Supporting Information

An efficient and general strategy towards the synthesis of polyethylene-based cyclic polymers

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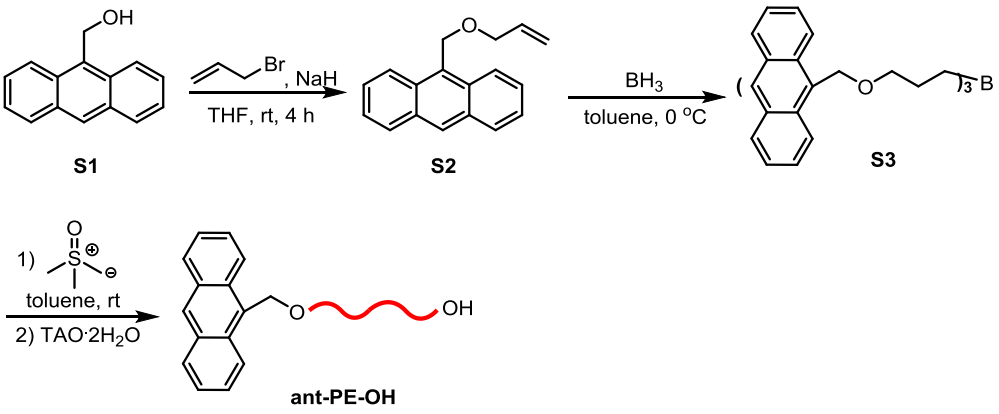
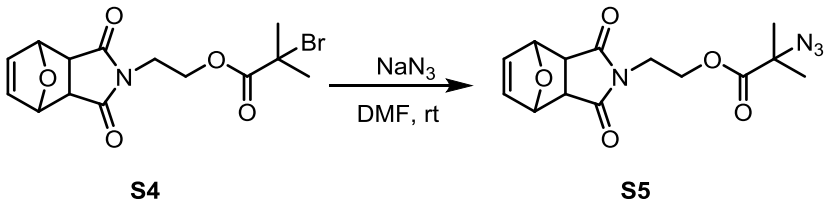
1. Synthetic Method



Scheme S1. Synthesis of α-anthracene-ω-hyroxyl polyethylene (ant-PE-OH).



Scheme S2. Synthesis of MI-N_3.

2. HT-GPC chromatograms

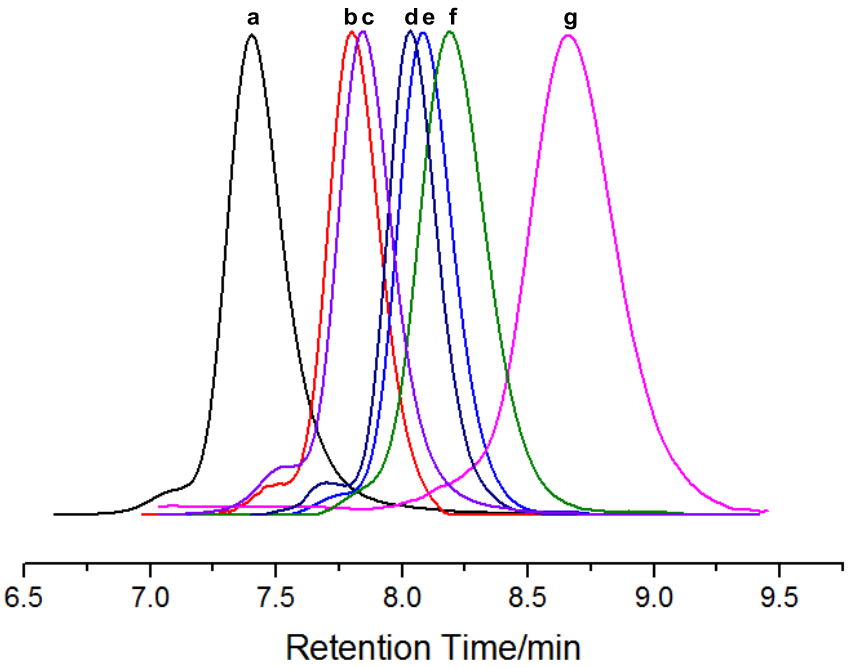


Figure S1. GPC traces of linear ant-PE-OH: (a) ant-PE_{595}-OH; (b) ant-PE_{190}-OH; (c) ant-PE_{175}-OH; (d) ant-PE_{118}-OH; (e) ant-PE_{100}-OH; (f) ant-PE_{61}-OH; (g) ant-PE_{30}-OH in 1,2,4-trichlorobezene at 150 ^{o}C.

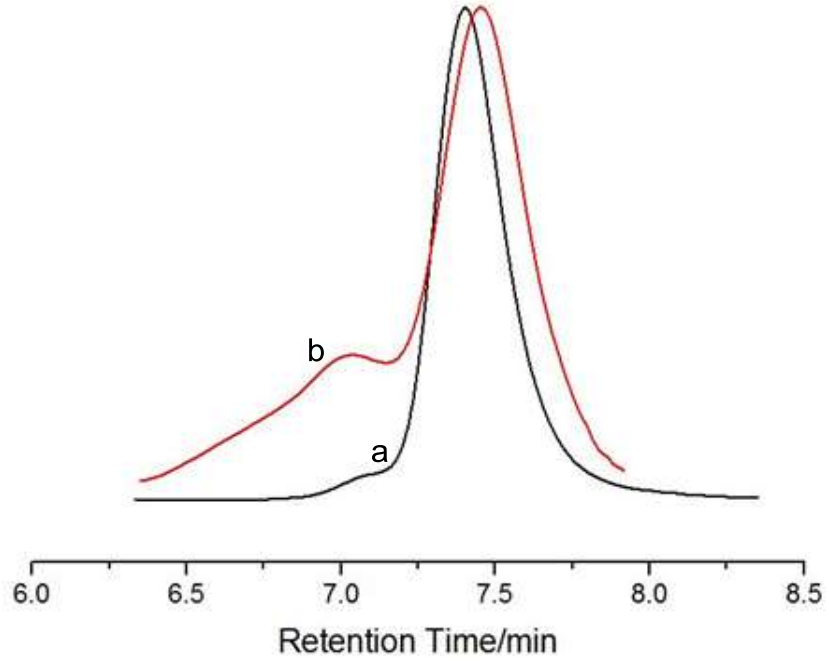


Figure S2. GPC traces of linear precursor N_3-PE_{595}-═(a), *c*-PE_{595} using a feeding ratio of 1.4 mL/h (b).

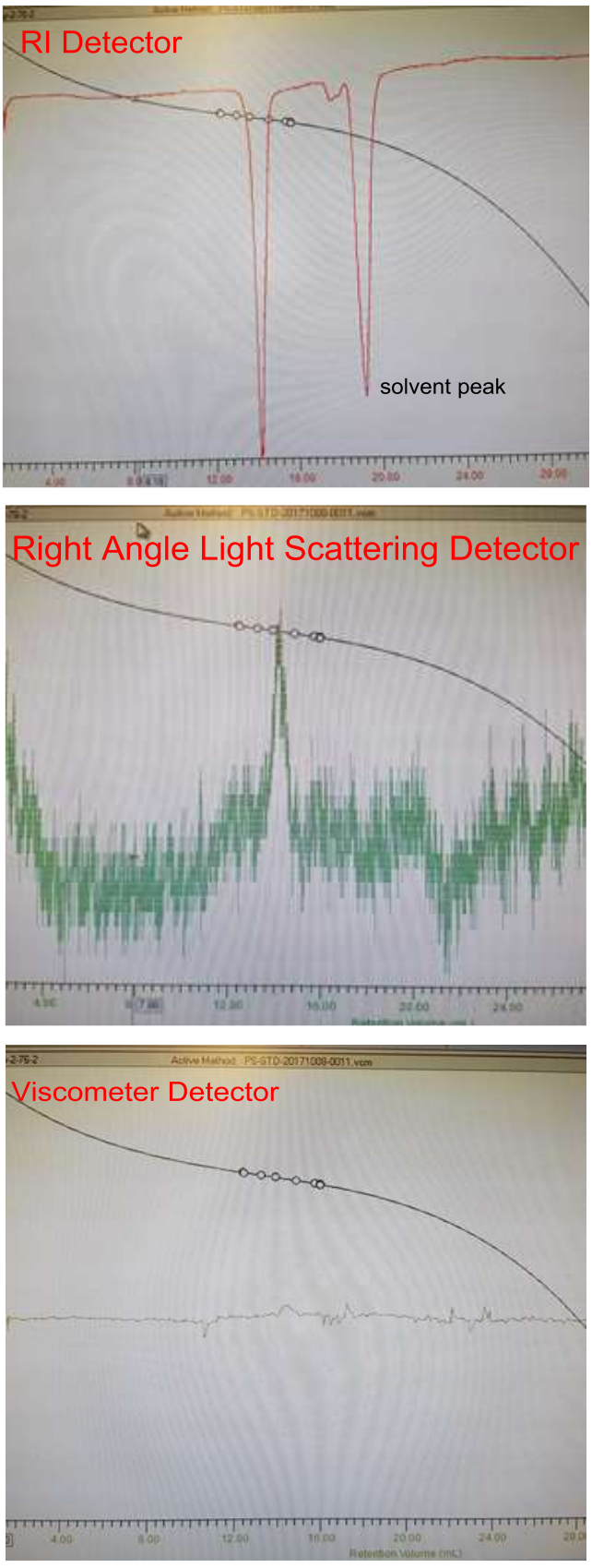


Figure S3. Triple-detection GPC traces of N_3-PE_{190}-≡.

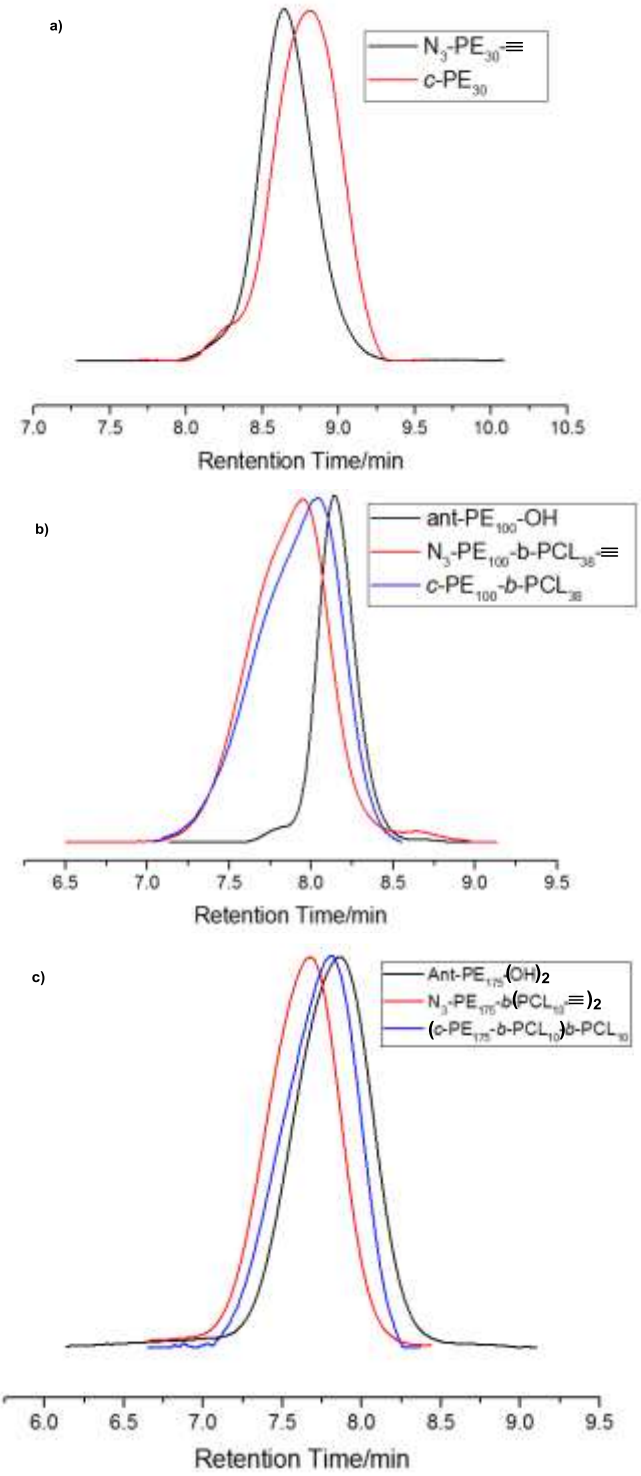


Figure S4. GPC traces of: (a) *c*-PE_{30} and its precursor; (b) *c*-PE_{100}-*b*-PCL_{38} and its precursors; (c) (*c*-PE_{175}-*b*-PCL_{10})-*b*-PCL_{10} and its precursors in 1,2,4-trichlorobezene at 150 ºC.

3. FT-IR spectra

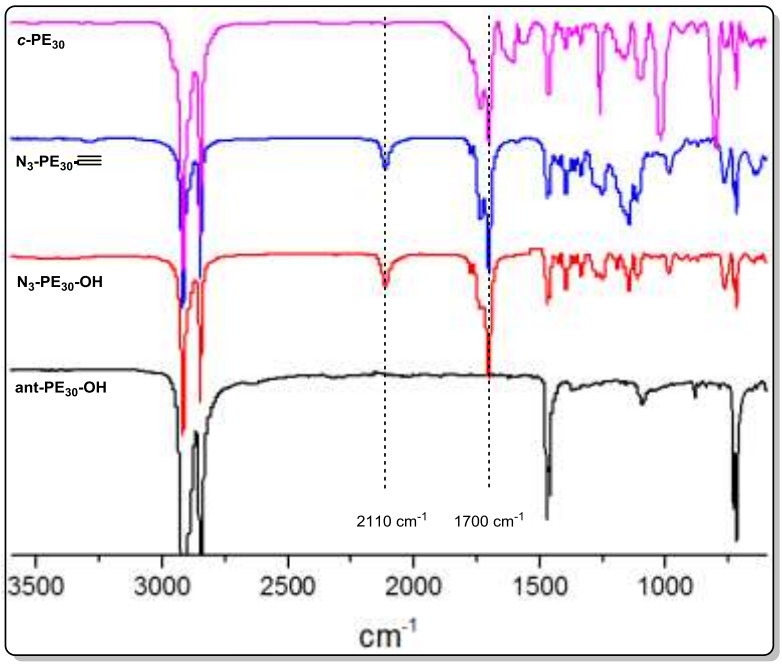


Figure S5. FT-IR spectra of: (a) ant-PE_{30}-OH; (b) N_3-PE_{30}-OH; (c) N_3-PE_{30}-≡; (d) *c*-PE_{30}.

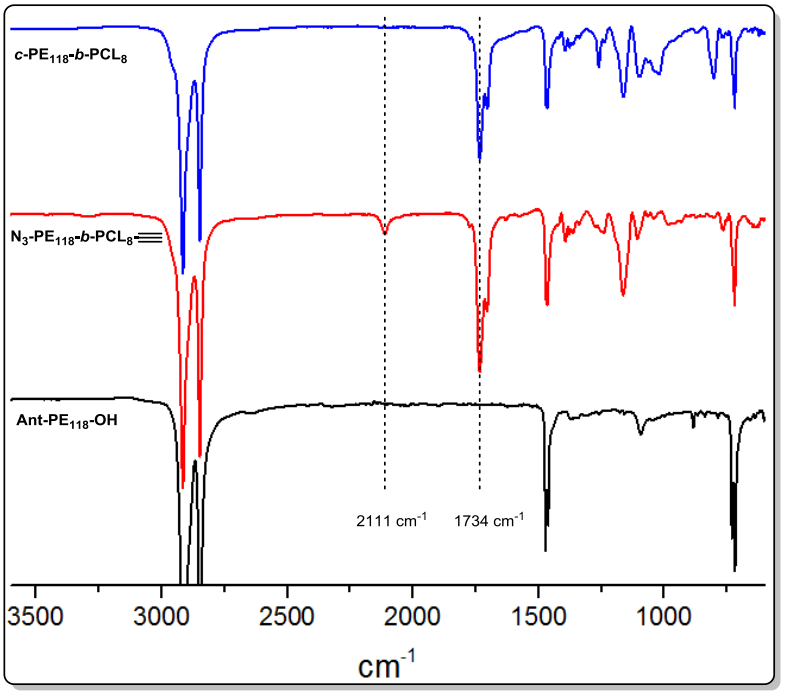


Figure S6. FT-IR spectra of: (a) ant-PE_{118}-OH; (b) N_3-PE_{118}-*b*-PCL_8-≡; (c) *c*-PE_{118}-*b*-PCL_8.

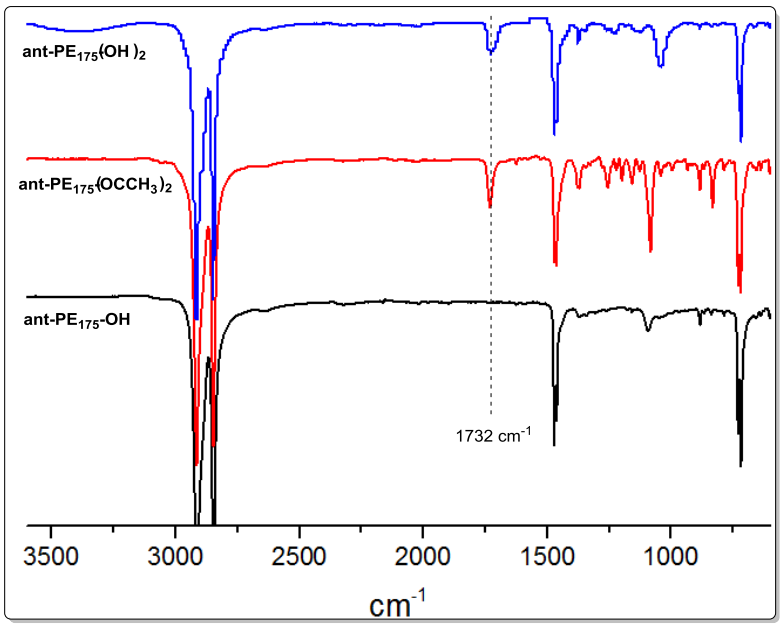


Figure S7. FT-IR spectra of: (a) ant-PE_{175}-OH; (b) ant-PE_{175}-$(OCCH_3)_2$; (c) ant-PE_{175}-$(OH)_2$.

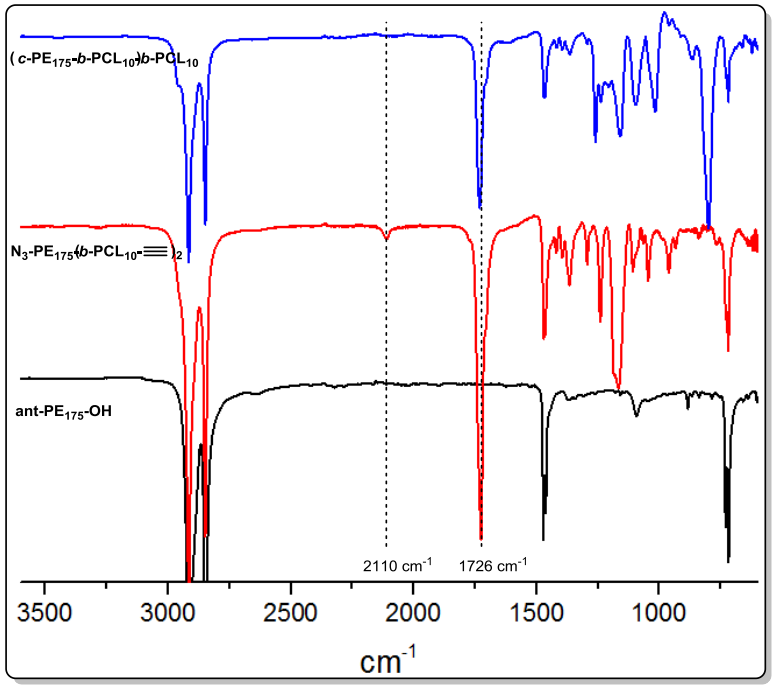


Figure S8. FT-IR spectra of: (a) ant-PE_{175}-OH; (b) N_3-PE_{175}-*b*-$(PCL_{10}$-≡$)_2$; (c) (*c*-PE_{175}-*b*-PCL_{10})-*b*-PCL_{10}.

4. ^{1}H NMR spectra

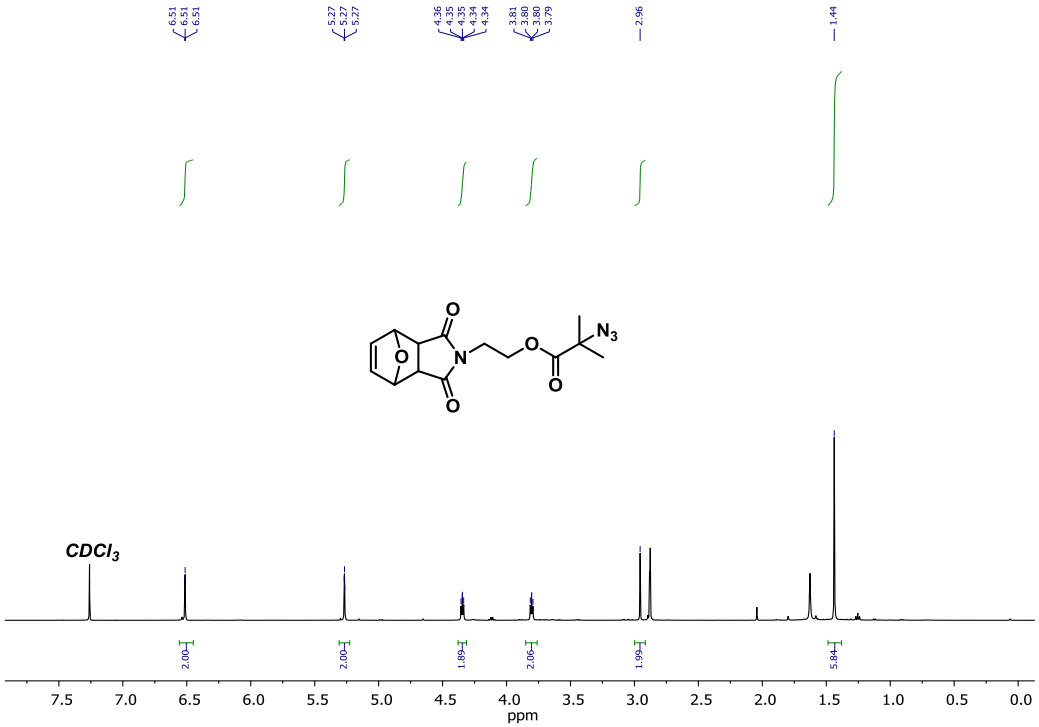


Figure S9. ^{1}H NMR (500 MHz) spectrum of MI-N_3 in chloroform-*d*.

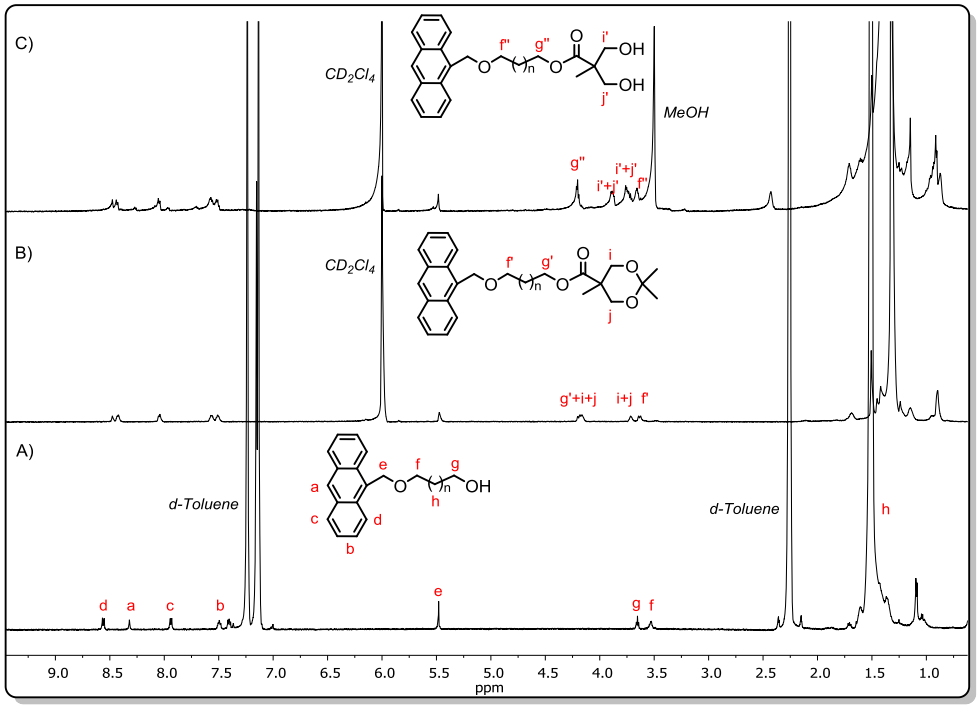


Figure S10. ^{1}H NMR (600 MHz) spectra of: (a) ant-PE_{61}-OH; (b) ant-PE_{61}-$(OCCH_3)_2$; (c) ant-PE_{61}-$(OH)_2$ in 1,1,2,2-tetrachloroethane-d_2 at 90 °C.

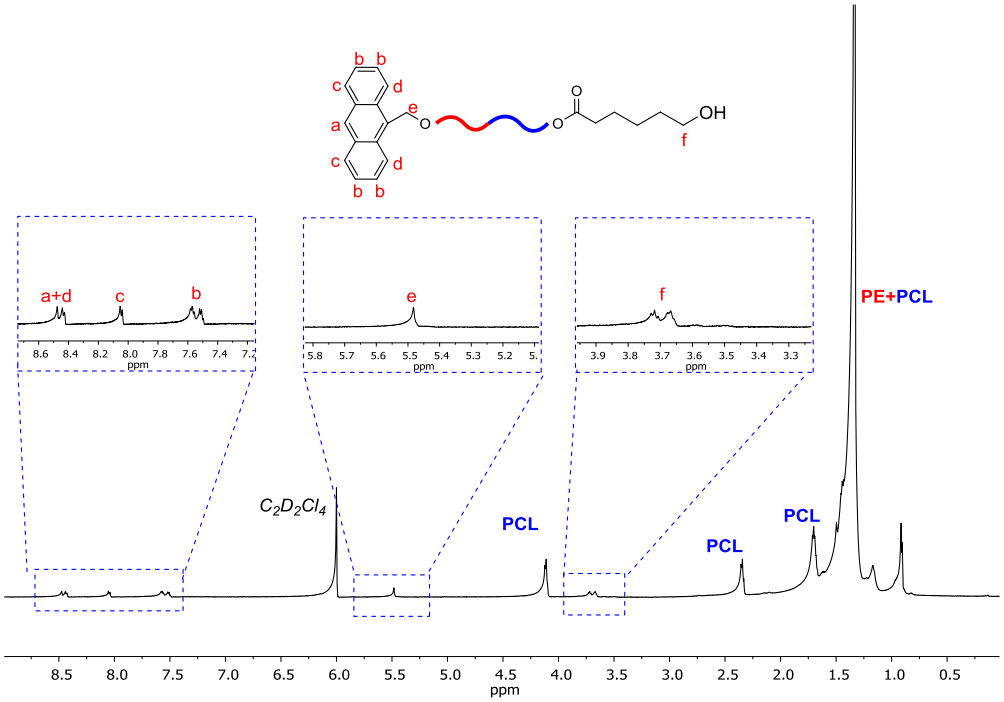


Figure S11. ^{1}H NMR (600 MHz) spectrum of ant-PE$_{118}$-*b*-PCL$_8$-OH in 1,1,2,2-tetrachloroethane-d_2 at 90 °C.

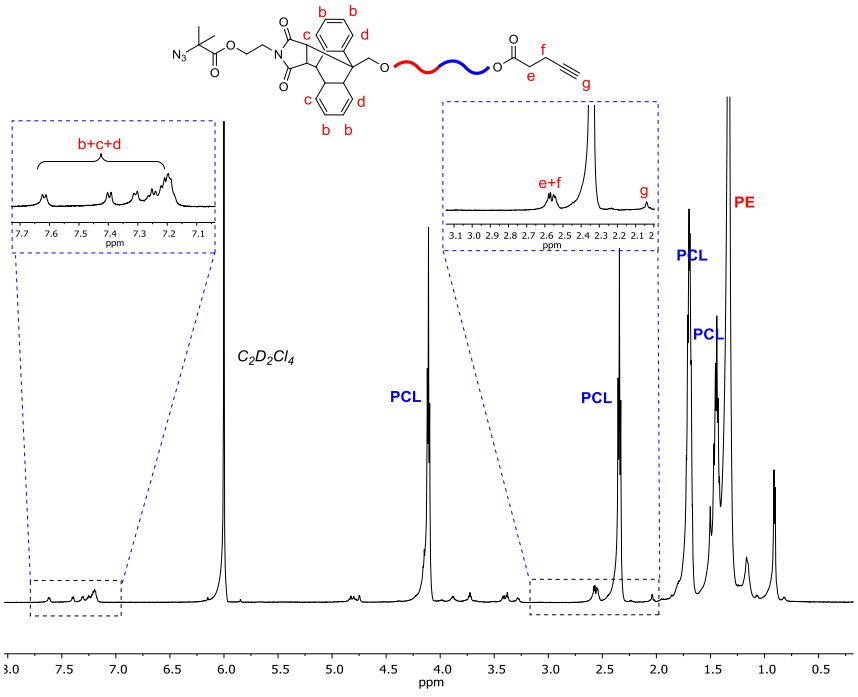


Figure S12. ^{1}H NMR (600 MHz) spectrum of N$_3$-PE$_{118}$-*b*-PCL$_8$-≡ in 1,1,2,2-tetrachloroethane-d_2 at 90 °C.

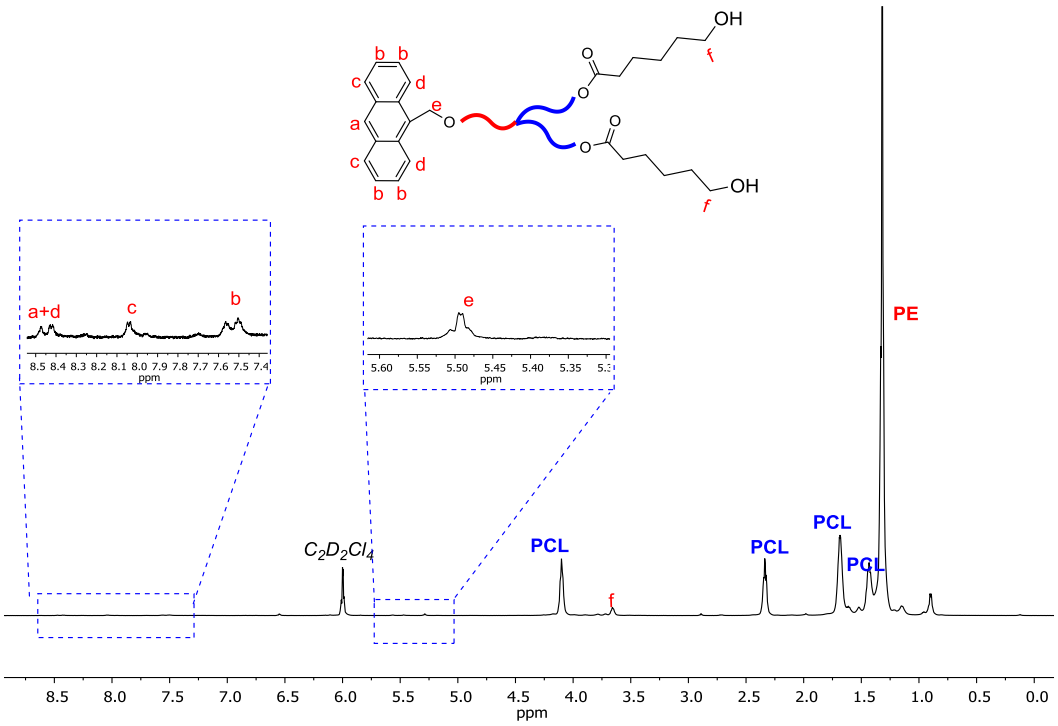


Figure S13. ^{1}H NMR (600 MHz) spectrum of ant-PE$_{175}$-*b*-(PCL$_{10}$-OH)$_2$ in 1,1,2,2-tetrachloroethane-d_2 at 90 °C.

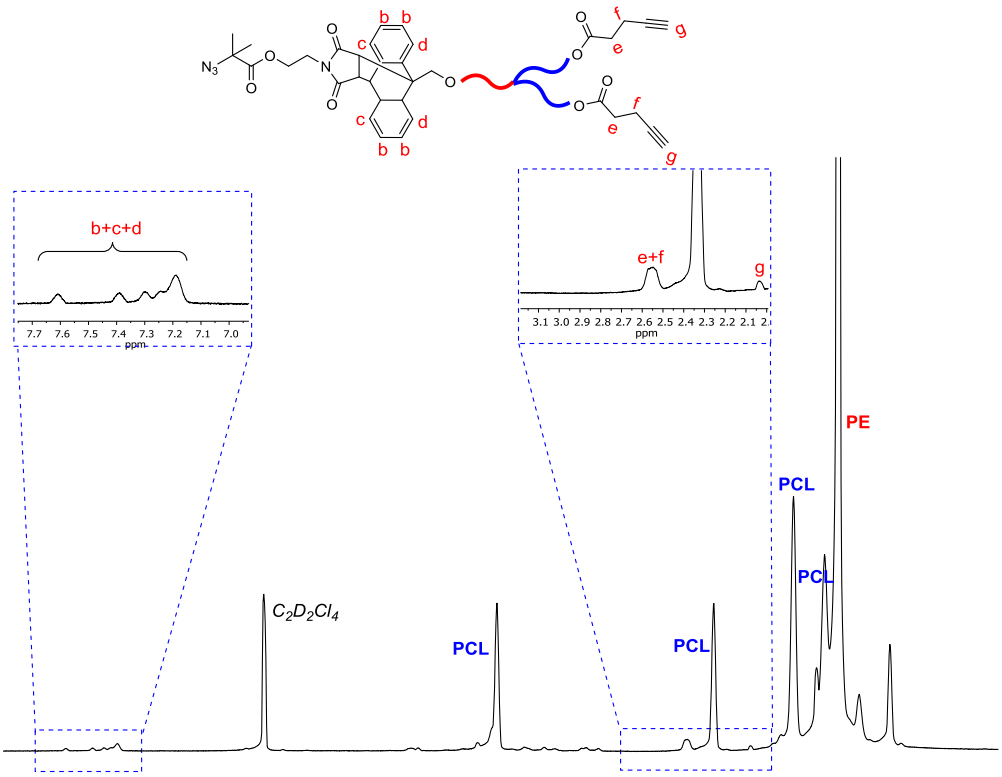
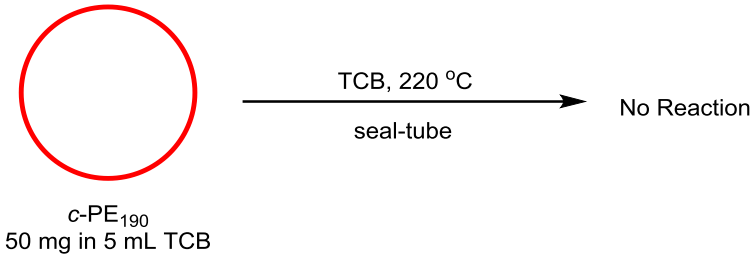


Figure S14. ^{1}H NMR (600 MHz) spectrum of N_3-PE$_{175}$-*b*-(PCL$_{10}$-≡)$_2$ in 1,1,2,2-tetrachloroethane-d_2 at 90 °C.

5. Retro-Diels-Alder Reaction

50 mg of *c*-PE_{190} was dissolved in 5 mL of 1,2,4-trichlorobeneze (TCB) and then stirred at 220 ^{o}C overnight (Scheme S3). There was no shift of the GPC trace (Figure S15) indicating that no retro-D-A reaction occurred.



Scheme S3. Retro-Diels-Alder reaction of *c*-PE_{190}.

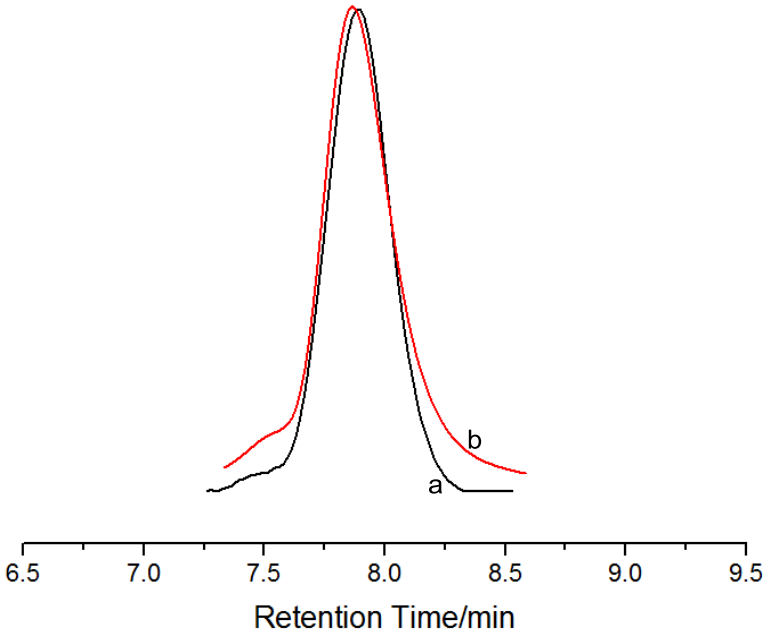


Figure S15. GPC traces of *c*-PE_{190}: (a) before and (b) after Retro-Diels-Alder reaction.