

Supplementary Information

Light absorption of poly(3-hexylthiophene) single crystals

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Materials: Single crystals were obtained from commercial P3HT (Merck Chemicals) of weight average molecular weight (M_n) of 26400 g/mol (contour length \sim 59 nm obtained by GPC) with a polydispersity index (PDI) of 1.79 and a regioregularity of 96.2%. Experimental details on P3HT crystal preparation can be found elsewhere¹.

Methods: UV-VIS absorption spectra were acquired using a USB2000 fiber optic spectrometer from Ocean Optics combined with the optical A1-Zeiss microscope in transmission mode. The value of the diameter of focus area when using a 50 μ m optical fiber and the 100x objective was about 0.5 μ m.

Crystal washing procedure: In order to remove amorphous/polycrystalline molecules/structures, single crystals of P3HT were washed in an anisole bath for up to 1 hour (anisole was kept at about 40 °C). After removing the samples from the bath, most of the solvent drained off the sample by keeping the sample vertical. The remaining solvent evaporated at room temperature after up to 2 min. Figure S1 shows optical micrographs recorded using crossed polarizers. These micrographs demonstrated that after washing the birefringence over the whole crystal was significantly higher and of uniform brightness. Birefringence of as-deposited crystals exhibited much lower brightness and contained spots of poor contrast. Figure S2 shows crystals before and after washing as well as their corresponding height profiles.

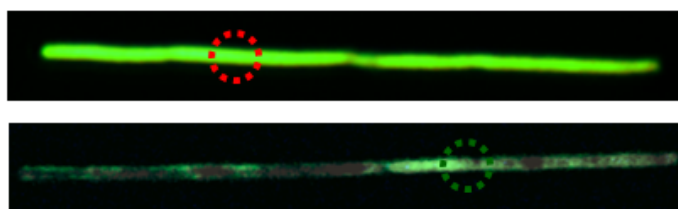


Figure S1. POM micrographs ($40 \times 6 \mu\text{m}^2$) showing a highly birefringent P3HT crystal that was ‘washed’ (top) in comparison to an as-deposited crystal surrounded by additional polymers (bottom). Absorption spectra in Figure 2 for as-deposited (olive) and washed (red) crystals were recorded in the positions indicated by the dotted circles.

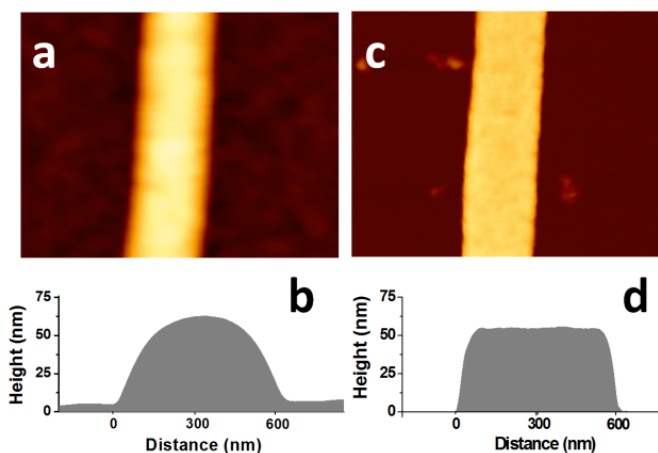


Figure S2. AFM height image of single crystals of P3HT ($2.6 \times 2 \mu\text{m}^2$): (a) before washing with and (c) after washing for 1 hour in the anisole bath at 40 °C. (b) and (d) are height profile corresponding to (a) and (c), respectively.

REFERENCES

1. K. Rahimi, I. Botiz, N. Stingelin, N. Kayunkid, M. Sommer, F. P. V. Koch, H. Nguyen, O. Coulembier, P. Dubois, M. Brinkmann and G. Reiter, *Angew. Chem. Int. Ed.*, 2012, 51, 11131-11135.