

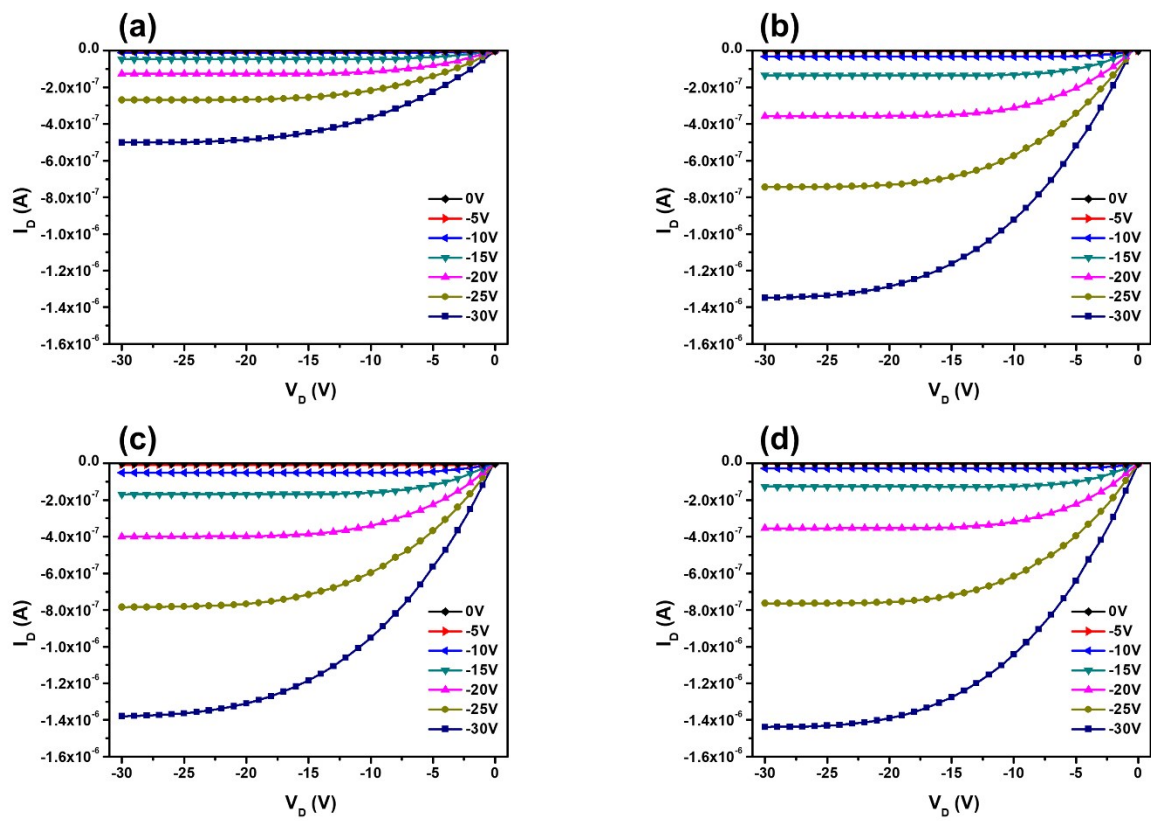
## Electronic Supplementary Information

### **Thermoelectric power factor exceeding $50 \mu\text{W m}^{-1} \text{K}^{-2}$ from water-borne colloids of polymer semiconductors**

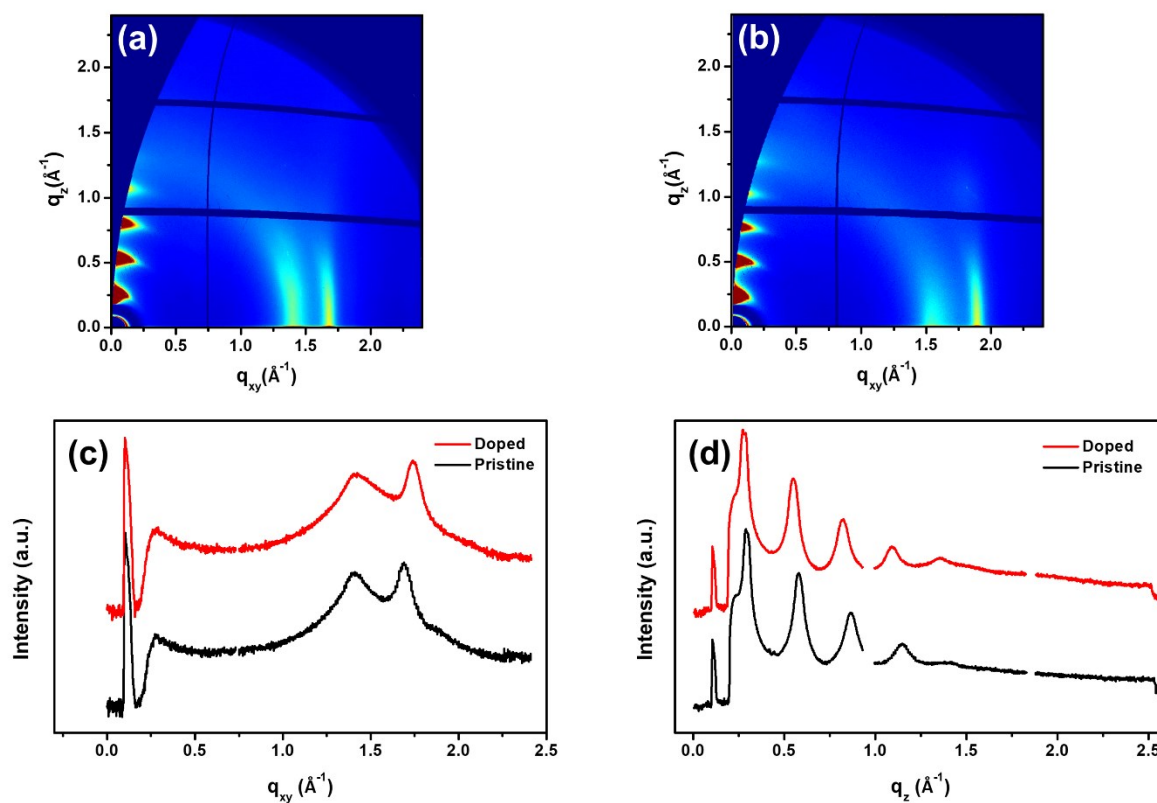
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**Fig. S1** Output curves of colloid based transistors for (a) 4 h, (b) 8 h, (c) 12 h, and (d) 16 h of dialysis time.



**Fig. S2** 2D GIXD data of (a) pristine PBTBT film and (b) F4TCNQ vapor doped film from 8 h of dialysis time. Apparent diffraction peak shift of chain axis and  $\pi$ - $\pi$  stacking was shown along the  $q_{xy}$  direction. Scattering profiles along with (c)  $q_{xy}$  and (d)  $q_z$  for pristine and F4TCNQ doped PBTBT films are summarized.  $\pi$ - $\pi$  stacking distance of doped film was decreased from  $\sim 3.72$  Å to  $\sim 3.61$  Å, and lamella stacking distance of doped film was increased from  $\sim 21.84$  Å to  $\sim 22.90$  Å.

| Polymer                       | Dopant            | S ( $\mu\text{V/K}$ ) | $\sigma$ (S/cm)  | PF <sub>max</sub> ( $\mu\text{W/m}^{-1} \text{K}^{-2}$ ) | Ref       |
|-------------------------------|-------------------|-----------------------|------------------|--|-----------|
| PBTTT                         | F2TCNQ            | 42                    | 670              | 120  | 1         |
| PBTTT                         | FTS               | 33 $\pm$ 5            | 1000 $\pm$ 70    | 110 $\pm$ 34   | 2         |
| PDPPSe-12                     | FeCl <sub>3</sub> | 62.3                  | 949              | 364  | 3         |
| PDPP3T                        | FeCl <sub>3</sub> | 226                   | 55               | 276  | 4         |
| C8TBT                         | FeCl <sub>3</sub> | 335                   | 1.17             | 13.11  | 5         |
| SWCNT/<br>C <sub>8</sub> BTBT | TCNQ              | 56.6 $\pm$ 1.1        | 885.4 $\pm$ 27.0 | 284.6 $\pm$ 6.1  | 6         |
| P(NDIOD-T2)                   | N-DMBI            | -850                  | 0.008            | 0.6  | 7         |
| PBTTT                         | F4TCNQ            | 495.96                | 2.23             | 54.89  | This work |

**Table S1.** Summarized some reported organic thermoelectric devices.

## Reference

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