

Electronic Supplementary Information

Insertion of double bond π -bridges of A-D-A acceptor for high performance near-infrared polymer solar cells

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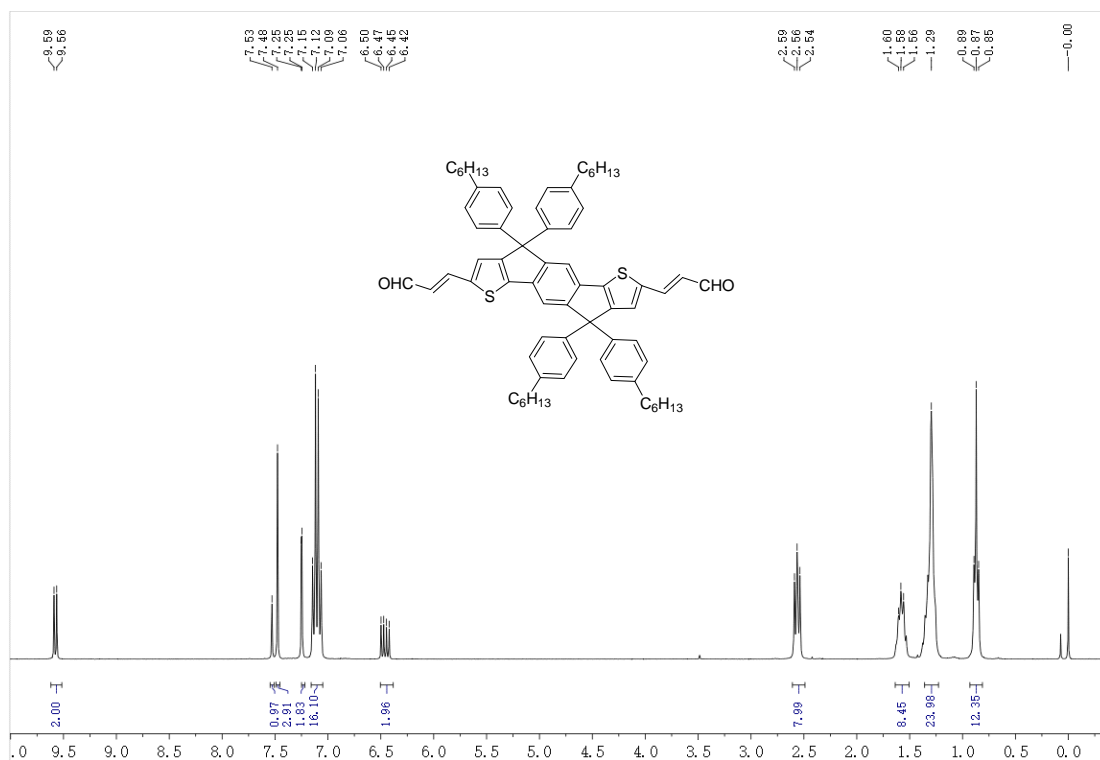


Figure S1. $^1\text{H-NMR}$ spectrum of SJ-CHO

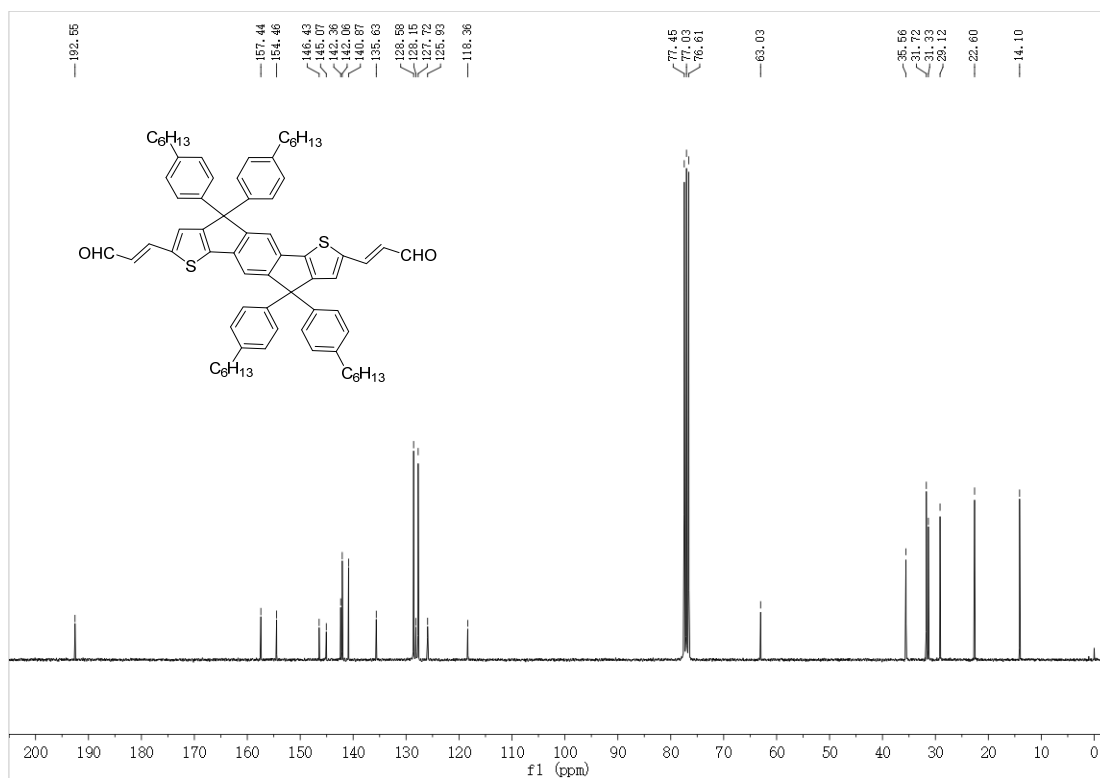


Figure S2. $^{13}\text{C-NMR}$ spectrum of SJ-CHO

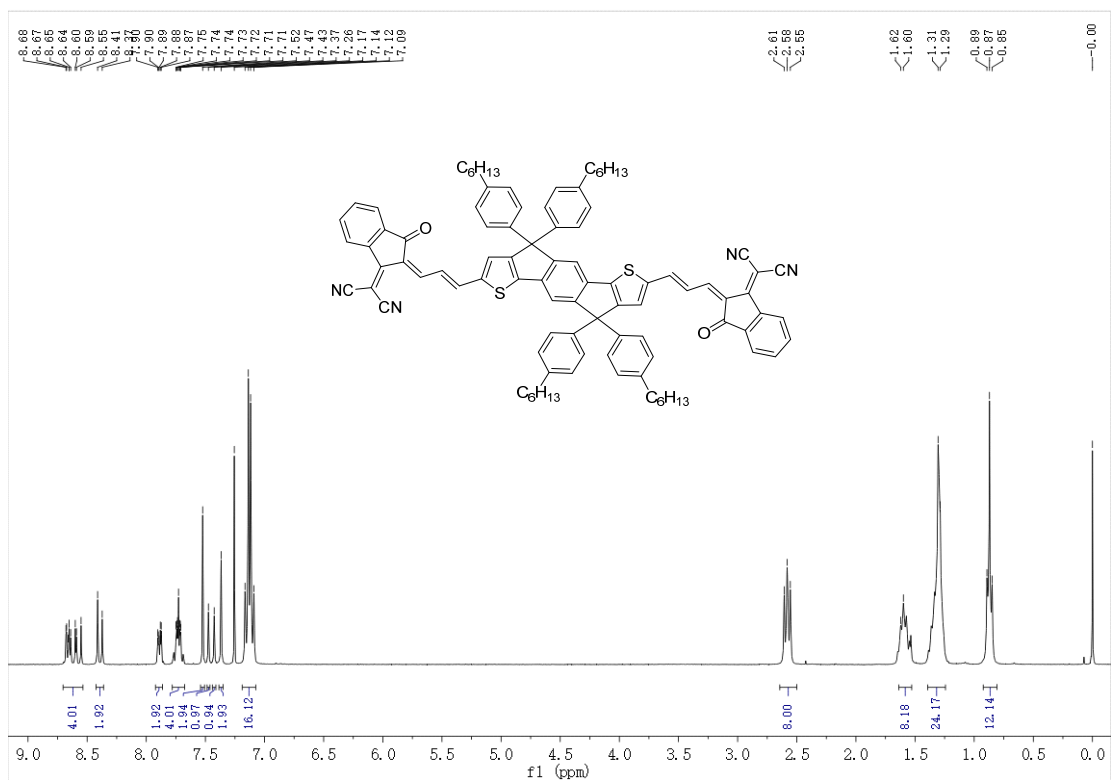


Figure S3. $^1\text{H-NMR}$ spectrum of SJ-IC

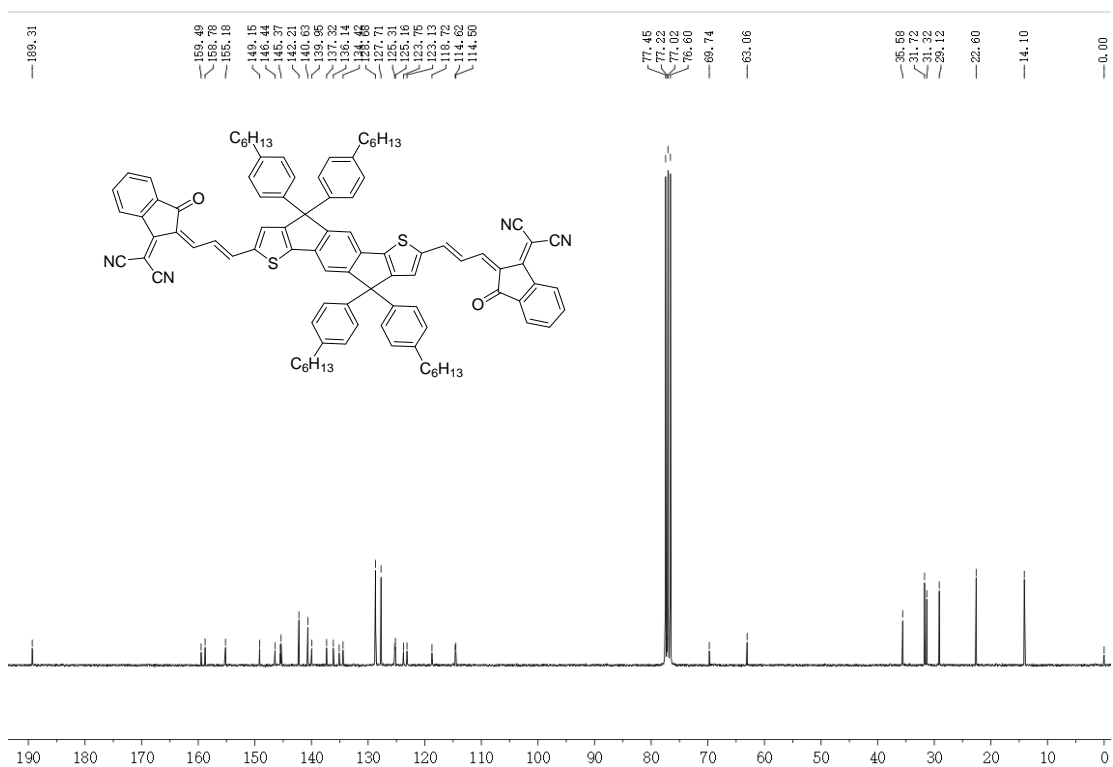


Figure S4. $^{13}\text{C-NMR}$ spectrum of SJ-IC

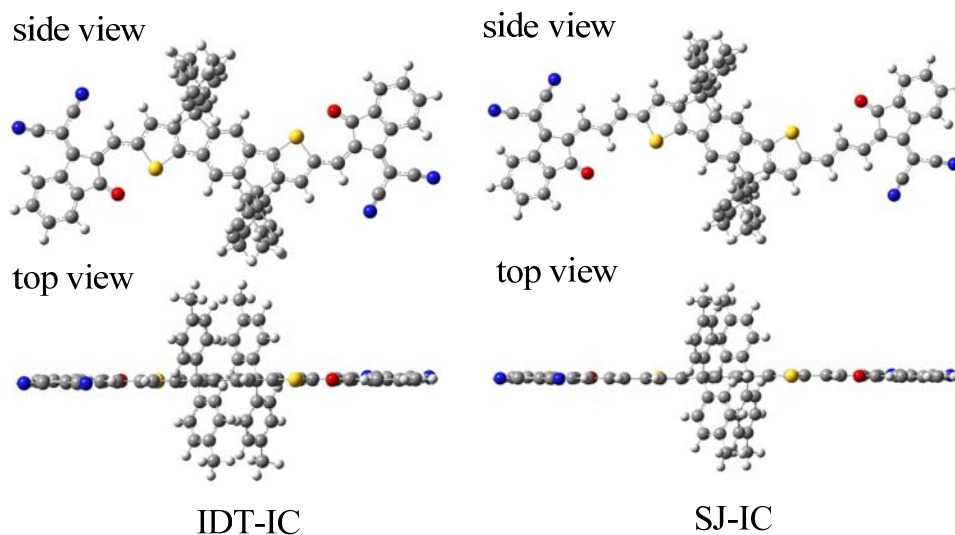


Figure S5. Simulated molecular geometries obtained by DFT calculations for simplified molecules of IDT-IC and SJ-IC

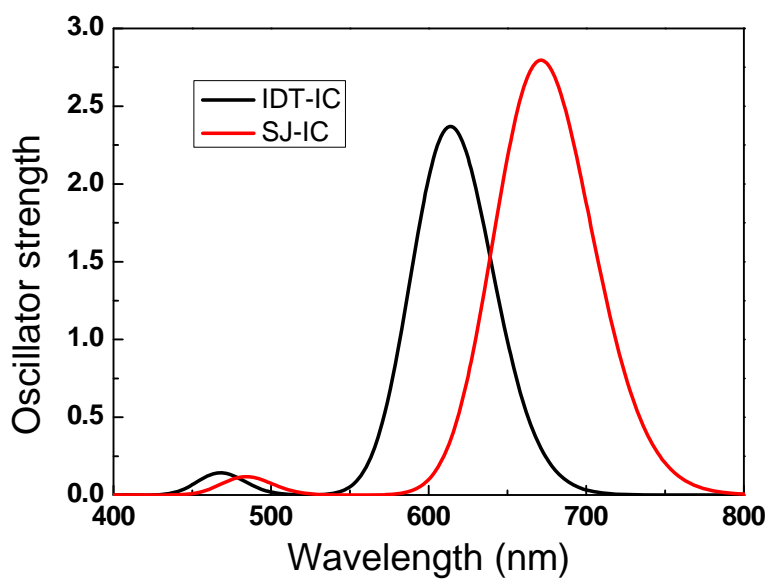


Figure S6. Absorption spectra of IDT-IC and SJ-IC calculated with density functional theory at the B3LYP/6-31G(d, p) level

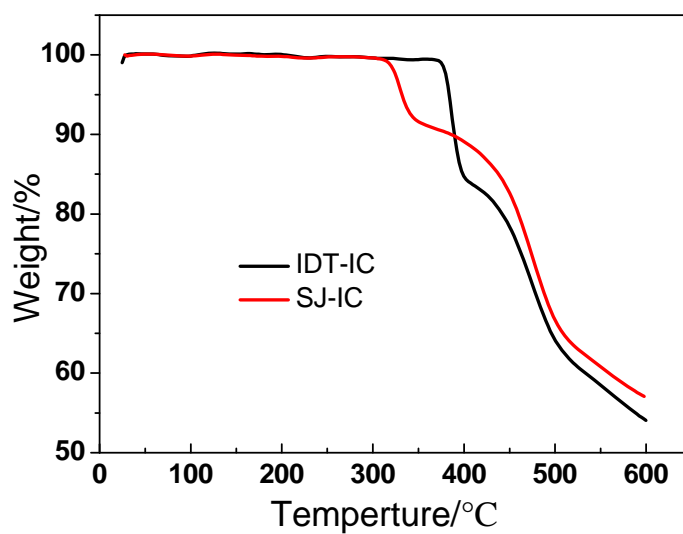


Figure S7.TGA plot of IDT-IC and SJ-IC

Table S1. Photovoltaic performance data of the PSCs based on J61: SJ-IC with different D:A weight ratio and annealing temperature under illumination of AM 1.5 G, 100 mW cm^{-2} .

D:A (w:w)	Annealing temperature(°C)	V_{oc} (V)	J_{sc} (mA cm^{-2})	FF (%)	PCE (%)
1:0.8	none	0.85	15.18	55.09	7.11
1:1	none	0.85	16.12	54.44	7.48
0.8:1	none	0.84	15.61	53.32	7.05
1:0.8	160	0.83	16.89	64.39	9.04
1:1	160	0.83	16.99	65.95	9.27
0.8:1	160	0.82	16.85	66.02	9.21

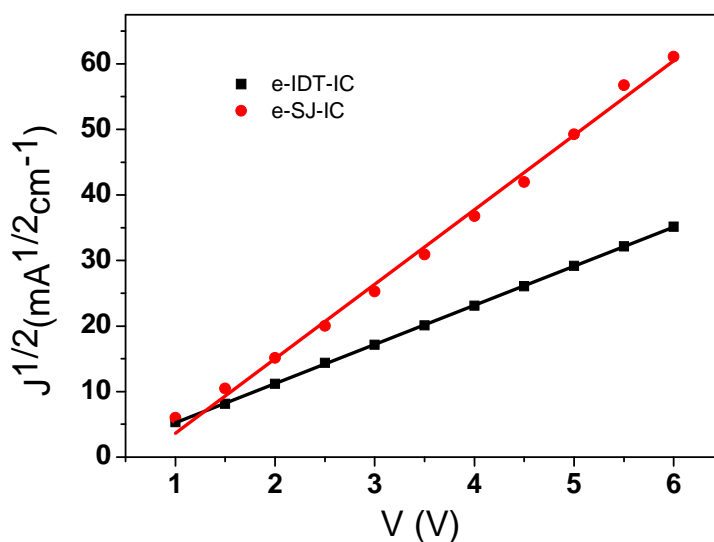


Figure S8. $J^{1/2} \sim (V_{\text{appl}} - V_{\text{bi}} - V_s)$ characteristics for the IDT-IC and SJ-IC-based electron-only device. Solid lines are the fitting lines of the data.

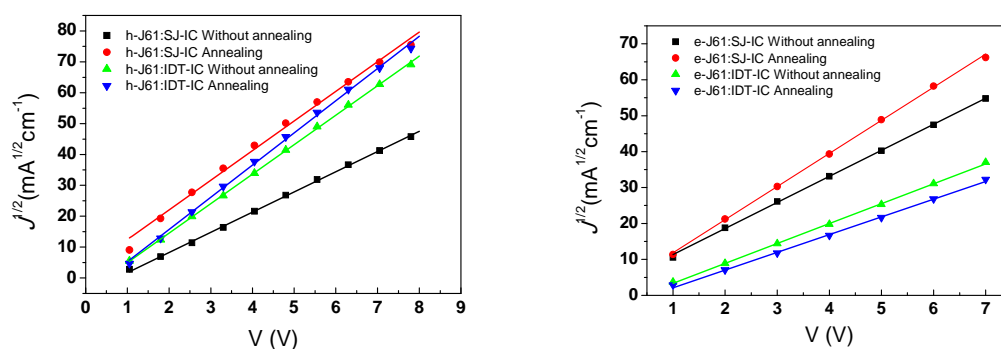


Figure S9. $J^{1/2} \sim (V_{\text{appl}} - V_{\text{bi}} - V_s)$ characteristics for the PSCs based on the blend films of J61:IDT-IC and J61: SJ-IC; (a) hole-only device, (b) electron-only device. Solid lines are the fitting lines of the data.

References

- (a) P. W. M. Blom, M. J. M. de Jong and M. G. van Munster, *Phys. Rev. B* 1997, **55**, R656; (b) G. G. Malliaras, J. R. Salem and P. J. Brock, C. Scott, *Phys. Rev. B* 1998, **58**, R13411.
- H. J. Bin, Z. G. Zhang, L. Gao, S. S. Chen, L. Zhong, L. W. Xue and Y. F. Li, *J. Am. Chem. Soc.* 2016, **138**, 4657.