Supplementary Information

Diketopyrrolopyrrole-based semiconducting polymer bearing thermocleavable side chains

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**Figure S1.** 300 MHz $^1$H NMR spectrum of 2,5-dihydro-3,6-di-2-thienyl-pyrrolo[3,4-c]pyrrole-1,4-dione (1) in DMSO-$d_6$. 
Fig. S2. 300 MHz $^1$H NMR spectrum of 2,5-bis(2-octyldodecanoyl)-3,6-di(thiophen-2-yl)pyrrolo[3,4-c]pyrrole-1,4(2H,5H)-dione (2) in CDCl$_3$. 

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**Fig. 3.** 300 MHz $^1$HNMR of the mixture of the decomposed compound 2 at 250 °C for 20 min measured in DMSO-$d_6$. It can be clearly seen that the aromatic peaks of compound 2 disappeared completely and the aromatic peaks corresponding to those of compound 1 appeared.
Fig. S4 Top: The proposed thermal decomposition reaction of compound 2 to form compound 1. Bottom: FT-IR spectra of pure compound 1 on a KBr substrate and compound 2 films on Si wafer substrates annealed at different temperatures in nitrogen. The intense peaks at 2922 cm\(^{-1}\) and 2851 cm\(^{-1}\) of the non-annealed 2 originate from the stretching vibrations of the side chain C-H bonds, which decreased significantly after heating at 200 °C for 3 hr. The peaks at 1728 and 1720 cm\(^{-1}\) are from the stretching vibrations of the C=O groups on the 2-octyldodecanoyl substituents of compound 2, which disappeared after heating at 200 °C for 3 hr. The new peak appeared at 1596 cm\(^{-1}\) in the thin film annealed at 200 °C for 3 hr is due to the bending of the N-H groups of the recovered compound 1. The spectrum of the sample annealed at 200 °C for 3 hr resembles the one of the pure compound 1, indicating that compound 2 was thermally decomposed to form compound 1.
**Supplementary Information**

**Fig. S5.** 300 MHz $^1$H NMR spectrum of 3,6-bis(5-bromothiophen-2-yl)-2,5-bis(2-octyldodecanoyl)pyrrolo[3,4-c]pyrrole-1,4(2H,5H)-dione (3) in CDCl$_3$. 
Fig. S6. 300 MHz $^1$H NMR spectrum of PDQT-te in CDCl$_3$. 
Fig. S7. GPC profile of PDQT-tc using chlorobenzene as an eluent and polystyrene as standards at column temperature of 40 °C.
**Fig. S8** Film thickness analysis of PDQT-te thin films using AFM: left) before (63 nm) and right) after (26 nm) thermal annealing at 200 °C for 3 hr.