

Supporting Information for:
n-Type Naphthalene Diimide-Biselenophene Copolymer for All-polymer Bulk
Heterojunction Solar Cells

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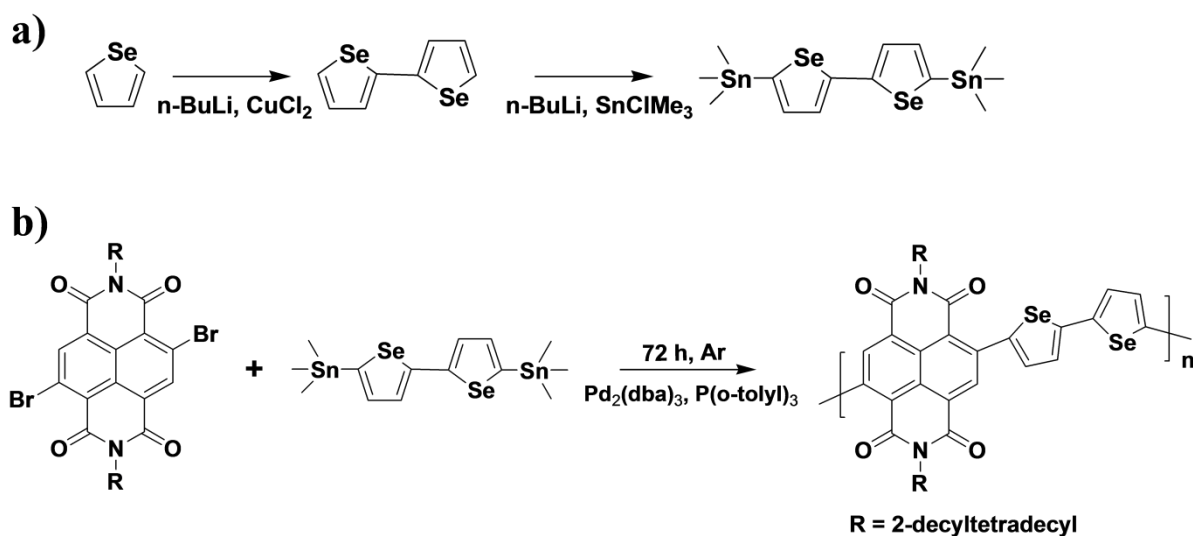


Figure S1. (a) Synthetic route to 5,5'-bis(trimethylstannyl)-2,2'-biselenophene. (b) Synthesis of PNDIBS.

SpinWorks 2.5: äö!

2,2-Biselenophene

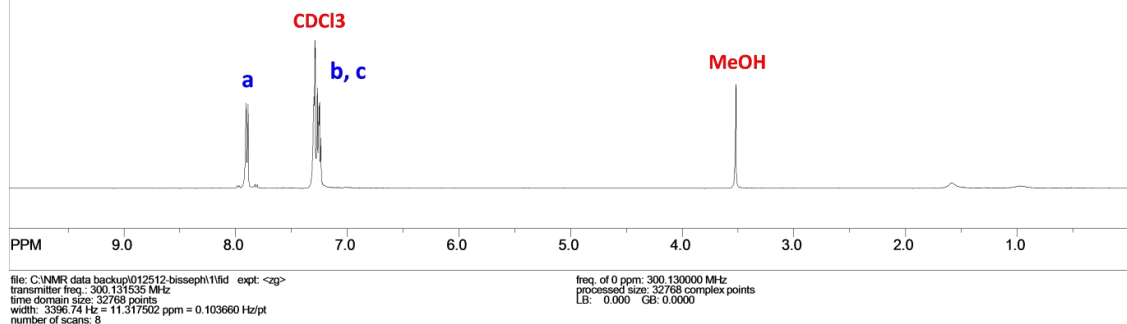
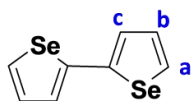


Figure S2. ^1H NMR spectrum of 2,2-biselenophene.

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5,5'-Bis(trimethylstannyl)-2,2'-biselenophene

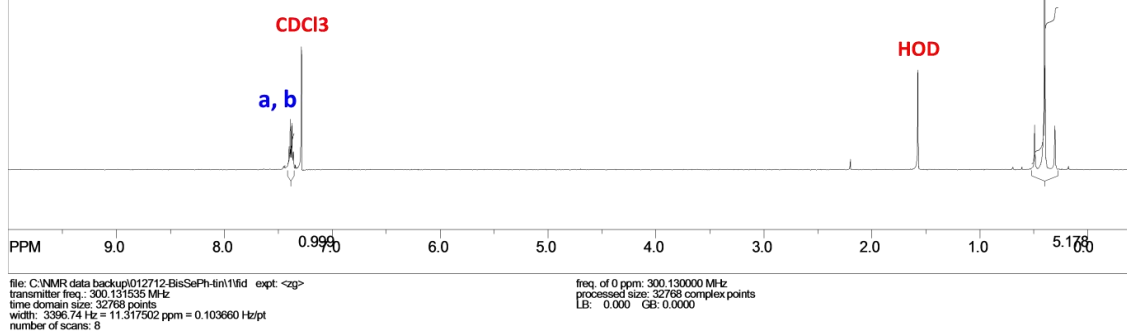
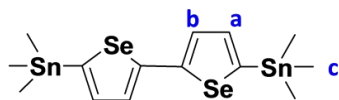


Figure S3. ^1H NMR spectrum of 5,5'-bis(trimethylstannyl)-2,2'-biselenophene.

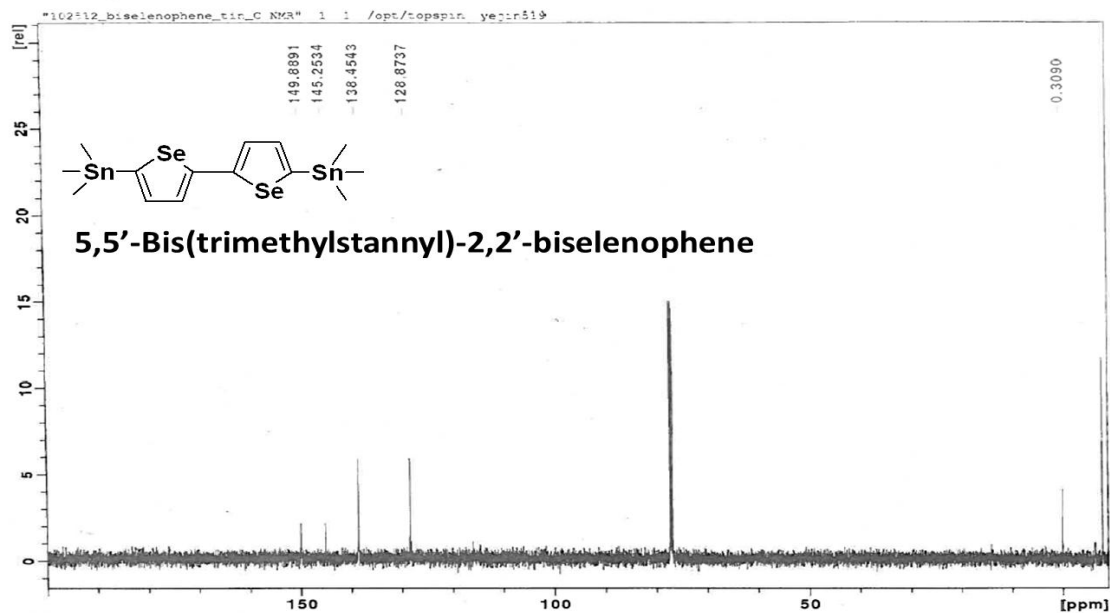


Figure S4. ¹³C NMR spectrum of 5,5'-bis(trimethylstannyl)-2,2'-biselenophene.

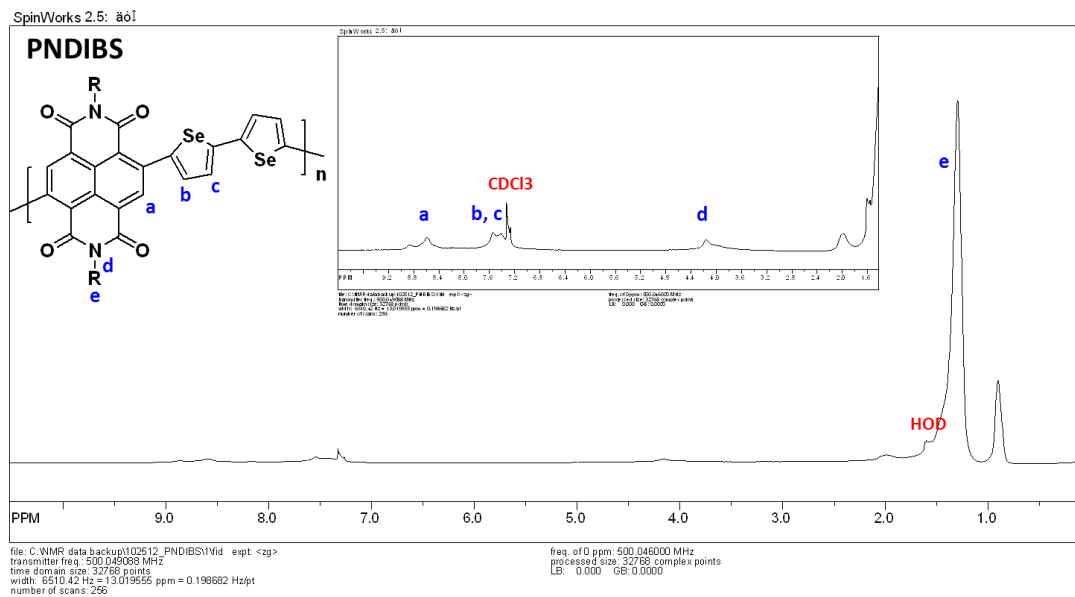


Figure S5. ¹H NMR spectrum of PNDIBS.

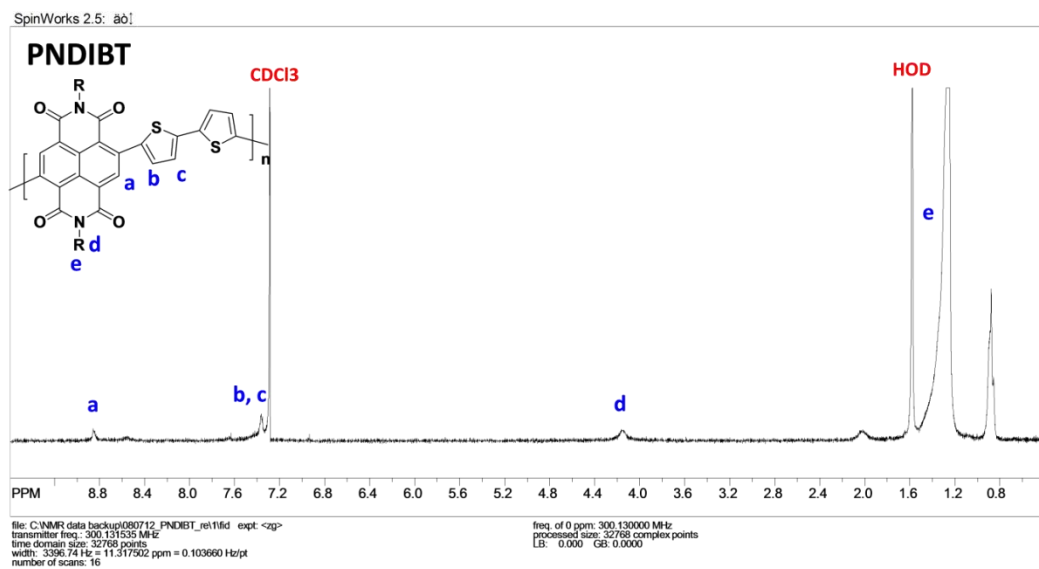


Figure S6. ^1H NMR spectrum of PNDIBT.

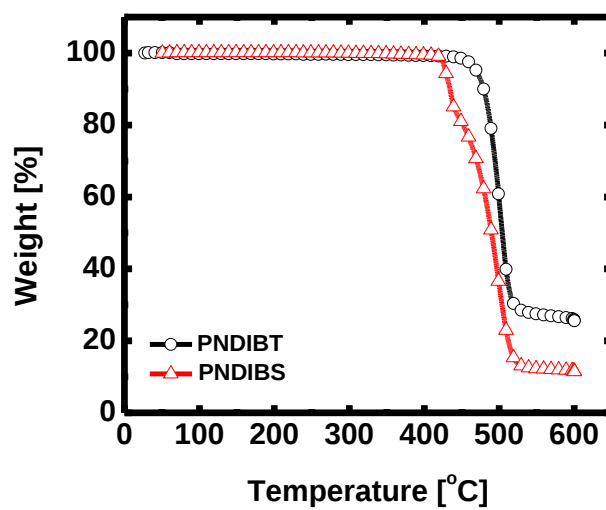


Figure S7. TGA thermograms of PNDIBS and PNDIBT in N_2 .

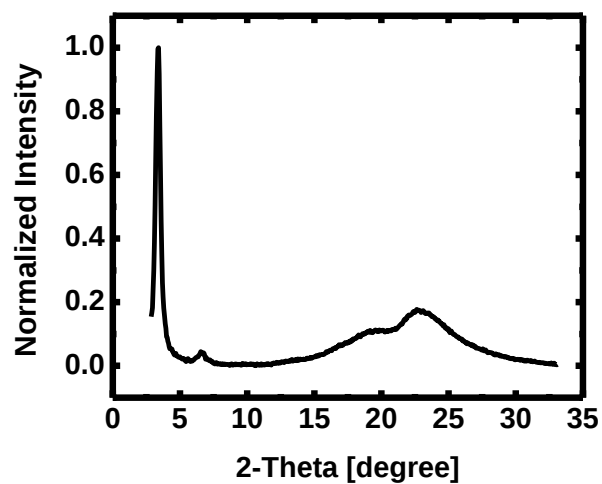


Figure S8. XRD pattern of PNDIBT film on glass substrate.

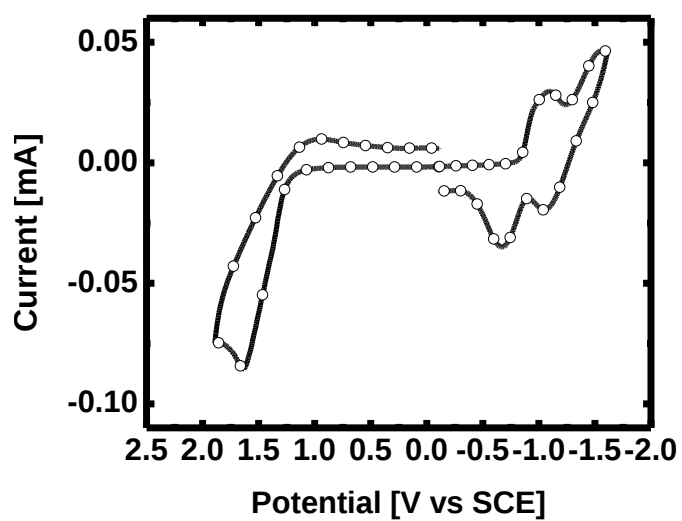


Figure S9. Cyclic voltammogram of PNDIBT in 0.1 M Bu_4NPF_6 solution in acetonitrile at a scan rate of 100 mV/s.

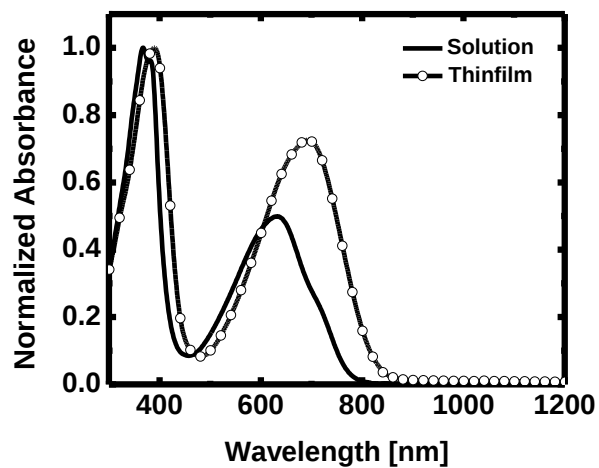


Figure S10. Optical absorption spectrum of PNDIBT in dilute chloroform solution and as a thin film on glass substrate.

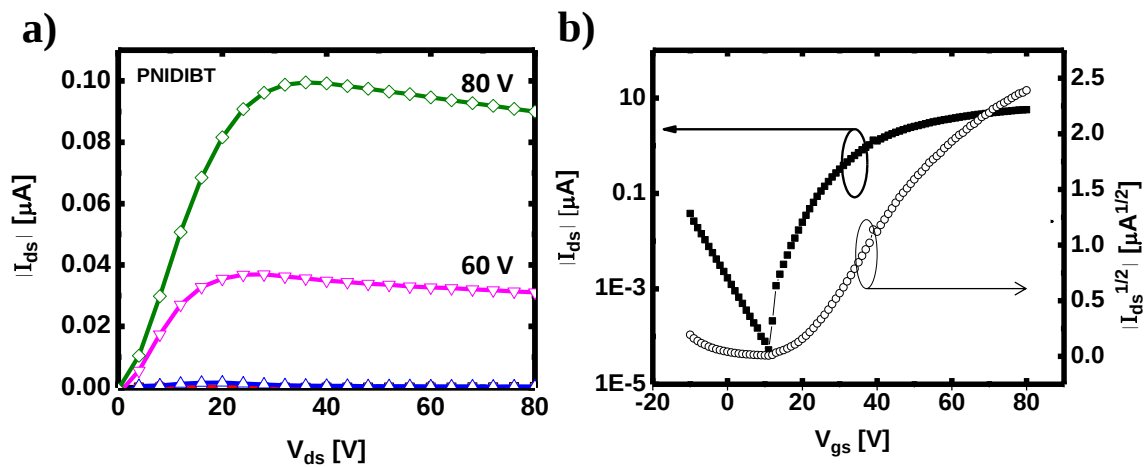


Figure S11. Output (a) and transfer (b) characteristics of the OFETs based on PNDIBT.

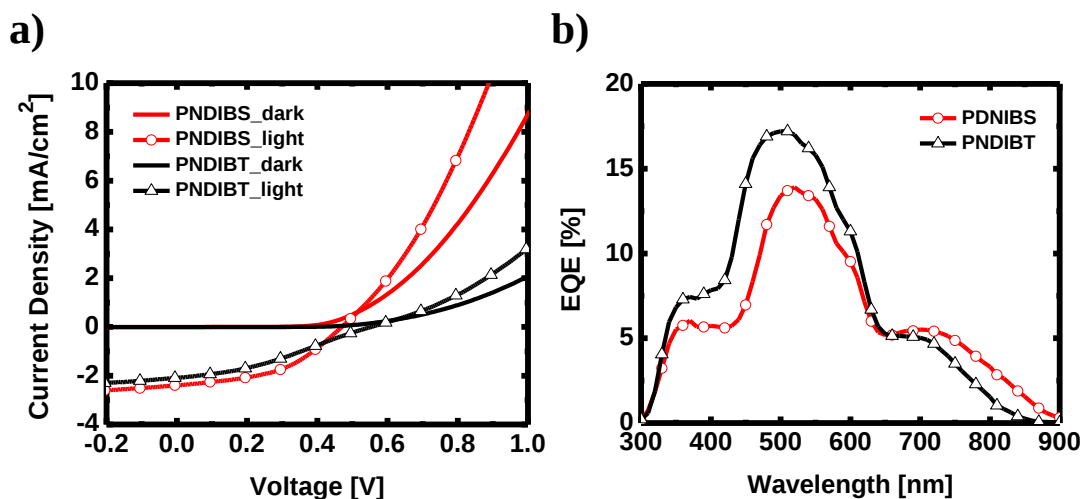


Figure S12. The current density — voltage characteristics (a) under 100 mW/cm² 1.5AM illumination in air and EQE spectrum (b) of P3HT:PNDIBS (1:3) and P3HT:PNDIBT (1:2) blend solar cells with a structure of ITO/PEDOT:PSS/active layer/LiF/Al without processing additive.

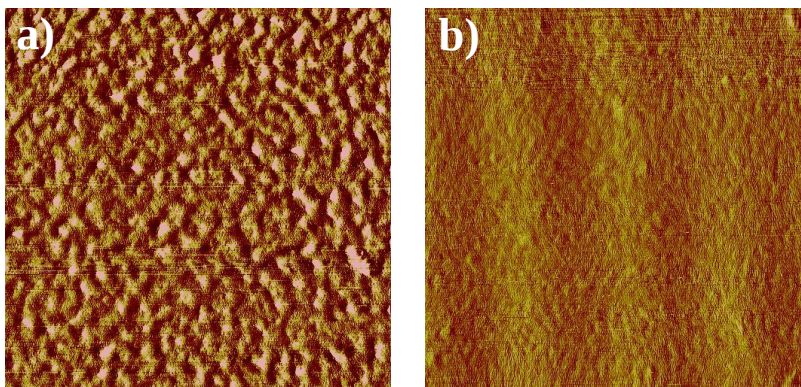


Figure S13. AFM topographical phase images ($5 \times 5 \mu\text{m}$) of P3HT:PNDIBS (1:3) (a) and P3HT:PNDIBT (1:2) (b) blend films.

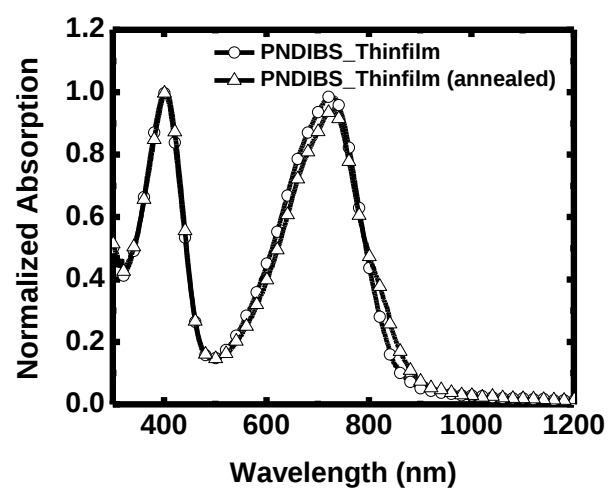


Figure S14. Optical absorption spectra of PNDIBS thin film as-casted on a glass substrate and after annealing at 200 °C for 10 min.