

Supplementary Information

Polyfluorenylacetylene for near-infrared laser protection: polymer synthesis, optical limiting mechanism and relationship between molecular structure and properties

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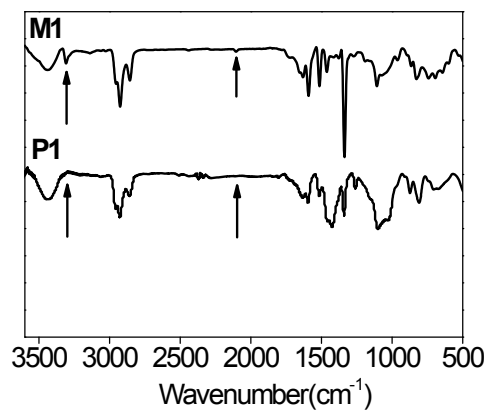


Fig. S1. FTIR spectra of **M1** and **P1**.

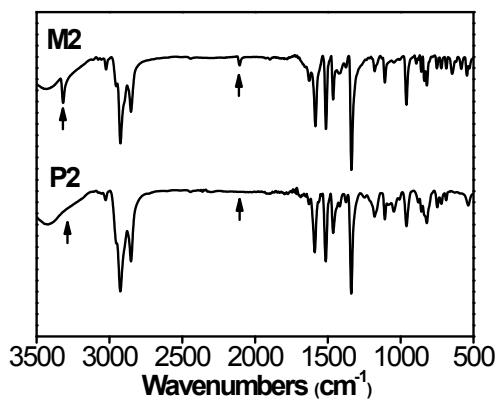


Fig. S2. FTIR spectra of **M2** and **P2**.

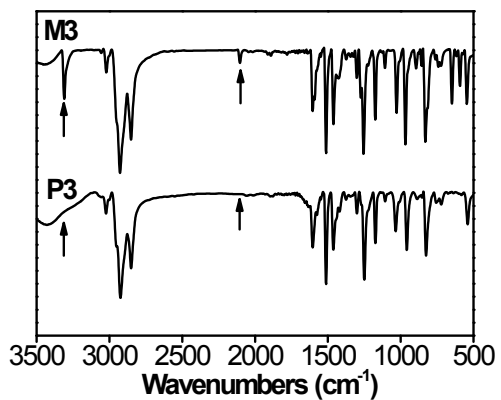


Fig. S3. FTIR spectra of **M3** and **P3**.

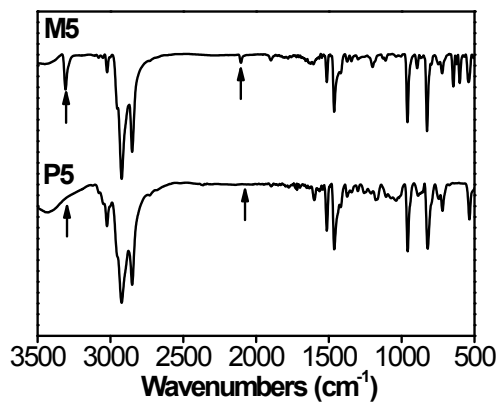


Fig. S4. FTIR spectra of **M5** and **P5**.

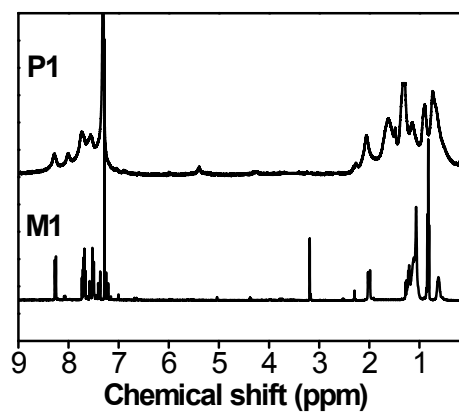


Fig. S5. ¹H NMR spectra of **M1** and **P1**.

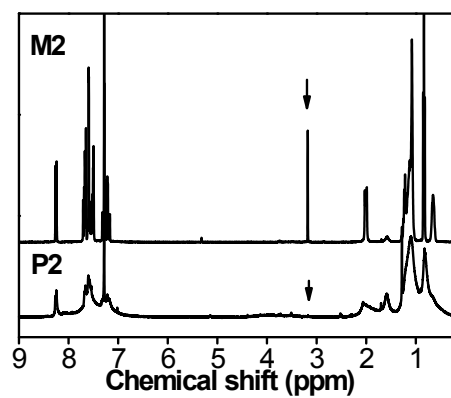


Fig. S6. ¹H NMR spectra of **M2** and **P2**.

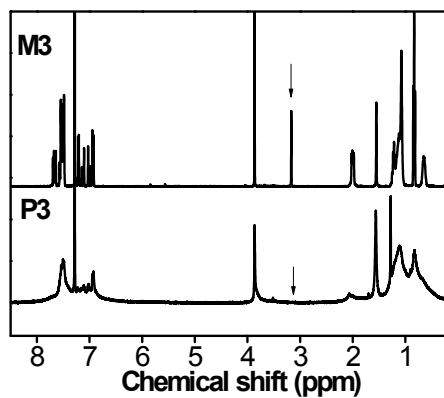


Fig. S7. ^1H NMR spectra of M3 and P3.

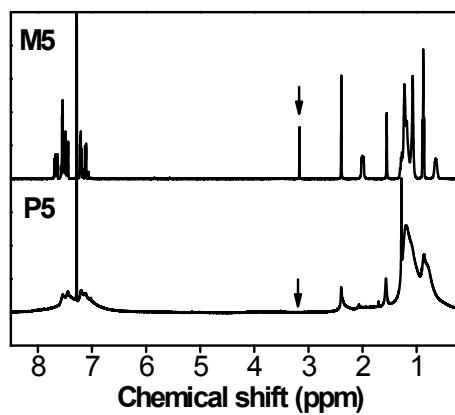


Fig. S8. ^1H NMR spectra of M5 and P5.

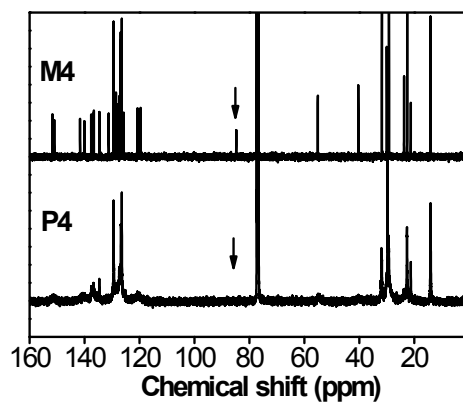


Fig. S9. ^{13}C NMR spectra of M4 and P4.

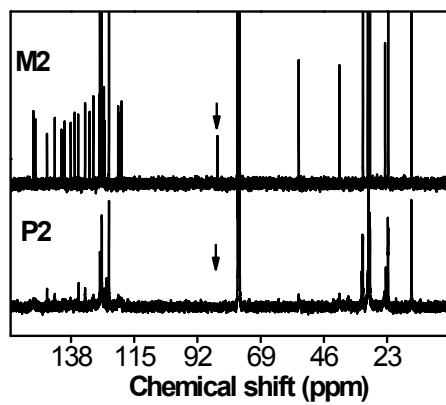


Fig. S10. ¹³C NMR spectra of **M2** and **P2**.

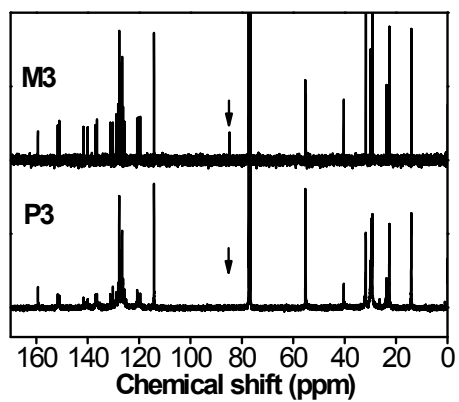


Fig. S11. ¹³C NMR spectra of **M3** and **P3**.

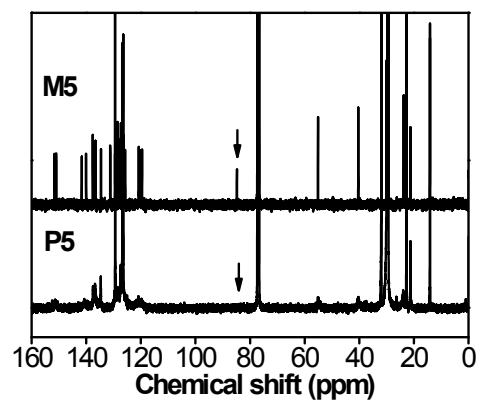


Fig. S12. ¹³C NMR spectra of **M5** and **P5**.

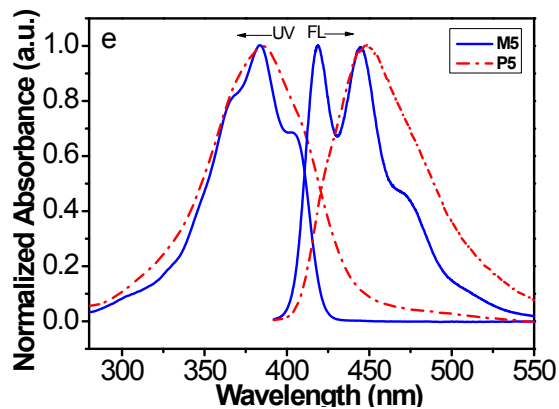


Fig. S13. Normalized UV-vis absorption and FL emission spectra of **M5** (solid line) and **P5** (dash dot) in THF solutions.

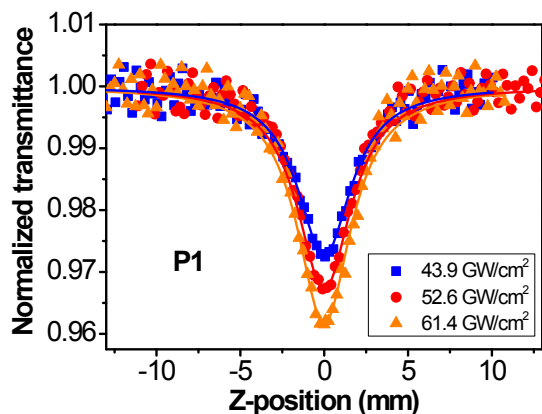


Fig. S14. Open-aperture Z-scans of **P1** at the different pulse energy in THF solution. Solid lines are the theoretical fit for two-photon absorption.

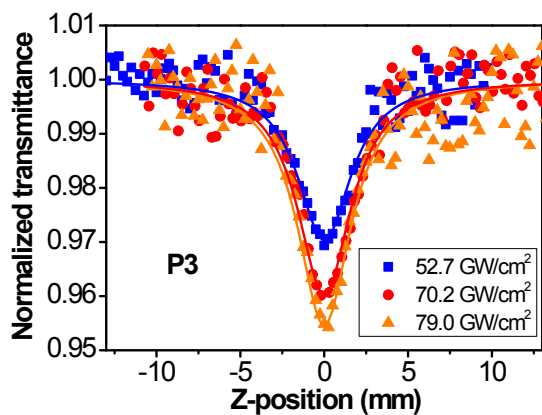


Fig. S15. Open-aperture Z-scans of **P3** at the different pulse energy in THF solution. Solid lines are the theoretical fit for two-photon absorption.

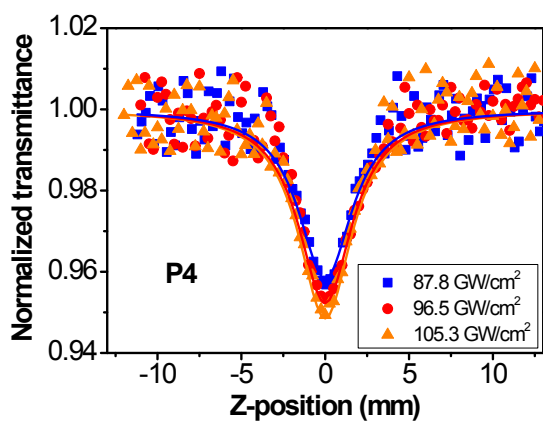


Fig. S16. Open-aperture Z-scans of **P4** at the different pulse energy in THF solution. Solid lines are the theoretical fit for two-photon absorption.

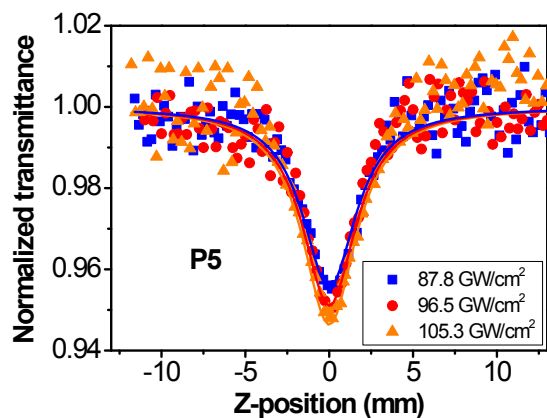


Fig. S17. Open-aperture Z-scans of **P5** at the different pulse energy in THF solution. Solid lines are the theoretical fit for two-photon absorption.

Table 1S. Optical Limiting and Two-photon Absorption Properties of **P1-P5**.

Polymer	^a Limiting threshold (GW/cm ²)	TPA coefficient	^b TPA
		β (cm/GW) [irradiance intensity (GW/cm ²)]	cross section σ_2 (GM)
		0.01931 [43.9]	817.0
P1	21.4	0.01933 [52.6]	817.9
		0.01934 [61.4]	818.3
P2	16.7	0.02109 [43.9]	892.4
		0.02185 [52.6]	924.5
		0.02161 [61.4]	914.4
P3	26.5	0.01751 [52.7]	740.9
		0.01755 [70.2]	742.6
		0.01760 [79.0]	744.7
P4	47.6	0.01446 [87.8]	611.8
		0.01444 [96.5]	611.0
		0.01445 [105.3]	611.4
P5	34.9	0.01505 [87.8]	636.8
		0.01506 [96.5]	637.2
		0.01506 [105.3]	637.2

^a Incident irradiance at which the transmittance starts to deviate from linear transmittance.

^b TPA cross-section values obtained by excitation at 780 nm (1 GM = 1×10^{-50} cm⁴ s photon⁻¹)