Enhancing the thermal stability of the bulk-heterojunction photovoltaics based on P3HT/PCBM by incorporating diblock amphipathic P3HT-PEO at D/A interface

Jikang Liu & Xiaoguang Zhu, Junli Li，Jiulin Shen, Guoli Tu*

Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan, Hubei, 430074, P. R. China

Correspondence to:

Guoli Tu

E-mail: tgl@hust.edu.cn,

1. We got the difference of the molecular weight of reactant and product by PS standard GPC, the mobile phase was tetrahydrofuran and the internal standard is polystyrene. The result got by PS standard GPC was shown in Fig.S1, for P3HT-Br (Mn=18879, Mw/Mn=1.16), for P3HT-PEO (Mn=25278, Mw/Mn=1.21).

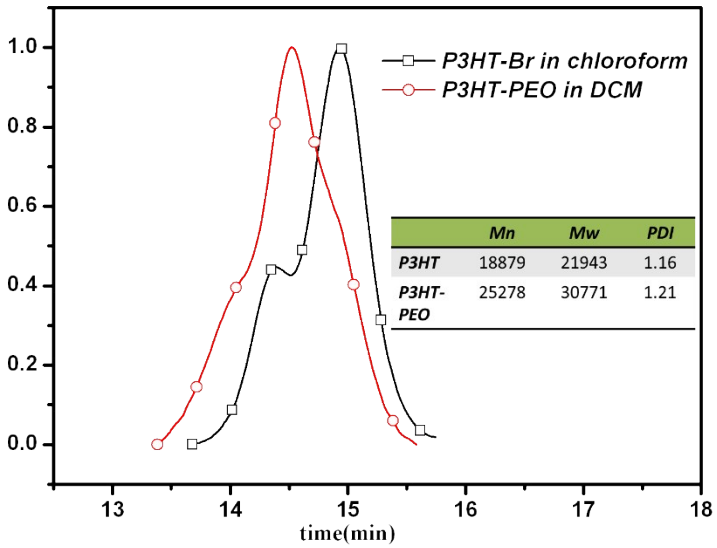

Fig.S1 .Molecular weight characterization by PS standard GPC of P3HT-Br and P3HT-PEO

2. To compare the absorption spectra of annealing and without annealing of P3HT and P3HT-PEO, films were prepared on quartz substrates from the solution of P3HT and P3HT-PEO respectively. The concentration of P3HT and P3HT-PEO were all 36 mg ml^{-1}, they were all spin-coated on quartz substrates at a spin speed of 1500 rpm for 90s.

P3HT-NA meant the film of P3HT without annealing.

P3HT-A meant the film of P3HT annealing at 150 ℃ for 10 min.

P3HT-PEO-NA meant the film of P3HT-PEO without annealing.

P3HT-PEO-A meant the film of P3HT-PEO annealing at 150 ℃ for 10 min.

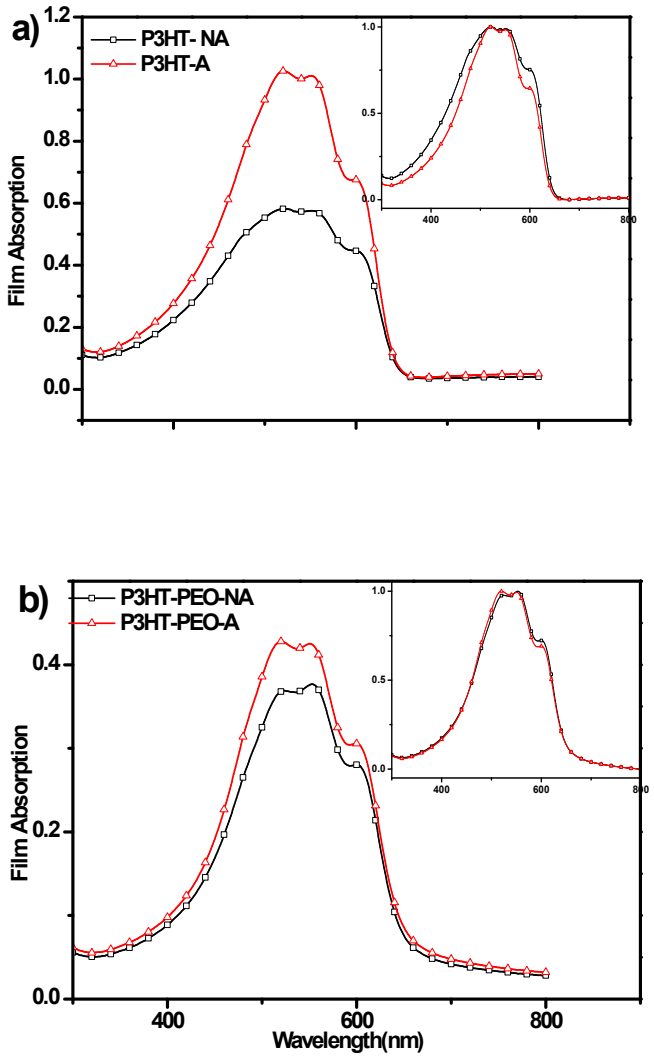

Fig.S2 The Uv-vis absorption spectrum of the films on the quartz glasses of P3HT (a) and P3HT-PEO (b) before and after annealing

3. In order to learn the Chemical properties of P3HT-PEO clearly, we took the TGA test of P3HT, PEO and P3HT-PEO, the test was under the atmosphere of nitrogen and the heating rate was 10℃/min.

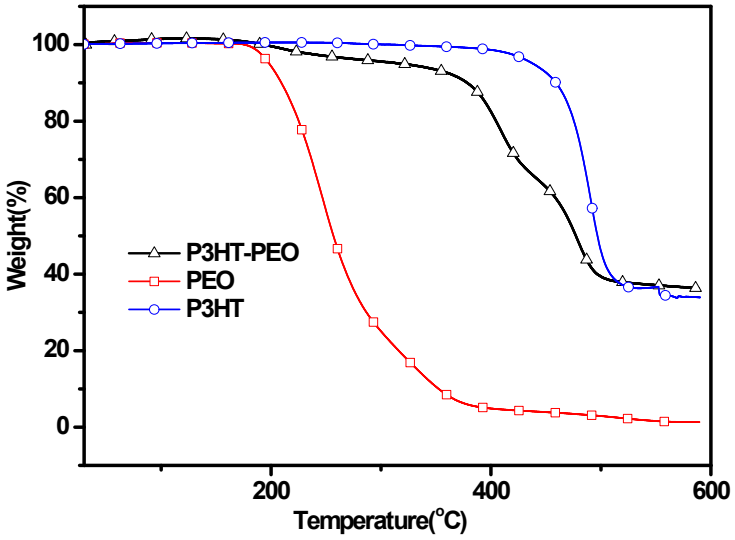

Fig.S3 The TGA of P3H、PEO and P3HT-PEO

4.We also took the Grazing-incidence wide-angle X-ray diffraction (GIWAXD) of the ternary films of P3HT:PCBM(1:0.8wt) and P3HT:PCBM:P3HT-PEO(1:0.8:5%) before and after thermal annealing(at 150 ℃ for 10， 30, 90 minutes).

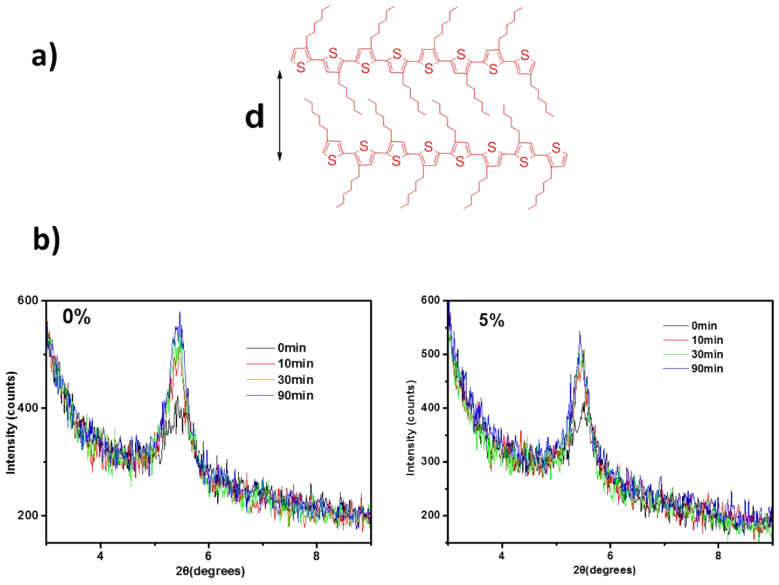

Fig.S4 (a)The accumulation schematic molecular chains of P3HT; (b)The XRD spectrum of films of P3HT:PCBM(1:0.8wt) and P3HT:PCBM:P3HT-PEO(1:0.8:5%) annealed at 150℃ for different time

5. The optical microscopy of the blend films for the device-0(with 0%wt P3HT-PEO) device-5(with 5%wt P3HT-PEO).

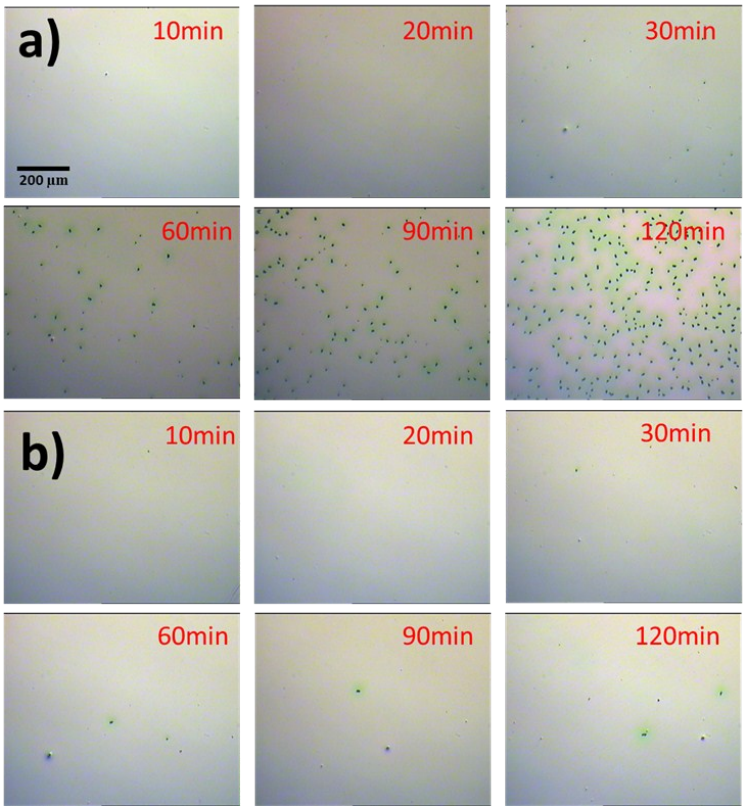

Fig.S5.The optical microscopy of the blend films for (a) the device-0(with 0%wt P3HT-PEO) and (b) device-5(with 5%wt P3HT-PEO) annealed at 150℃ for different time