Supporting information for:

Precise Growth of Low-dimensional Pyrene▪Perylene▪TCNQ Co-Crystals and Structure-Property related Optoelectronic Properties

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Experimental Section

Materials. Tetracyanoquinodimethane (TCNQ), perylene and pyrene were purchased from Sigma-Aldrich Company and used without further purification.

Device Fabrication. Source-drain gold electrodes were fabricated by photolithography and electron beam deposition of Au on Si substrate with 300 nm thick SiO_2. The PyPeT microrods, P3T1 microsheets and P1T1 microrods were firstly dispersed in the poor solvent of *n*-hexane and then directly deposited onto the pre-patterned substrates. Randomly, some nanostructures were attached to the Au electrodes and bridged the source and drain electrodes. To remove the solvent thoroughly, the devices were annealed at 393 K in vacuum oven for 1 h. All the measurements were carried out with a Keithley 4200 SCS and standard probe station at ambient conditions in the shielded box at room temperature.

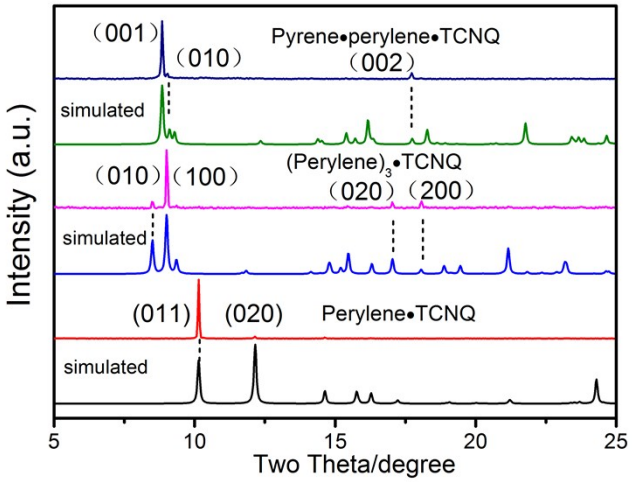

Figure. S1 XRD patterns of PyPeT microrods, P3T1 microsheets and P1T1 microrods along with their standard XRD powder patterns simulated from Cif.

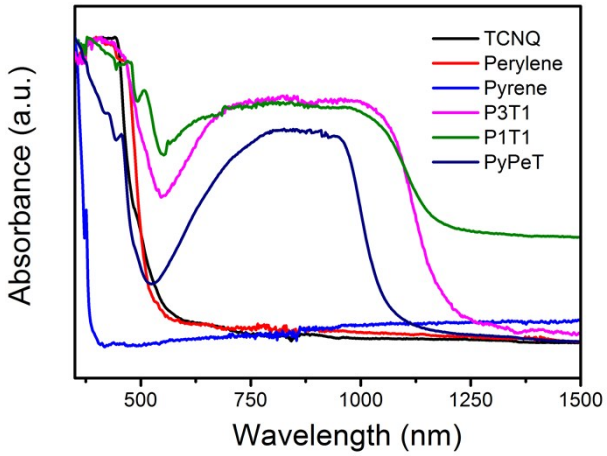

Figure. S2 UV-Vis-NIR absorption spectra of PyPeT microrods, P3T1 microsheets and P1T1 microrods along with the source powders of perylene, pyrene and TCNQ.

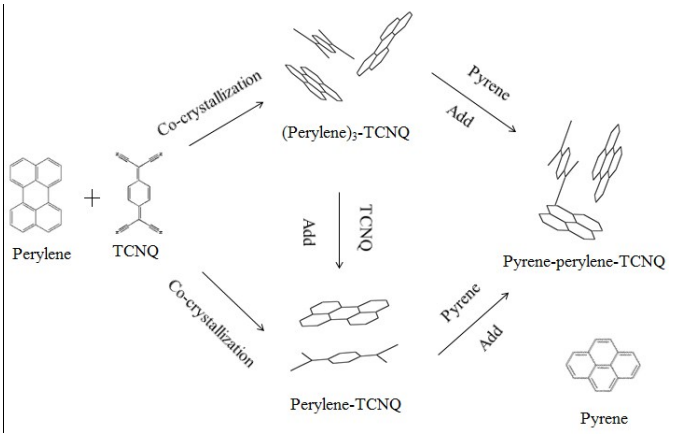

Figure. S3 Schematic of the growth and phase transformation process.

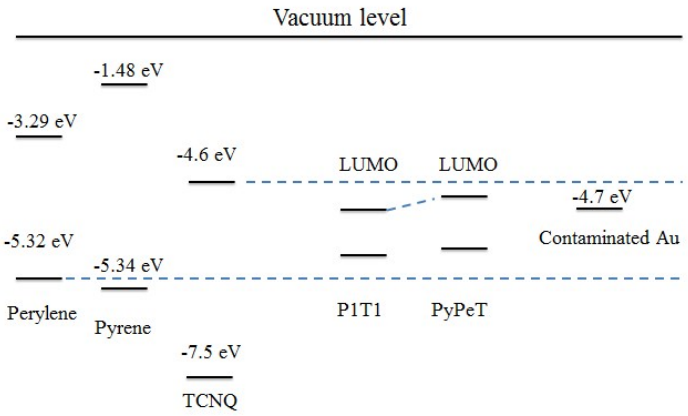

Figure. S4 HOMO-LUMO engineering. Schematic positions of perylene, pyrene, TCNQ, P1T1 and PyPeT co-crystal bands with the work function of Au in air.

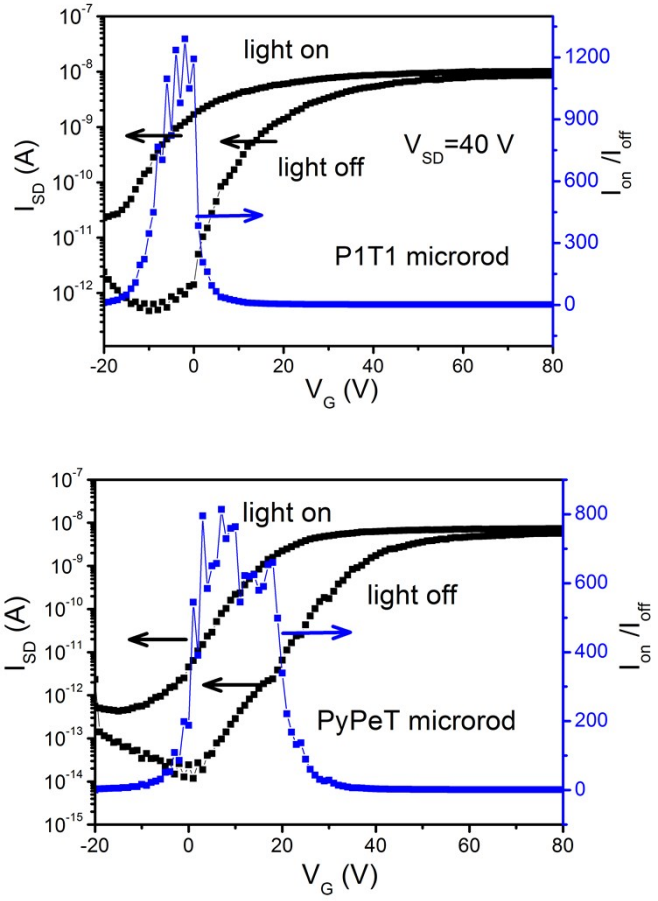

Figure. S5 Transfer characteristics of the devices based on individual P1T1 microrod (up) and PyPeT microrod (down) measured in the dark and under white light irradiation along with the I_{on}/I_{off} ratio-V_G curve.