Supporting Information

Ultrathin film heterojunctions by combining solution processing and sublimation for ambipolar organic field-effect transistors

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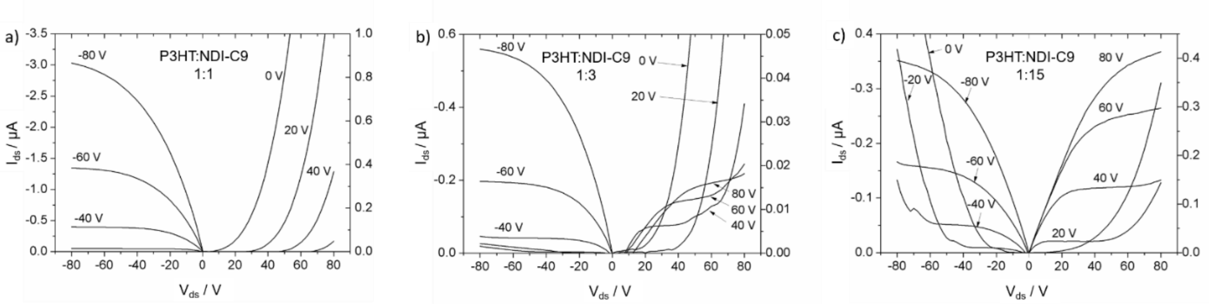

Fig. S1. Output characteristics at different gate voltages of spin-coated P3HT:NDI-C9 OFETs with concentration ratios of a) 1:1, b) 1:3, c) 1:15.

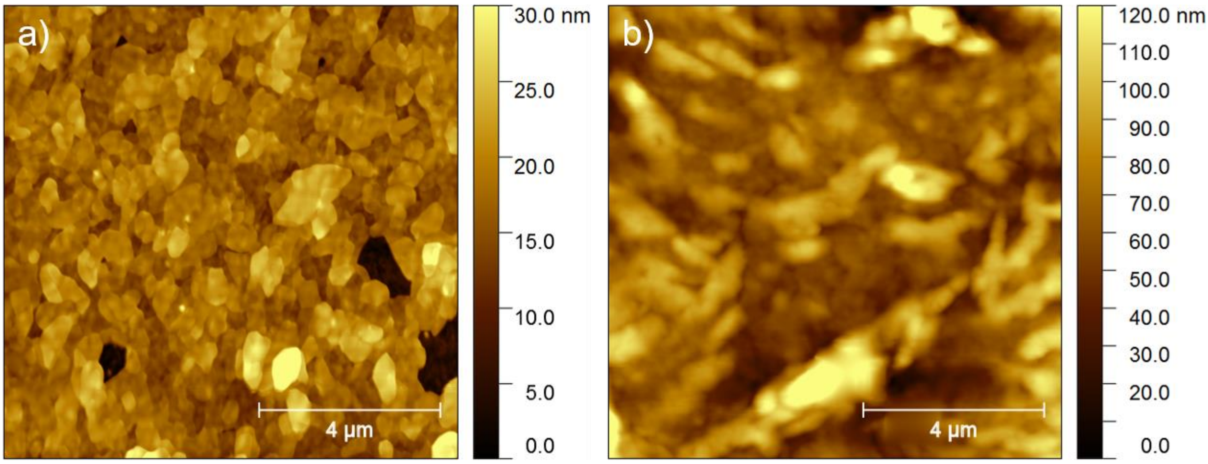

Fig. S2. AFM height images of P3HT:NDI-C9 blends spin-coated from toluene solutions with concentration ratios of a) 1:1 and b) 1:15.

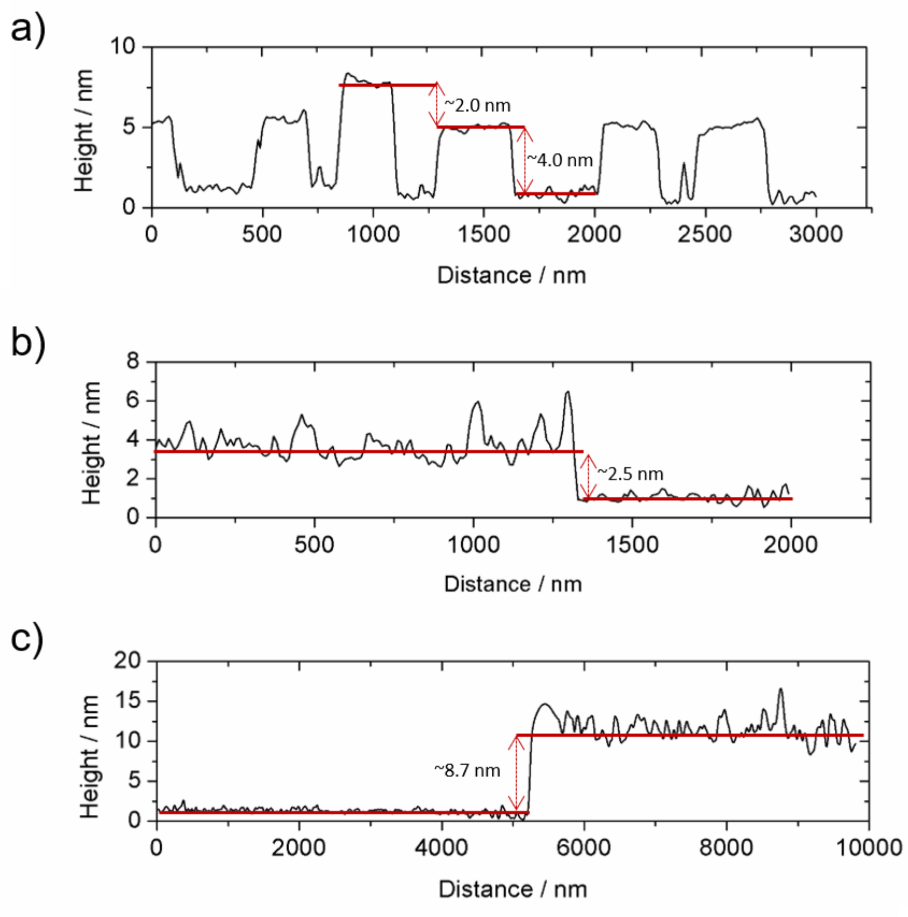

Fig S3. Step-height profiles used for film thickness determination. a) 2 nm of nominal thickness (the value calculated by the quartz balance according to the mass of evaporated material) NDI-C9 film evaporated on HMDS treated Si/SiO_2 substrate, b) thinnest P3HT film sipn-cast from 24h aged toluene solution on HMDS treated Si/SiO_2 substrate, c) binary film deposited by spin-casting 8.0 nm of aged P3HT on HMDS treated Si/SiO_2 substrate, followed by evaporation of 2.0 nm of nominal thickness of NDI-C9.

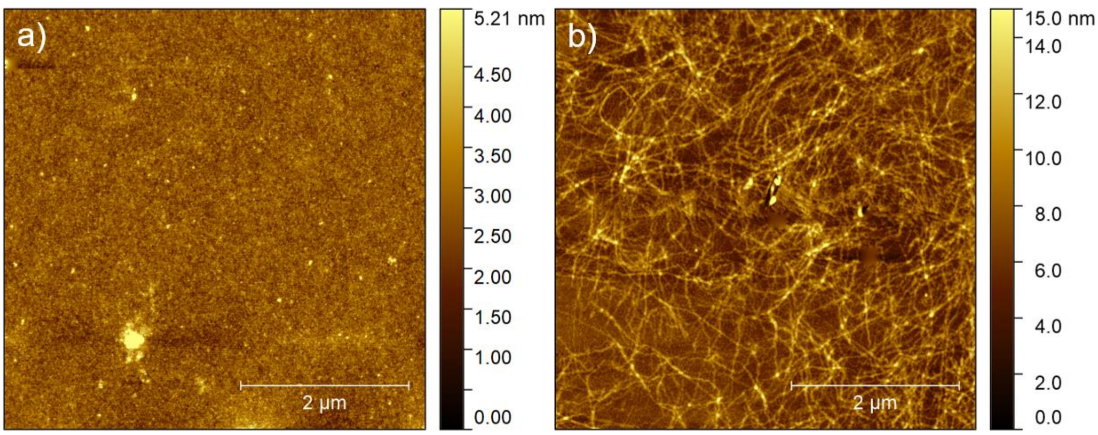

Fig. S4. AFM height images of P3HT films spin-cast from a) fresh and b) 24h aged toluene solutions.

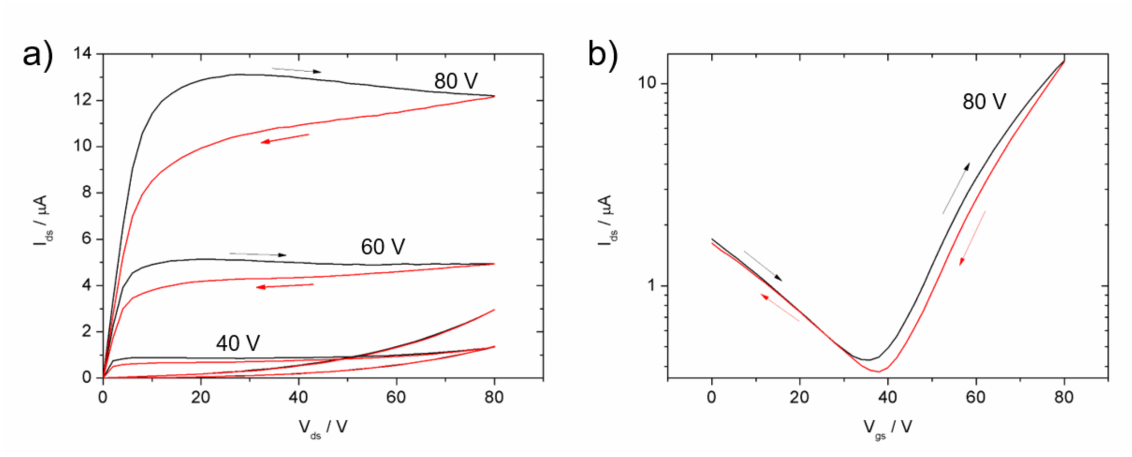

Fig S5. Output (a) and transfer (b) characteristics of a bilayer OFET consisting of 3 nm spin-cast P3HT bottom and 15 nm NDI-C9 evaporated top layers. Black lines correspond to forward scans from 0 to 80 V, and red ones to reverse scans from 80 to 0 V.

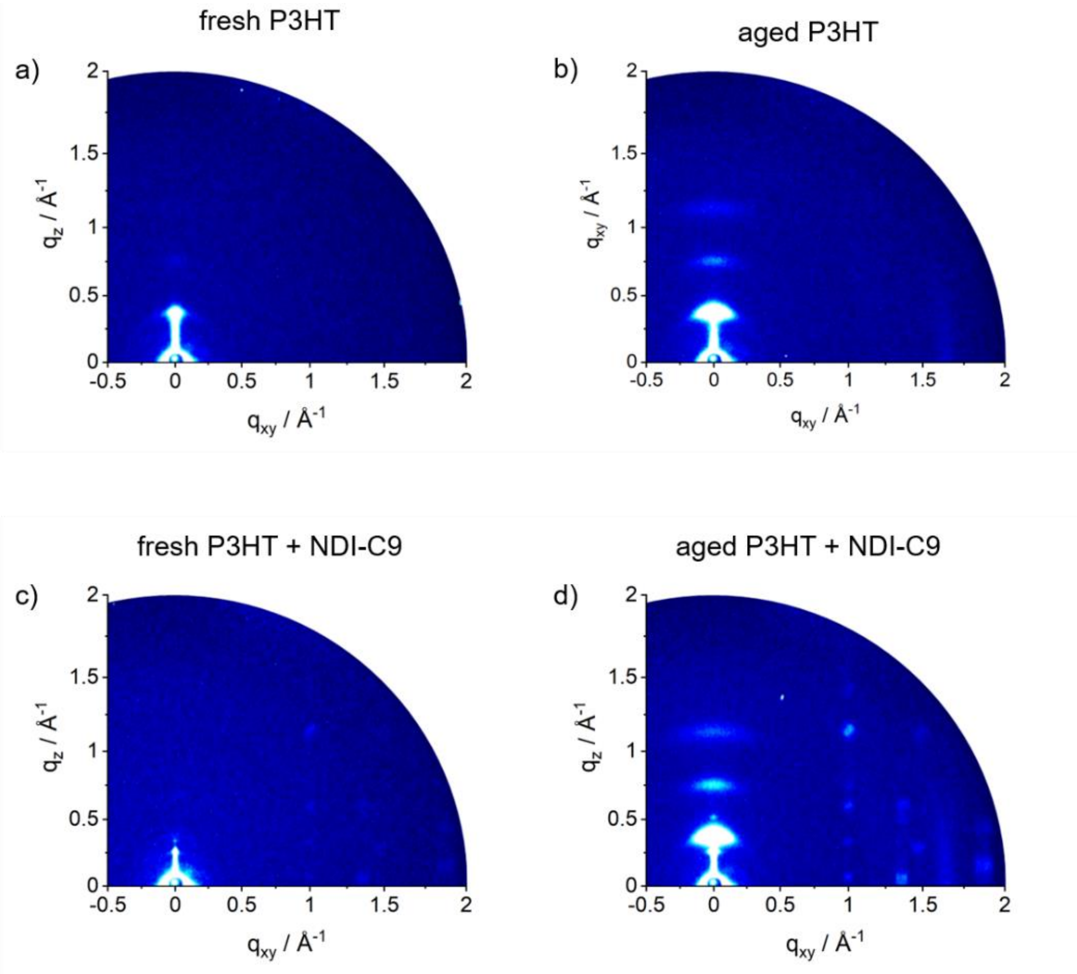

Fig S6. GIWAXS patterns of thick films fabricated on HMDS treated Si/SiO_2 substrates: a) 80 nm of P3HT spin-cast from fresh toluene solution, b) 80 nm of P3HT spin-cast from aged toluene solution, c) 60 nm of NDI-C9 evaporated on 80 nm of P3HT spin-cast from fresh toluene solution, d) 60 nm of NDI-C9 evaporated on 80 nm of P3HT spin-cast from aged toluene solution.

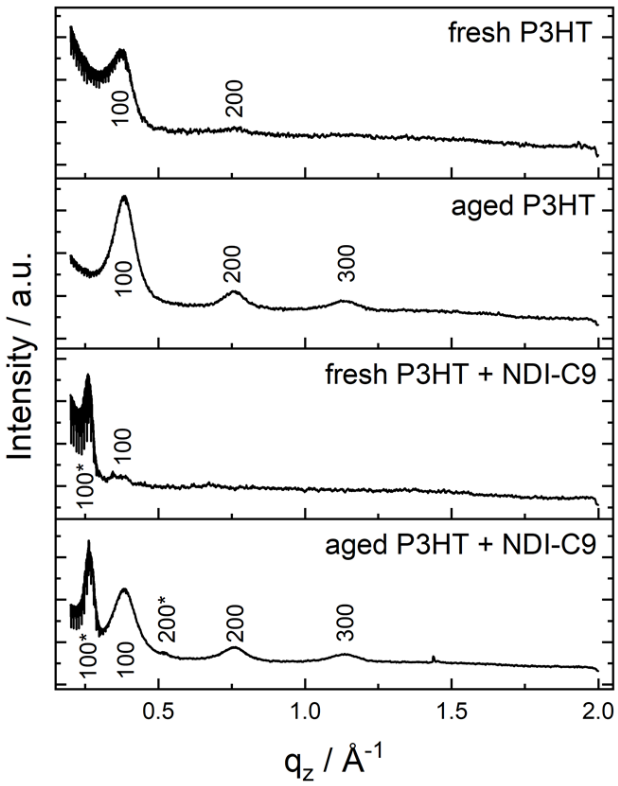

Fig S7. Meridional integration of GIWAXS patterns from Fig. S6 with indicated Miller indices. Asteriks corresponds to NDI-C9.

Table S1. Structural parameters derived from the GIWAXS patterns in Fig. S6.

Sample	Interlayer Miller indices	d-spacing [Å]	π-π stacking distance [Å]
fresh P3HT	100	16.8	–
	200	8.2	
aged P3HT	100	16.5	3.8
	200	8.3	
	300	5.5	
NDI-C9 on fresh P3HT	100	24.1 (NDI-C9) 16.8 (P3HT)	–
NDI-C9 on aged P3HT	100	24.1 (NDI-C9) 16.5 (P3HT)	3.5 (NDI-C9) 3.8 (P3HT)
	200	12.1 (NDI-C9) 8.3 (P3HT)	
	300	5.5 (P3HT)	