

Electronic Supplementary information (ESI)

Amorphous Electron Donors with Controllable Morphology for Non-fullerene Polymer Solar cells

Nergui Uranbileg,^{a,b} Chenglin Gao,^{a,c} Chunming Yang,^d Xichang Bao,^a Liangliang Han^{a,*}, and Renqiang Yang^{a,*}

^a. CAS Key Laboratory of Bio-based Materials, Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese Academy of Sciences, Qingdao 266101, China.

Email: hanll@qibebt.ac.cn, yangrq@qibebt.ac.cn

^b. Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, Beijing 100049, China.

^c. College of Materials Science and Engineering, Qingdao University of Science and Technology, Qingdao 266042, China.

^d. Shanghai Synchrotron Radiation Facility, Shanghai Advanced Research Institute, Chinese Academy of Sciences, Shanghai 201204, China.

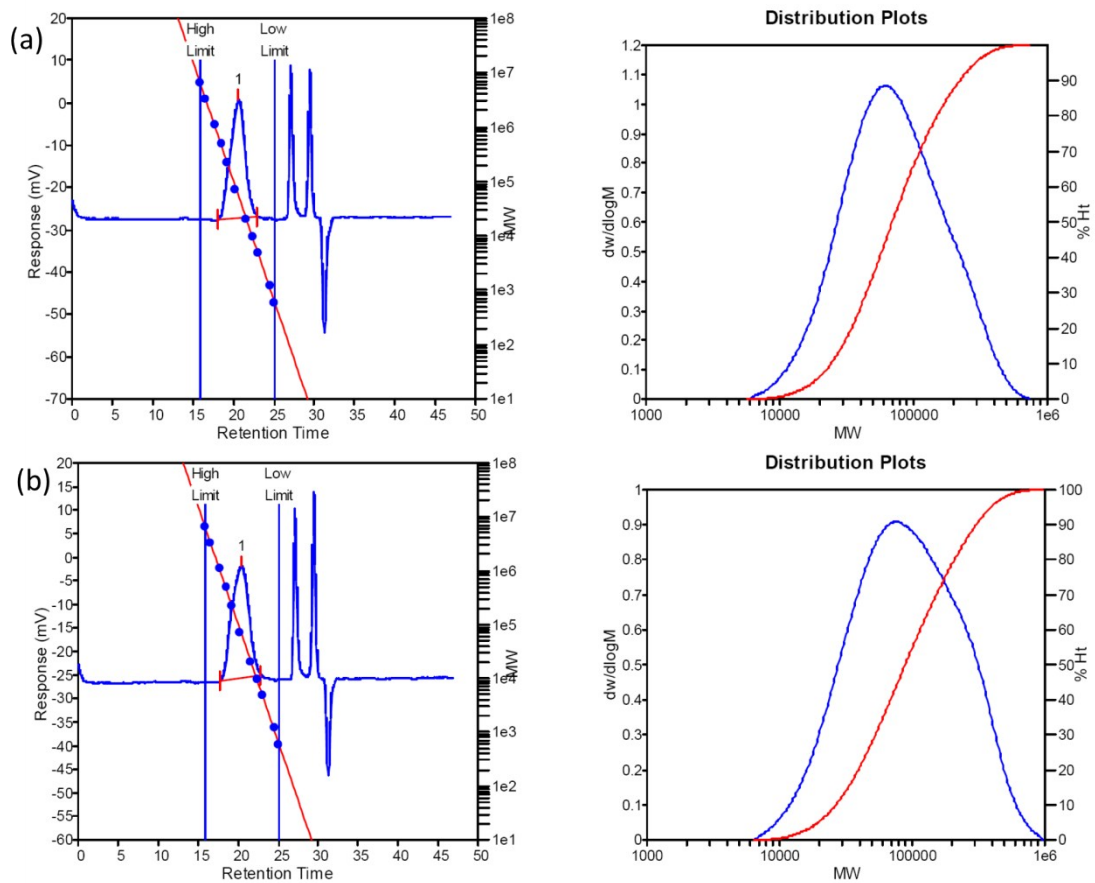


Figure S1. GPC chromatograms of PBDD-CH (a) and PBDD-CH-S (b) carried out in 1,2,4-trichlorobenzene at a column temperature of 150 °C.

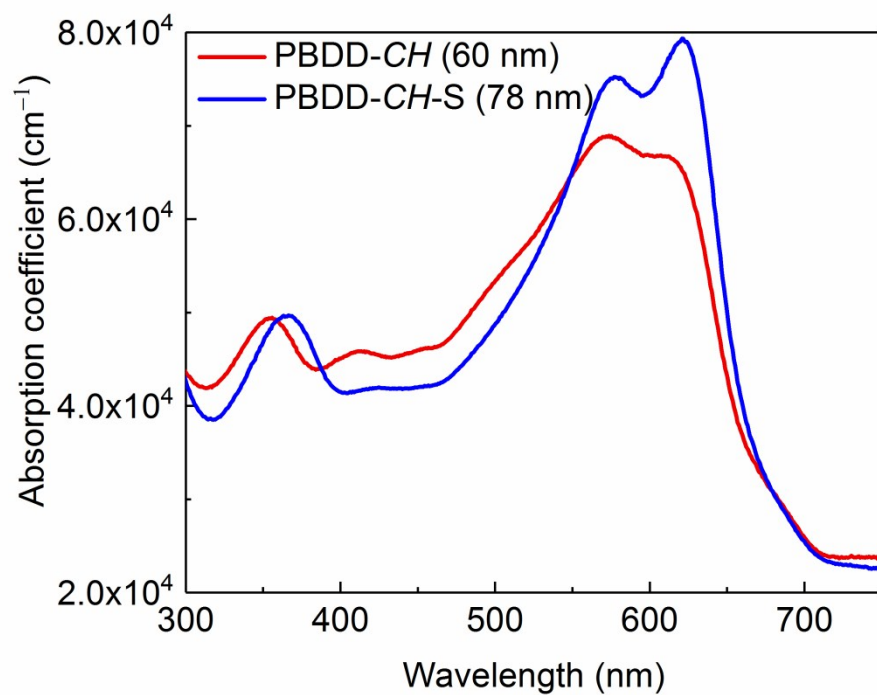


Figure S2. UV-vis absorption spectra for PBDD-CH and PBDD-CH-S in their pristine films.

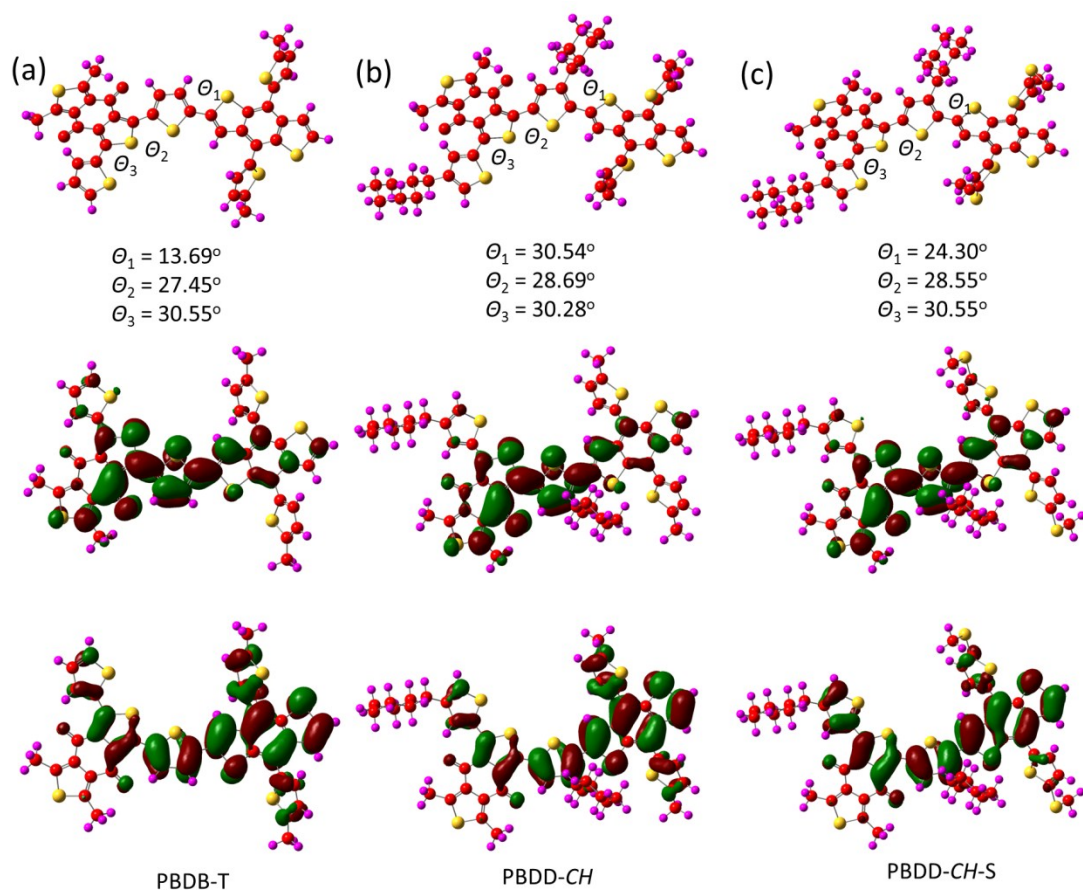


Figure S3. The ground-state geometries of BBDT-BDD repeated units (C: red, S: yellow, H: purple. To simplify the calculation, only one repeating unit of each polymer was subjected to the calculation, and 2-ethylhexyl was replaced by CH₃ groups).

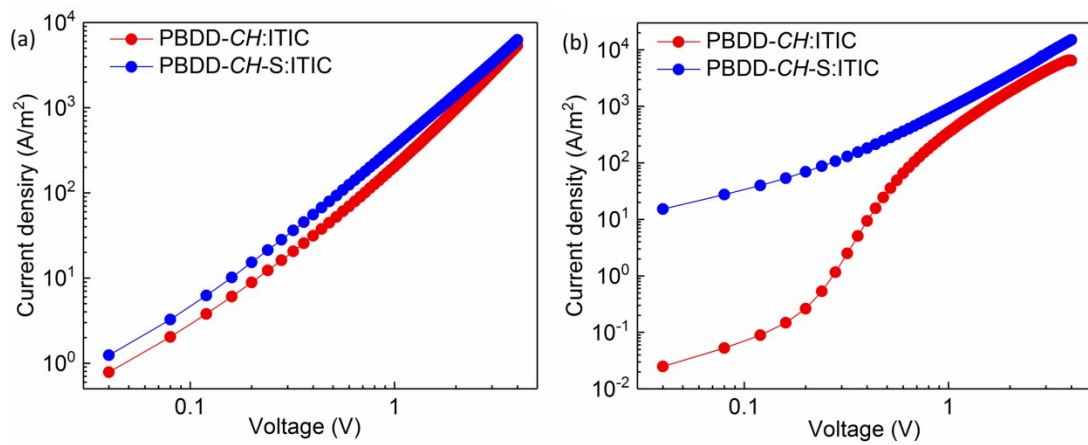


Figure S4. J -($V_{\text{app}}-V_{\text{bi}}-V_{\text{s}}$) characteristics for PBDD-CH:ITIC and PBDD-CH-S:ITIC based devices.

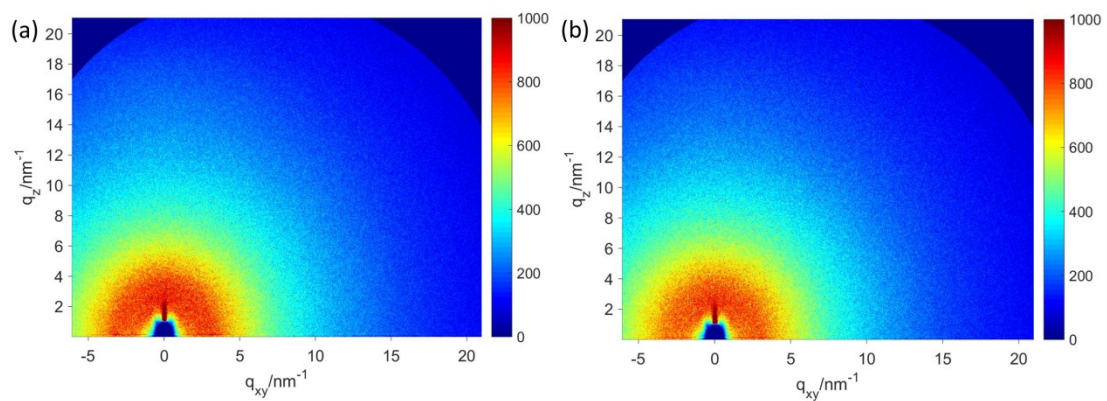


Figure S5. 2D-GIWAXS patterns for PBDD-CH:ITIC and PBDD-CH-S:ITIC blending films.

Structure characterization of the monomers and polymers.

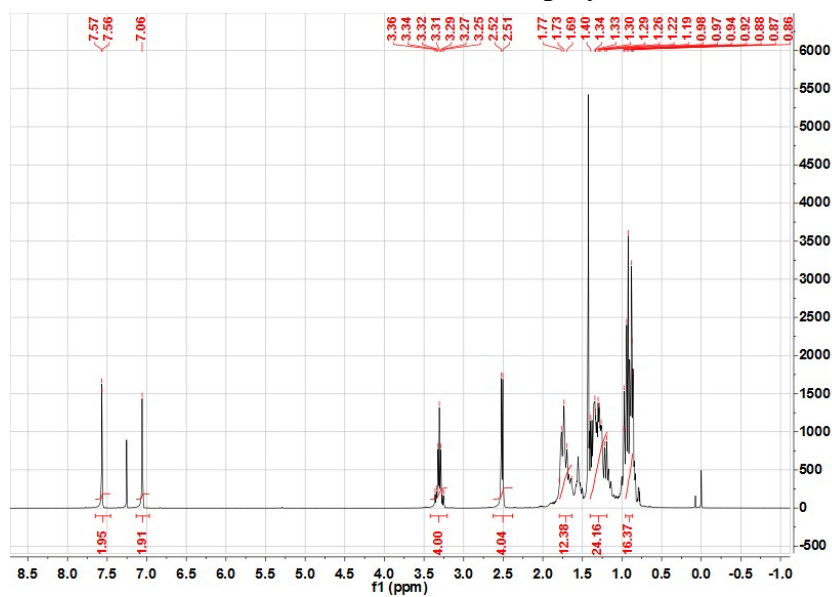


Figure S6. ^1H NMR spectra for BDD-CH.

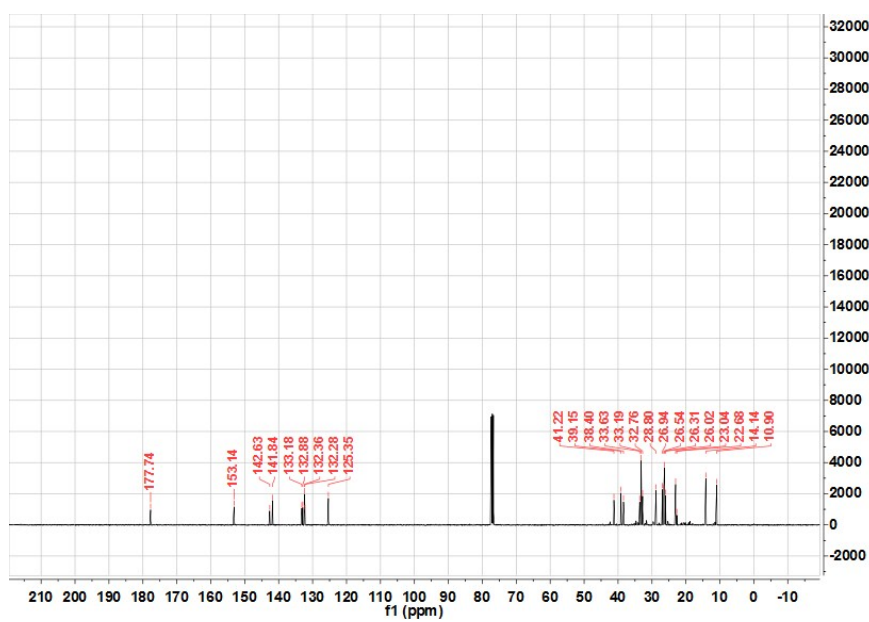


Figure S7. ^{13}C NMR spectra for BDD-CH.

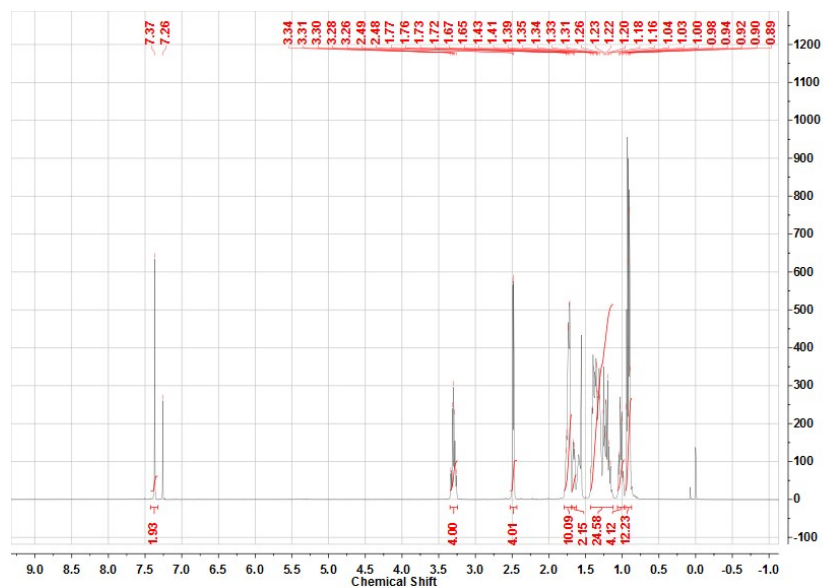


Figure S8. ^1H NMR spectra for monomer DBrBDD-CH.

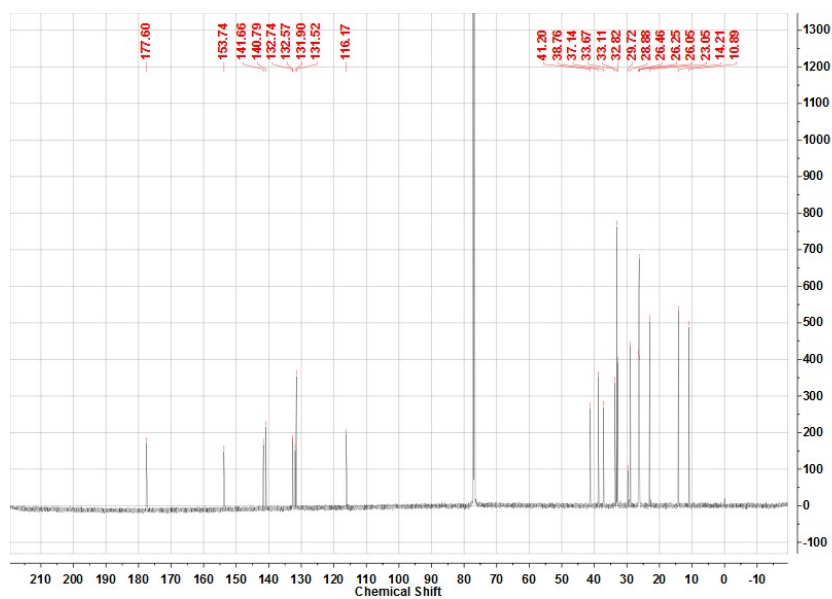


Figure S9. ^{13}C NMR spectra for monomer DBrBDD-CH.

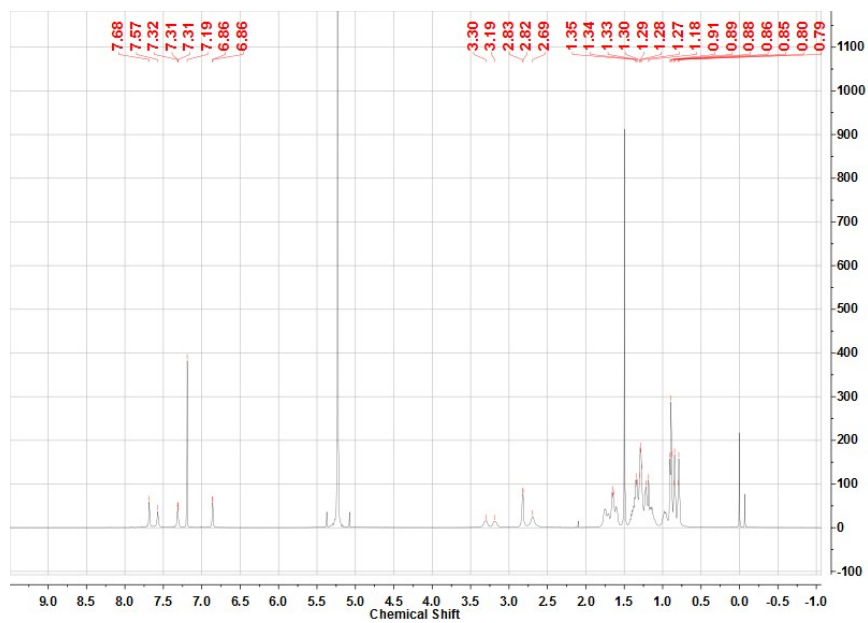


Figure S10. ^1H NMR spectra for PBDD-CH.

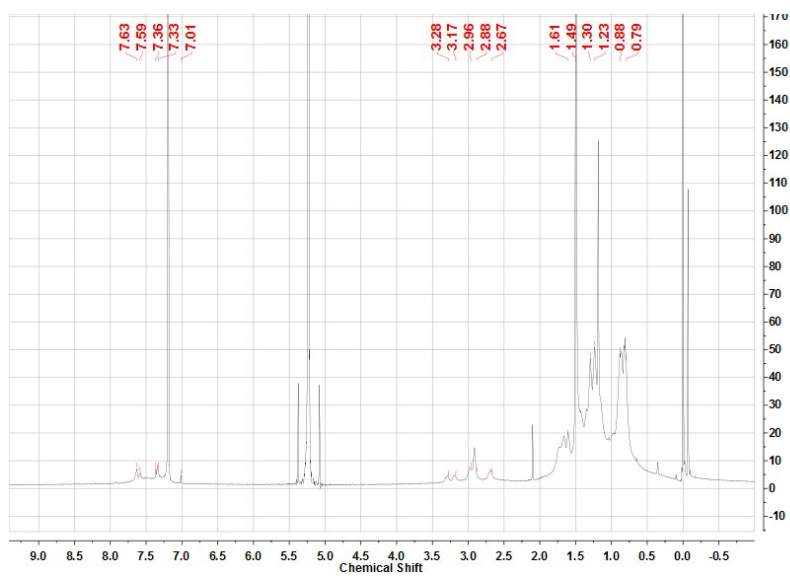


Figure S11. ^1H NMR spectra for PBDD-CH-S.

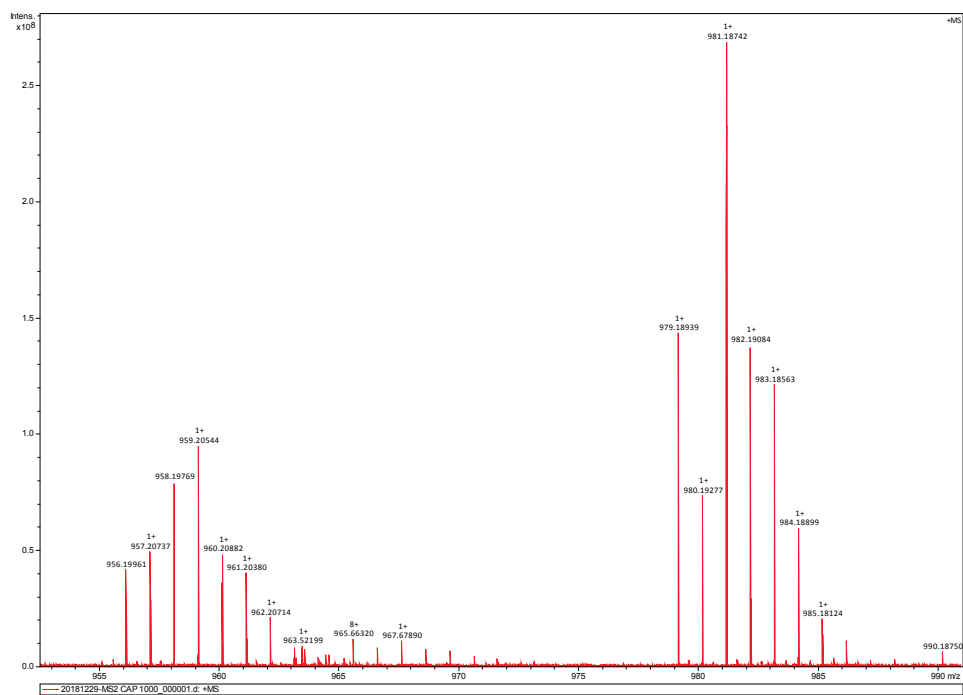


Figure S12. HRMS for monomer DBrBDD-CH.