

Supporting information for

**Tuning structure and properties of a
ferromagnetic organic semiconductor via a
magnetic field-assisted reduction process**

Han Zhou ^{1,2}, Zaitian Cheng ^{1,2}, Zhiqiang Ai ^{1,2}, Xinyao Li ^{1,2}, Lin Hu ^{1,*},

Fapei Zhang ^{1,*}

¹ Anhui Key Laboratory of Low-Energy Quantum Materials and Devices,
High Magnetic Field Laboratory, HFIPS, Chinese Academy of Sciences,
Hefei Anhui 230031, P. R. China 1; e-mail@e-mail.com

² University of Science and Technology of China, Hefei Anhui 230026, P. R.
China

* Correspondence: hulin@hmfl.ac.cn (L. Hu); fzhang@hmfl.ac.cn (F. Zhang)

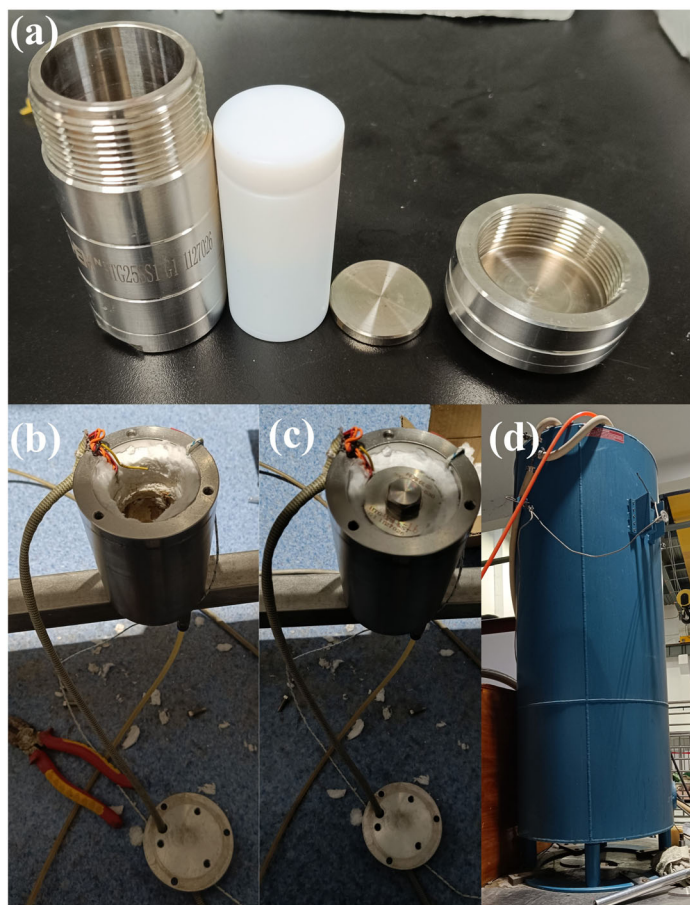


Figure S1. (a) A photograph of an autoclave including a Teflon-lined tank and a non-magnetic stainless shell. (b, c) A photograph of a homemade heater (b) and the heater fixed with the autoclave (c). (d) A photograph of a superconducting magnet (containing a heater inside) used in this work.

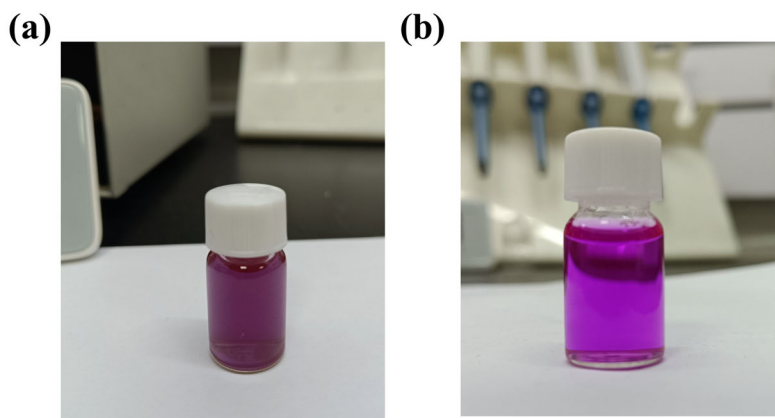


Figure S2. The photographs of the raw PDI solution (a) and the 9T-24h-PDI solution (b) prepared for UV–visible measurement.

Note. Calculation of crystallite size and the π - π stacking distance

The crystallite size is estimated from the full width at half maximum (FWHM) and peak position and is based on the Scherrer equation as follows:

$$D = \frac{\lambda}{\beta \cos \theta}$$

where D is the crystallite size, λ is the X-ray wavelength in our experiment (0.154 nm), θ is the Bragg angle of the diffraction peak (in radians), and β is the FWHM of a diffraction peak in radians.

The π - π stacking distance d is calculated from the position of the (122) peak and is

based on the Bragg diffraction formula ($d = \frac{a}{q}$, where q is the wavevector at the (122) peak position).

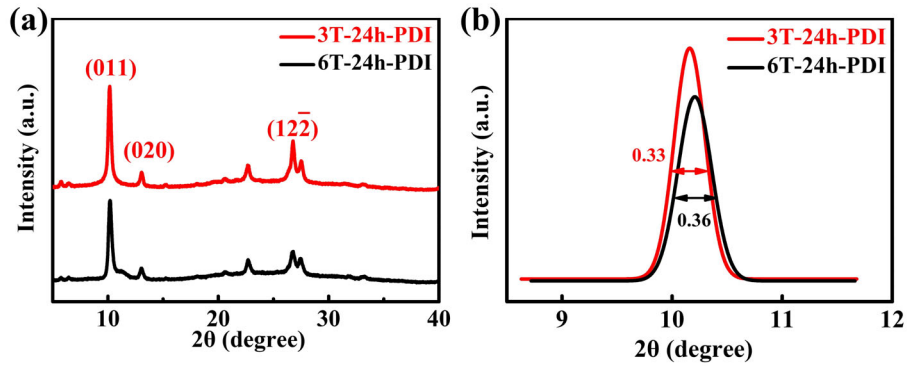


Figure S3. (a) XRD pattern of the as-prepared 3T-24h-PDI and 6T-24h-PDI powder; (b) the profile of the (011) reflection shown in Fig. S3a.

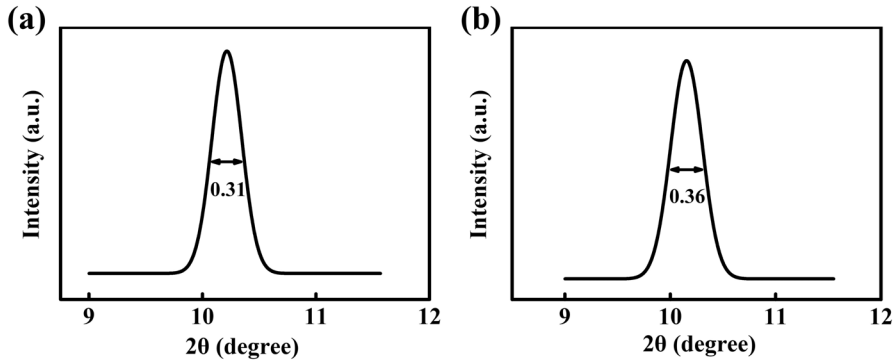


Figure S4. XRD profiles of the (011) reflection for the samples of 0T-24h-PDI (a) and 9T-24h-PDI (b) shown in Figure 2d.

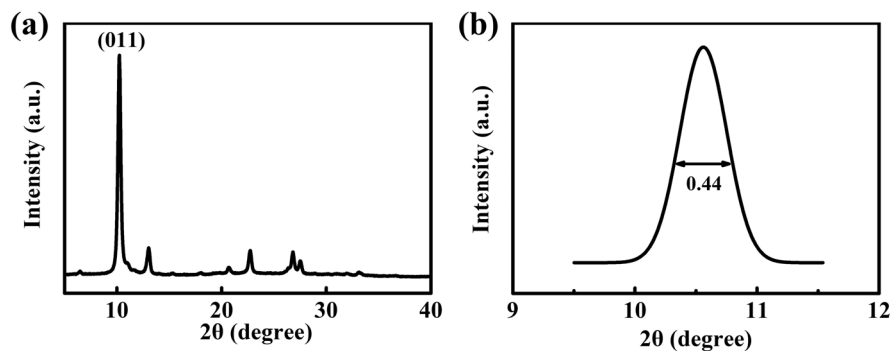


Figure S5. (a) XRD pattern of the as-prepared 9T-36h-PDI powder; (b) the profile of the (011) reflection shown in Fig. S5a.

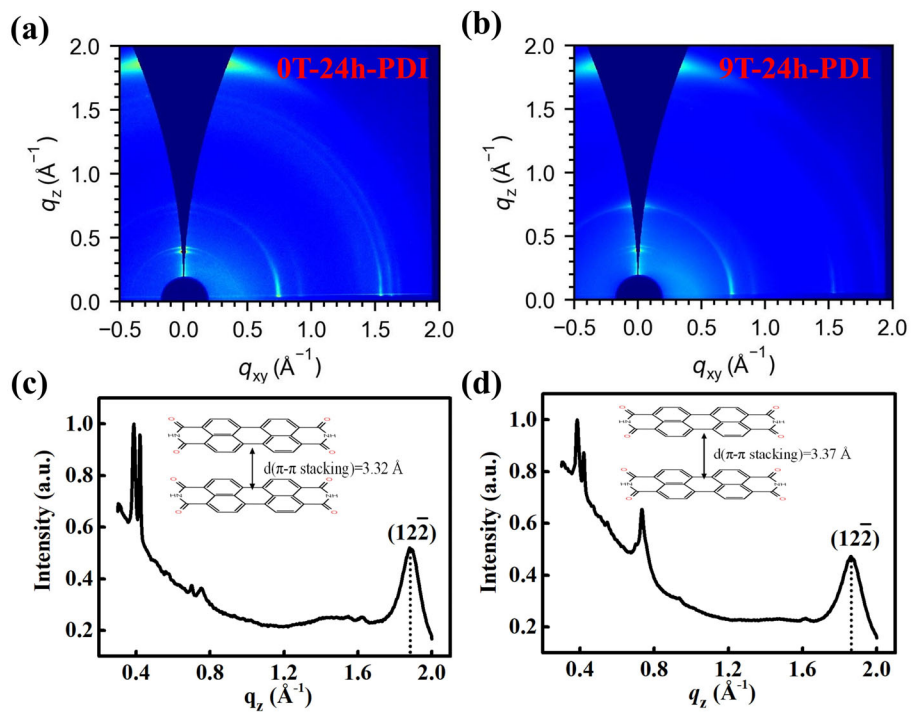


Figure S6. (a-b) 2D GIXRD patterns of as-prepared films cast from the 0T-24h-PDI solution (a) and 9T-24h-PDI solution (b), respectively; (c-d) cross-section profiles along q_z of the GIXRD patterns shown in Figure S6a-b.

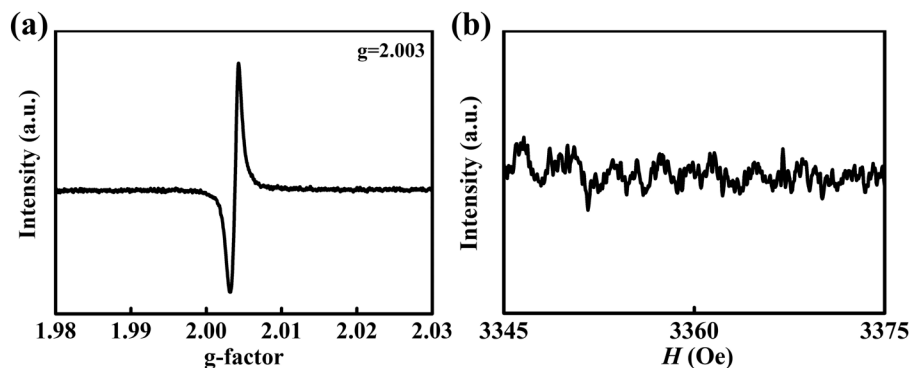


Figure S7. (a) G-factor spectrum of the as-prepared 9T-24h-PDI film. (b) EPR spectrum of the PDI dianion solution (9T-24h-PDI solution).

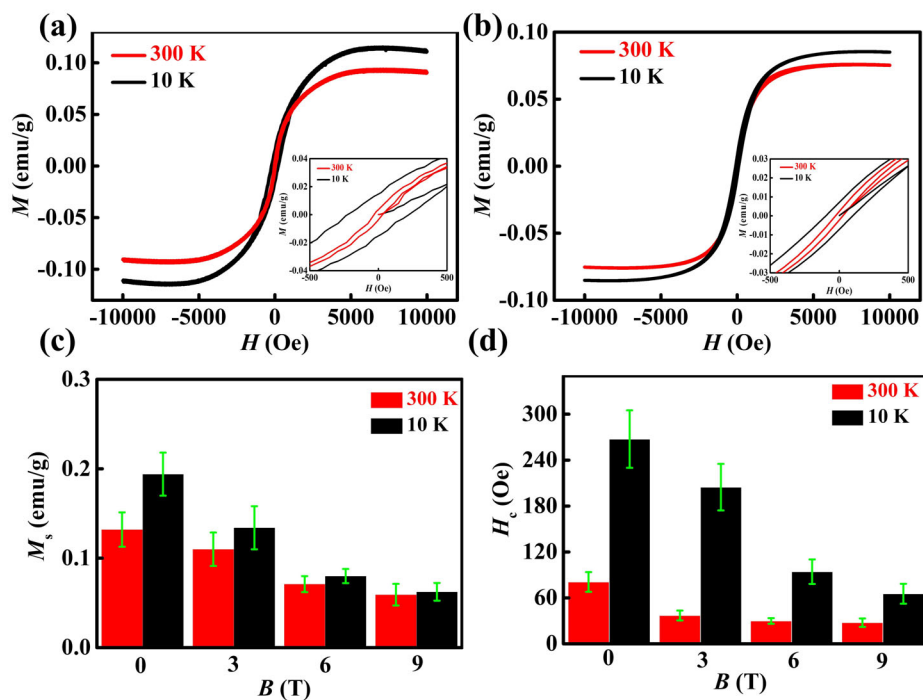


Figure S8. (a, b) M-H curves of the 3T-24h-PDI (a) and 6T-24h-PDI (b) powders measured at 10K and 300K; (c, d) saturation magnetization (c) and coercive field (d) of the PDI magnets prepared by the solvothermal approach under an external magnetic field of 0T, 3T, 6T, and 9T. The data collected are based on at least 5 sample batches for each preparation condition (field strength).

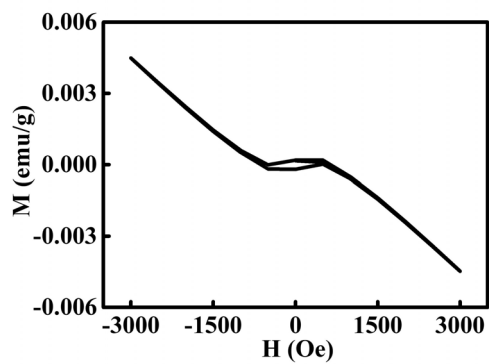


Figure S9. M-H curves of the raw PDI powder obtained at 300 K.

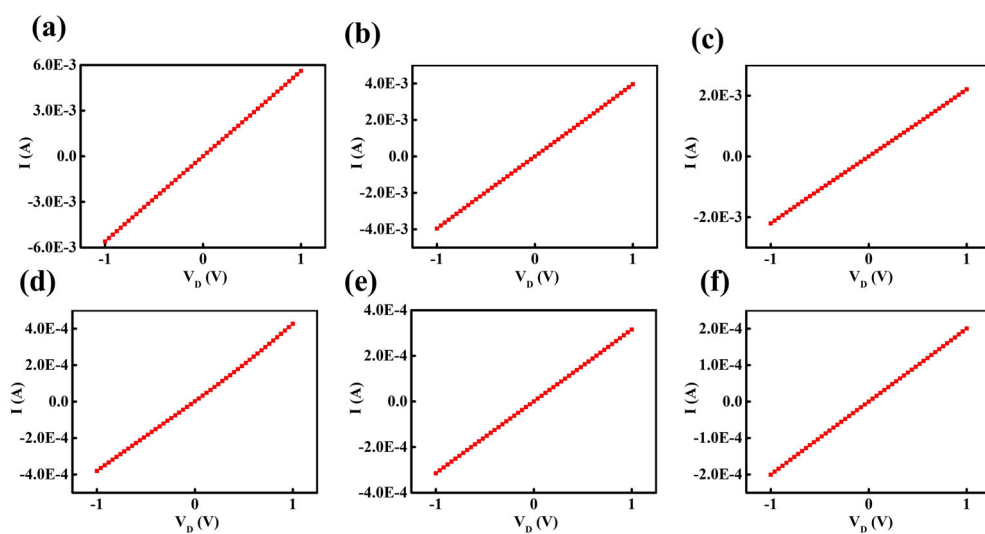


Figure S10. I-V curves of the 0T-24h-PDI film exposed to ambient air for 1h (a), 2h (b), 3h (c), 6h (d), 9h (e), and 12h (f), respectively.

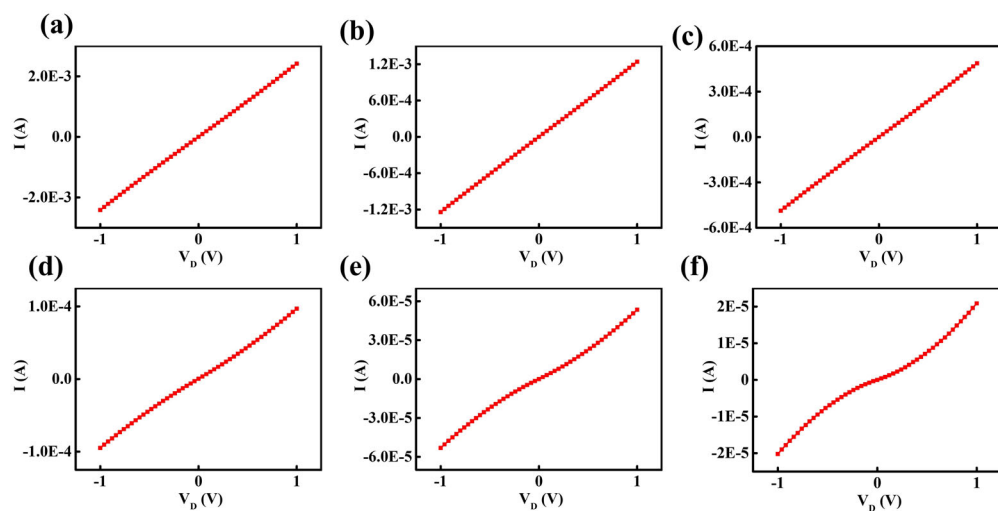


Figure S11. I-V curves of the 9T-24h-PDI film exposed to ambient air for 1h (a), 2h (b), 3h (c), 6h (d), 9h (e), and 12h (f), respectively.

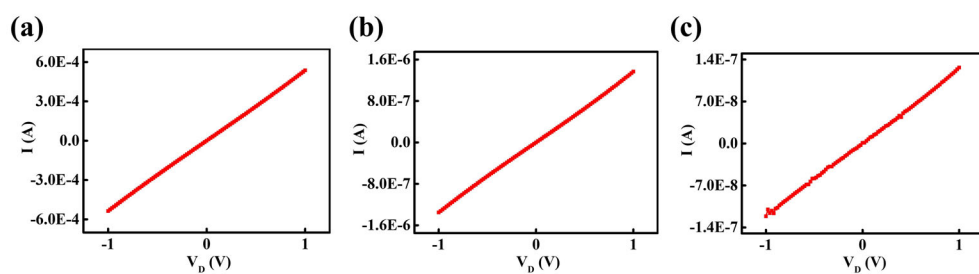


Figure S12. I-V curves of the 9T-36h-PDI film exposed to ambient air for 1h (a), 2h (b), and 3h (c).

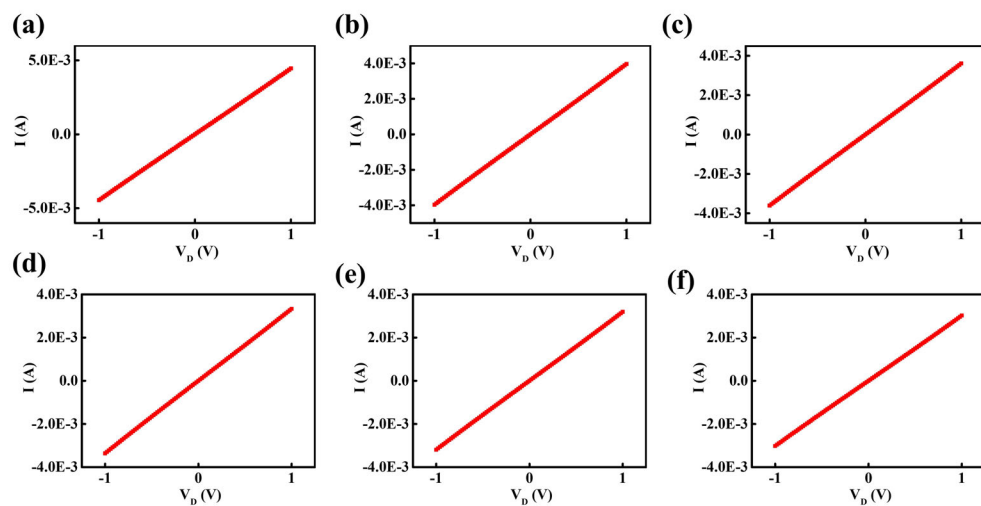


Figure S13. I-V curves of the 9T-36h-PDI film exposed to ambient air for 30s (a), 60s (b), 90s(c), 120s (d), 150 (e), and 180s (f), respectively.

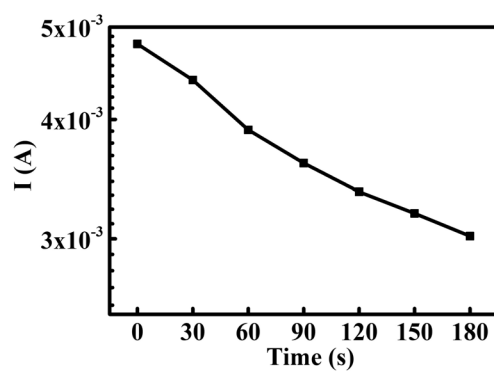


Figure S14. The device current at the bias of 1V of the 9T-36h-PDI film for different air exposure times extracted from the I-V curves in Figure S13.