.06	-0.61	2.00×10^{-4}
Device_P (red light)	6.62×10^1	1.90	-0.29	3.81×10^{-4}
Device_P (Nonirradiated)	1.08×10^2	1.70	-0.54	2.23×10^{-4}
Device_P (green light)	1.73×10^2	1.72	-0.25	3.12×10^{-4}
Device_P (Nonirradiated)	5.43×10^2	1.90	-0.38	1.56×10^{-4}
Device_P (blue light)	1.62×10^1	4.67	0.66	7.65×10^{-5}
Device_T (Nonirradiated)	4.93×10^3	0.46	0.76	6.40×10^{-3}
Device_T (red light)	2.26×10^2	1.32	-0.12	1.31×10^{-2}
Device_T (Nonirradiated)	1.85×10^3	0.51	0.75	5.41×10^{-3}
Device_T (green light)	5.84×10^1	30.23	-2.61	8.06×10^{-3}
Device_T (Nonirradiated)	1.52×10^3	0.75	0.65	1.21×10^{-2}

Device_T (blue light)	1.44×10^2	3.13	-2.33	7.39×10^{-3}
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Table S3. Summary of the performance parameters of organic thin-film phototransistors.

Material	Semiconductor	Voltage (V)	Light	<i>P</i>	<i>R</i> (A/W)	Ref.
EHPDI	N-type	80	White	5.44	24.5×10^{-3}	34
CV/NaBH ₄ -doped BPE-PTCDI	N-type	100	polychromatic	6	89.03	35
diF-TES ADT	p-type	-40	Green	115	0.139	36
TIPS-pentacene	p-type	-10	blue	$\sim 4 \times 10^4$	17×10^{-3}	37
(PDPPT3-HDO): COTIC-4F	heterojunction structure	± 3	UV light	1.3×10^5	1.07×10^{-3}	38
PTCDI-C ₁₃	N-type	3	Green	301.22	0.12×10^{-3}	This work
Pentacene	P-type	3	Red	17.03	0.01×10^{-3}	This work
PTCDI-C ₁₃ /Pentacene (6 layer)	heterojunction structure	± 3	Green	5007.70	8.36×10^{-3}	This work

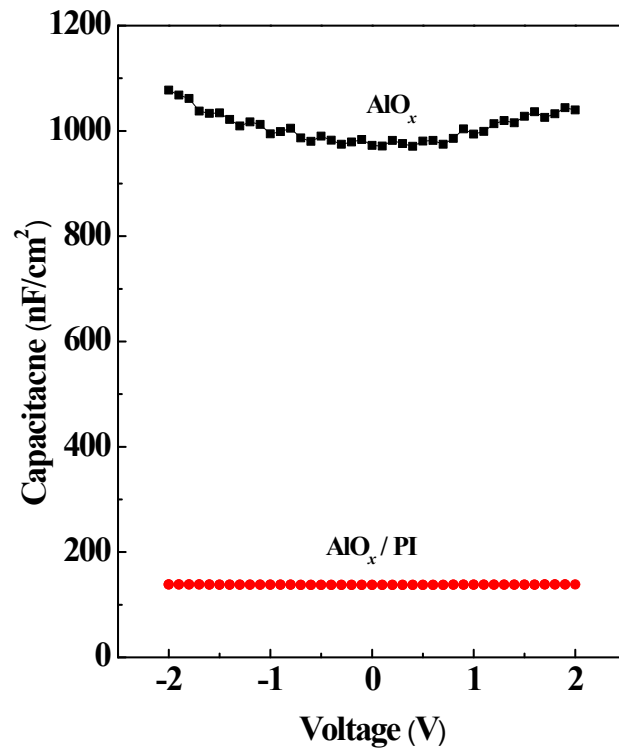


Fig. S1 The capacitance values of the AlO_x and PI/AlO_x dielectric layers at a measurement frequency of 1 kHz.

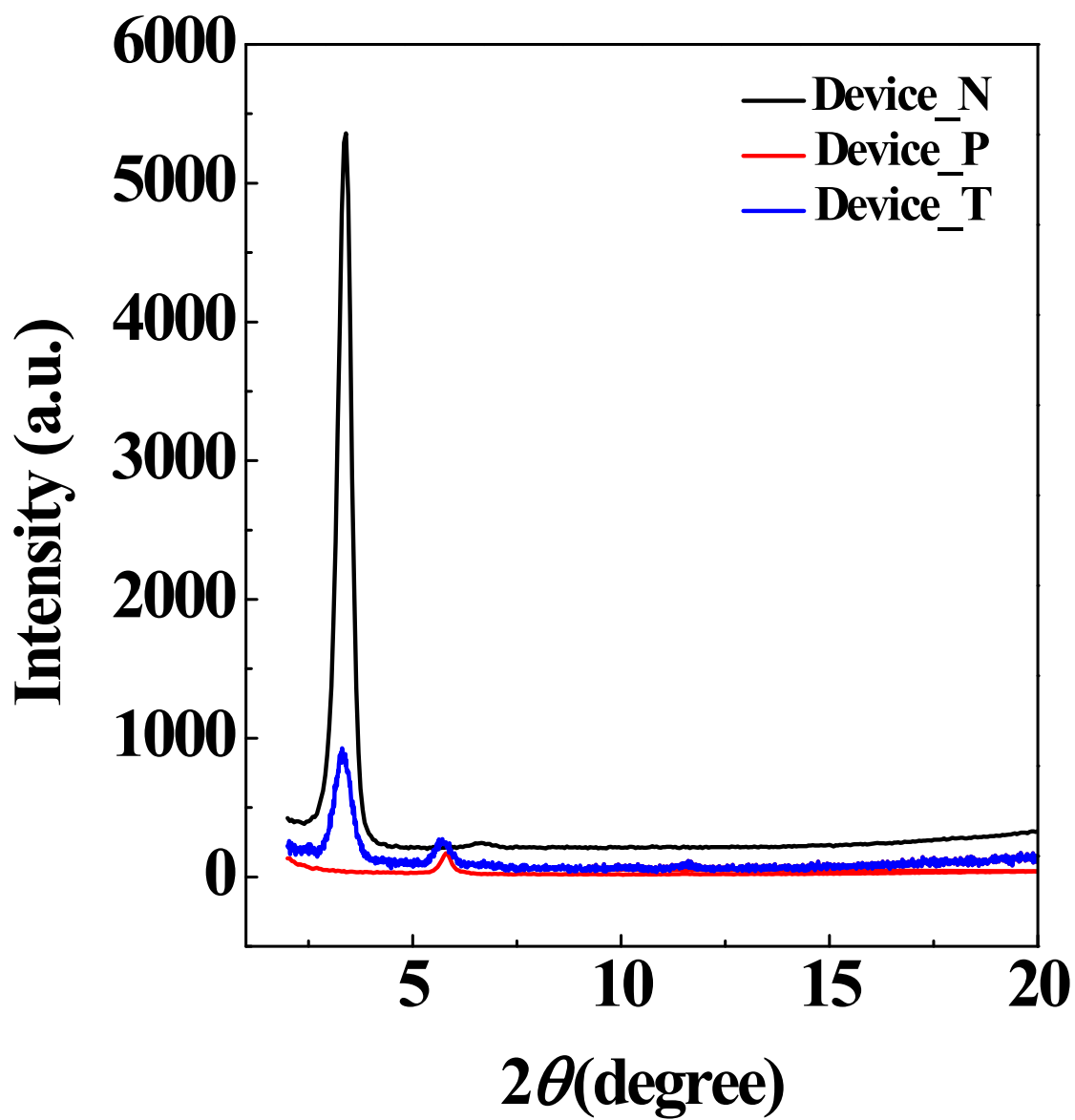


Fig. S2. XRD diffraction patterns of different semiconductor devices.