

Supporting Information

Molecular Engineering of (*E*)-1,2-bis(3-cyanothiophene-2-yl)ethene-based Polymeric Semiconductors for Unipolar n-Channel Field-Effect Transistors

Congyuan Wei,^{a,b†} Zhonghai Tang,^{a,c†} Weifeng Zhang,^a Jianyao Huang,^a Yankai Zhou,^{a,b} Liping Wang,^{*c} and Gui Yu^{*a,b}

^a *Beijing National Laboratory for Molecular Sciences, CAS Research/Education Center for Excellence in Molecular Sciences, Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, P. R. China*

^b *School of Chemical Sciences, University of Chinese Academy of Sciences, Beijing 100049, P. R. China*

^c *School of Material Science and Engineering, University of Science and Technology Beijing, Beijing 100083, P. R. China*

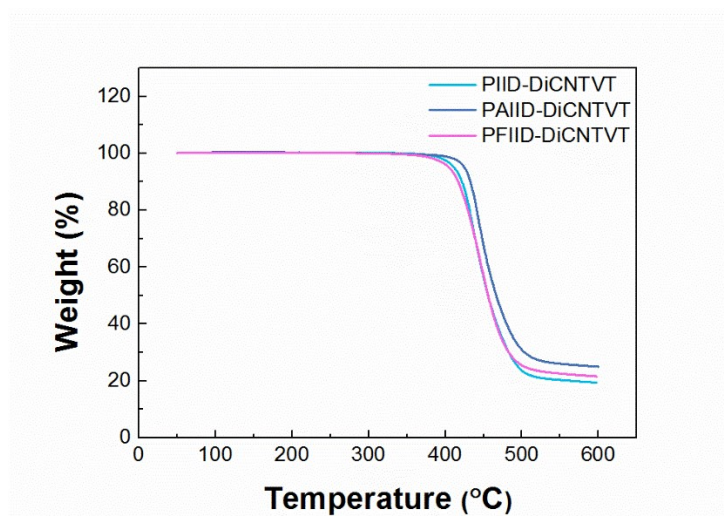


Figure S1. Thermogravimetric traces of PIID-DiCNTVT, PAIID-DiCNTVT, and PFIID-DiCNTVT.

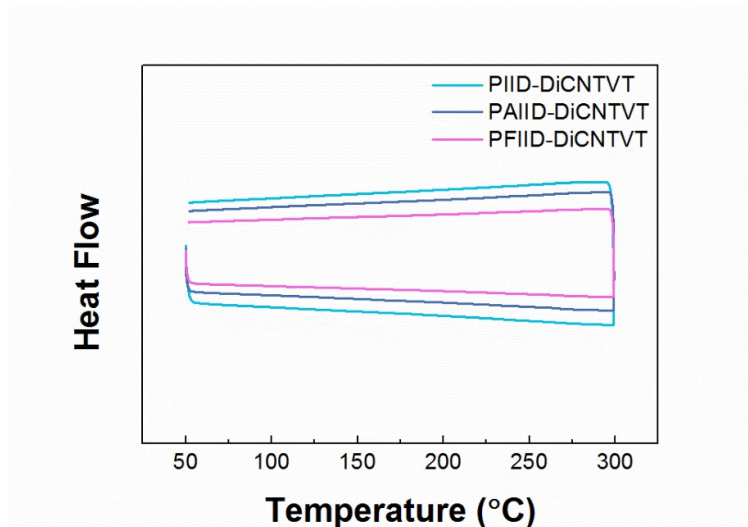


Figure S2. Differential scanning calorimetry analyses of **PIID-DiCNTVT**, **PAIID-DiCNTVT**, and **PFIID-DiCNTVT**.

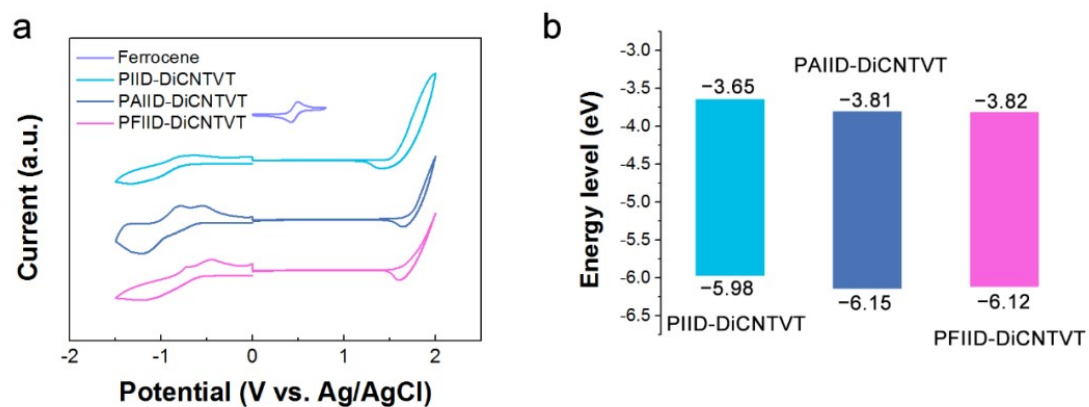


Figure S3. Cyclic voltammetry curves and schematic diagram of energy levels of **PIID-DiCNTVT**, **PAIID-DiCNTVT**, and **PFIID-DiCNTVT**.

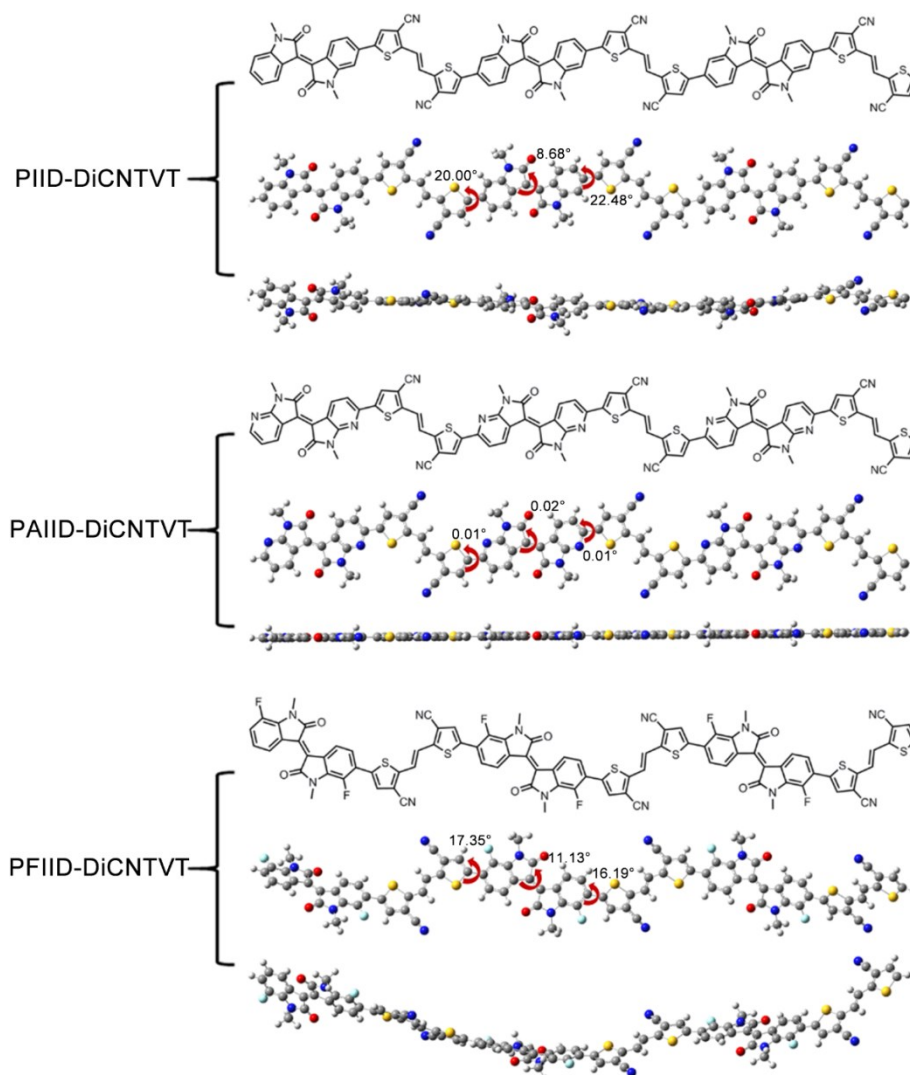


Figure S4. Chemical structures of trimers (up), the front view (middle), and the side view (bottom) of the simulated trimers of **PIID-DiCNTVT**, **PAIID-DiCNTVT**, and **PFIID-DiCNTVT**.

Table S1. Calculated frontier orbital energy levels of trimers of **PIID-DiCNTVT**, **PAIID-DiCNTVT**, and **PFIID-DiCNTVT**

polymer	HOMO (eV)	LUMO (eV)
PIID-DiCNTVT	-5.50	-3.44
PAIID-DiCNTVT	-5.60	-3.62
PFIID-DiCNTVT	-5.62	-3.62

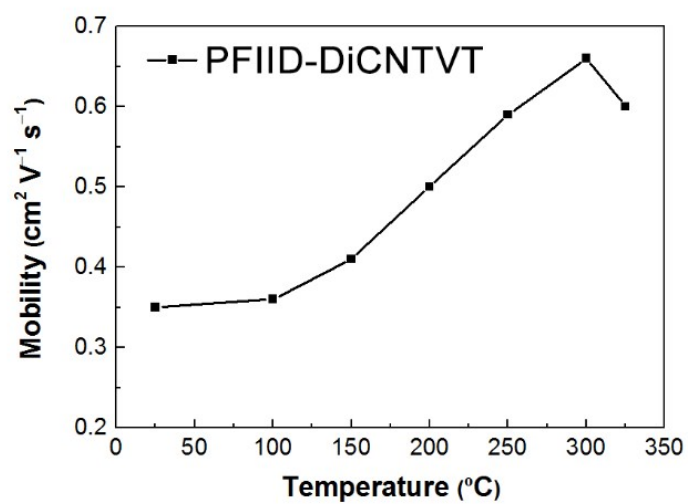
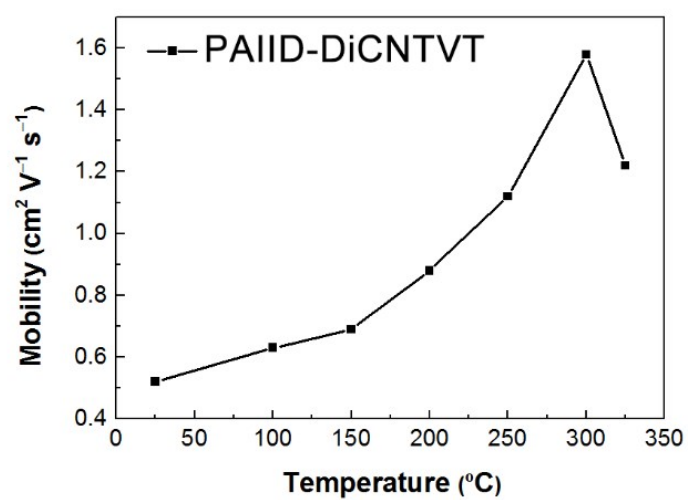
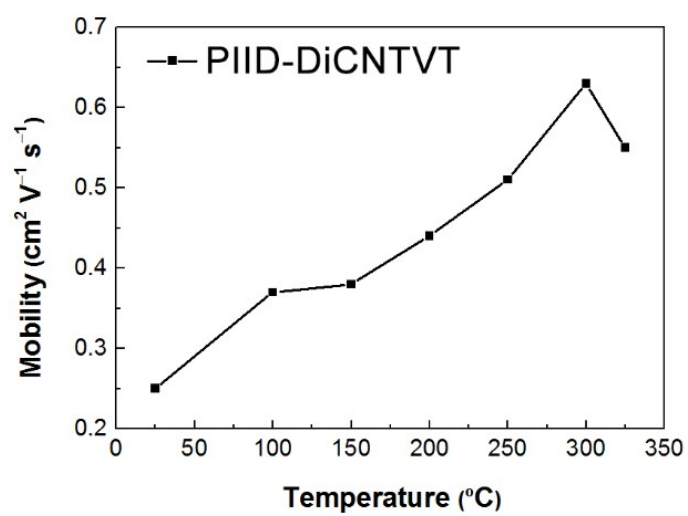


Figure S5. Temperature-dependent mobilities of transistors based on **PIID-DiCNTVT**, **PAIID-DiCNTVT**, and **PFIID-DiCNTVT**.

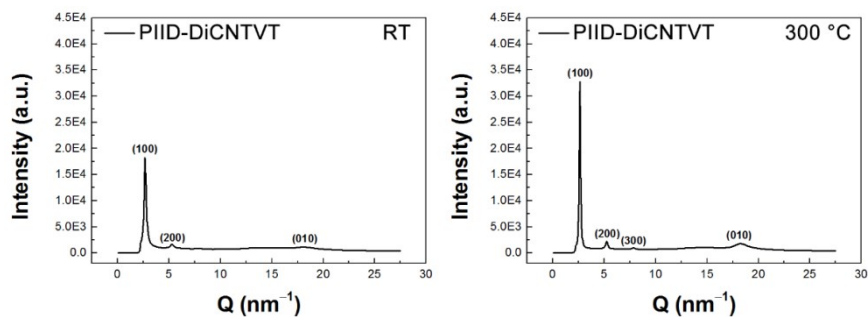


Figure S6. 1-D XRD profiles in out-of-plane direction of the **PIID-DiCNTVT** thin film before and after thermal annealing treatment.

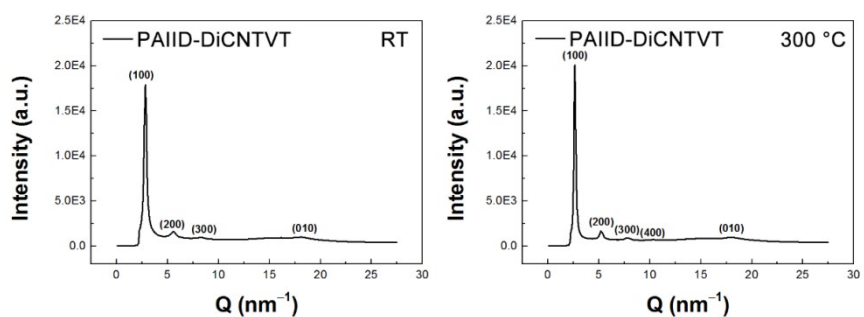


Figure S7. 1-D XRD profiles in out-of-plane direction of the **PAIID-DiCNTVT** thin film before and after thermal annealing treatment.

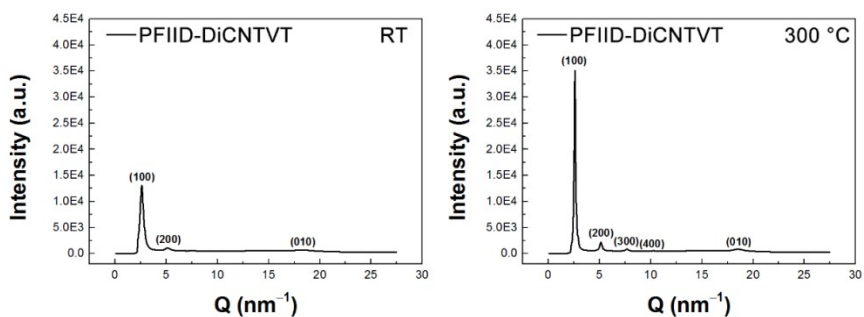


Figure S8. 1-D XRD profiles in out-of-plane direction of the **PFIID-DiCNTVT** thin film before and after thermal annealing treatment.

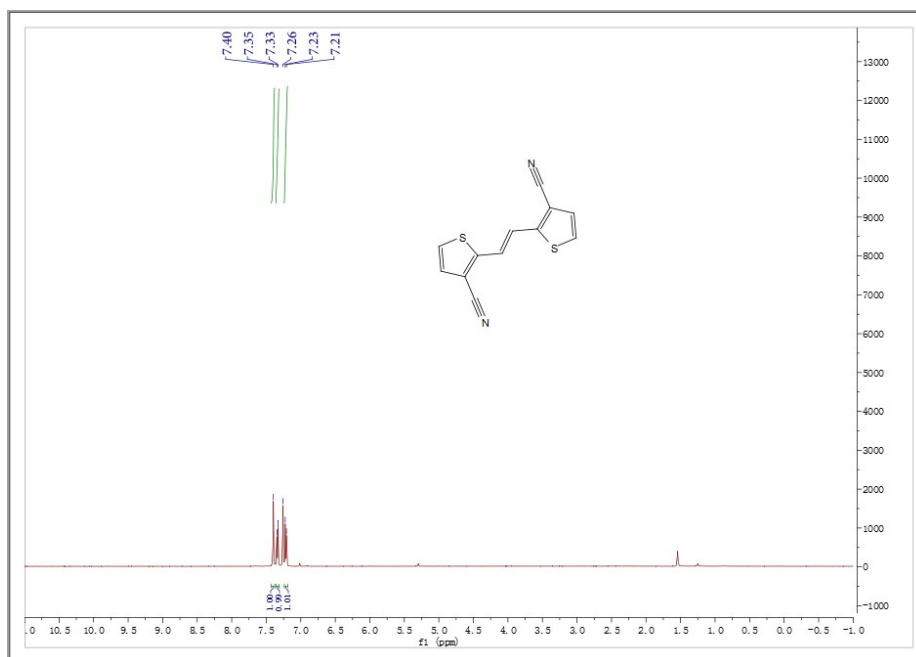


Figure S9. ¹H NMR spectrum of the compound DiCNTVT.

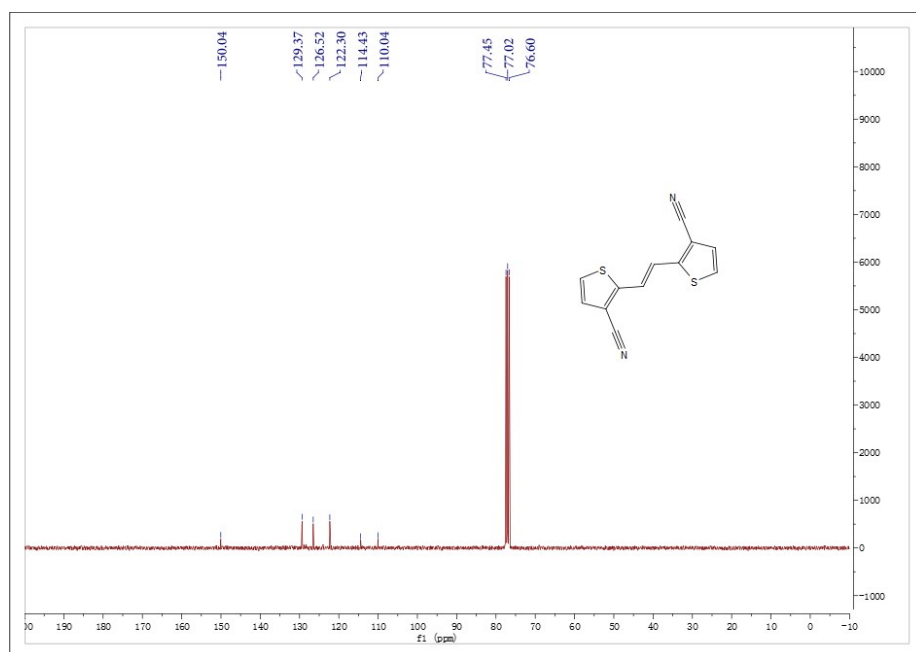


Figure S10. ¹³C NMR spectrum of the compound DiCNTVT.

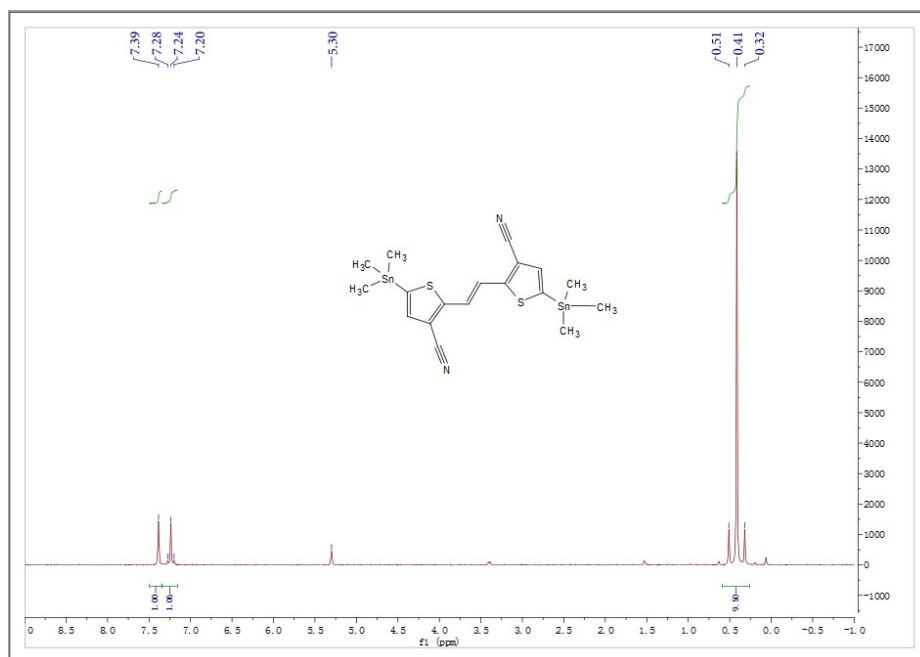


Figure S11. ¹H NMR spectrum of compound DiCNTVT-Sn.

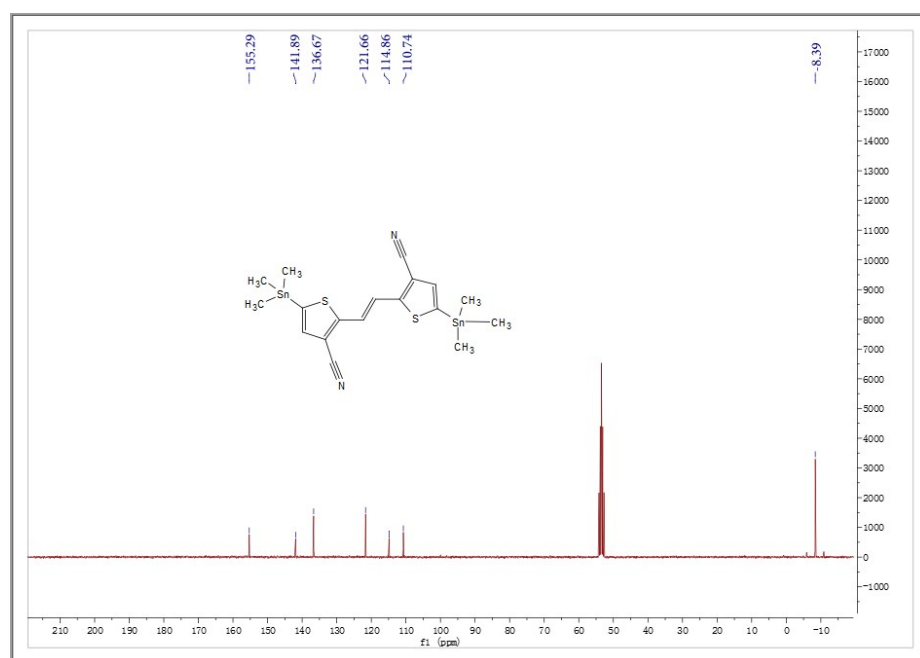


Figure S12. ¹³C NMR spectrum of compound DiCNTVT-Sn.

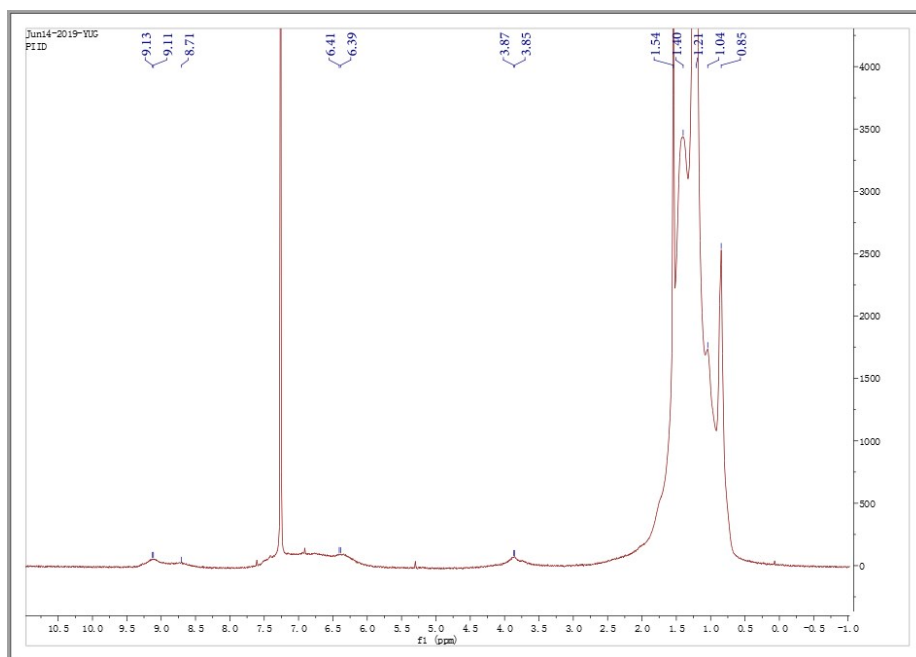


Figure S13. ^1H NMR spectrum of polymer PIID-DiCNTVT.

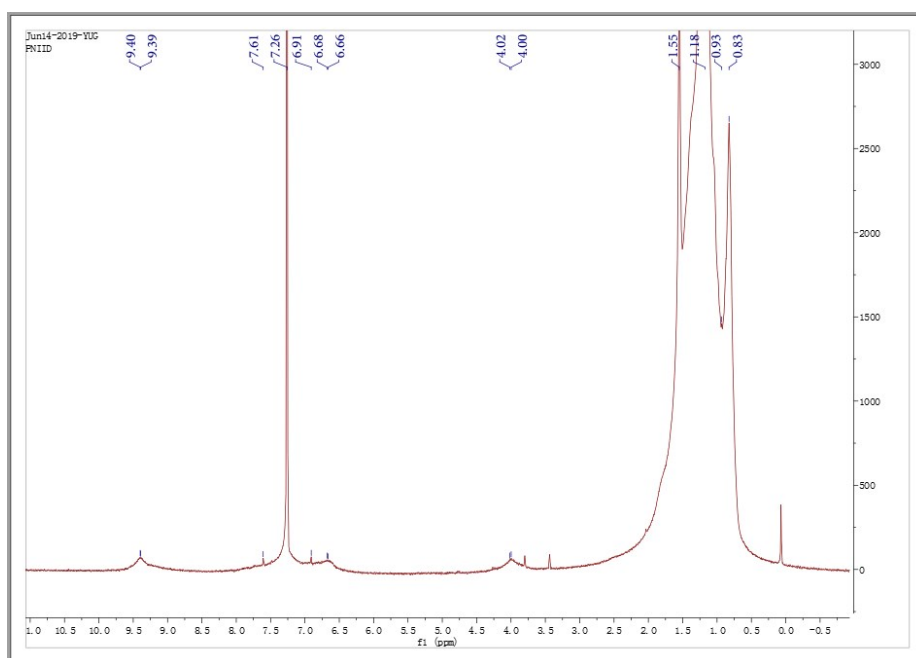


Figure S14. ^1H NMR spectrum of polymer PAIID-DiCNTVT.

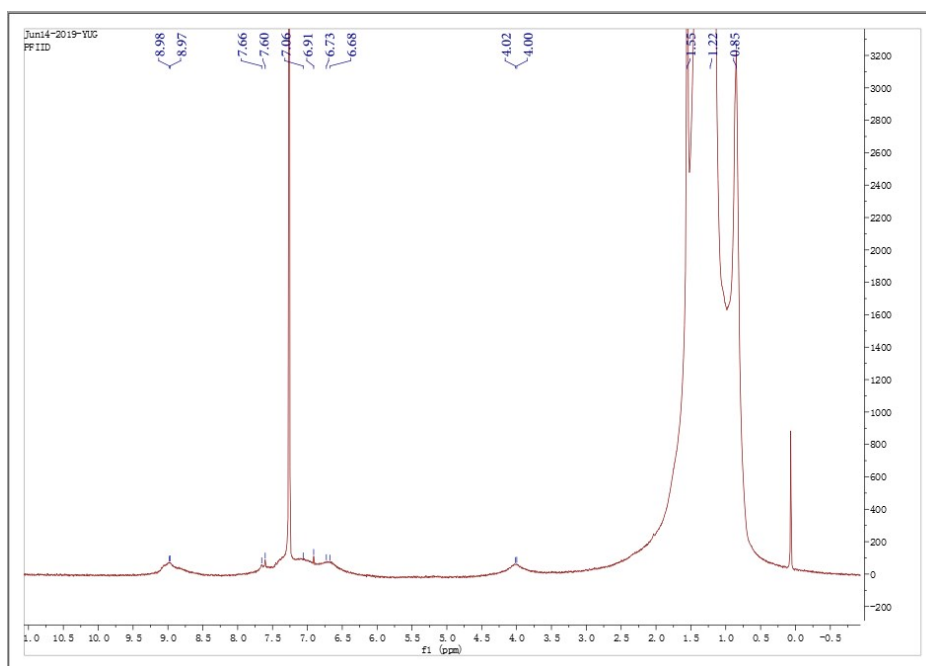


Figure S15. ^1H NMR spectrum of polymer **PFIID-DiCNTVT**.