Supporting Information

for

Stimuli-responsive helical polymeric particles with amplified circularly polarized luminescence

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Contents

Monomer structures characterization.

Fig. 1a: In the FT-IR spectrum of M1, the characteristics for –C≡C bond (2124 cm^{-1}) and amide (I and II, 1663, 1570 cm^{-1}) were clearly observed. In the FT-IR spectrum of M2, the characteristics for –C≡C bond (2121 cm^{-1}), –C–N– bond (1151 cm^{-1}) and –S=O bond (1333 cm^{-1}) clearly appeared.

Fig. 1b and 1c: The particular chemical shifts of H and C for –HC≡ (δ_H 2.35 ppm, δ_C 68.7 ppm) and $–(CH_3)_3$ (δ_H 1.43 ppm, δ_C 32.8 ppm) were obviously observed in the ^1H NMR and ^{13}C NMR spectrum of M1. And the particular chemical shifts of H and C for –HC≡ (δ_H 1.95 ppm, δ_C 46.5 ppm), –Ar–H (δ_H 7.34~8.65 ppm, δ_C 114.6~155.7 ppm) and $–N(CH_3)_2$ (δ_H 2.95 ppm, δ_C 35.6 ppm) were obviously presented in the NMR spectrum of M2.

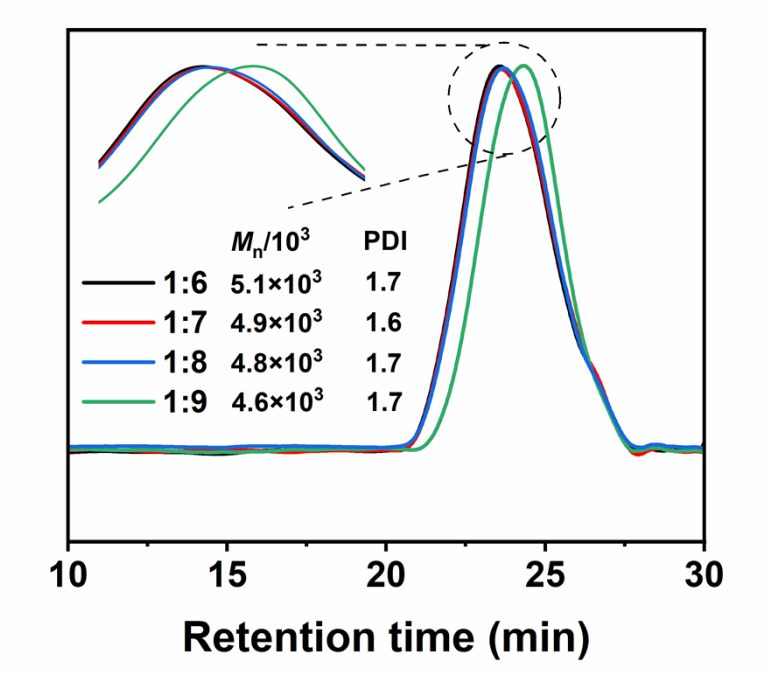

Fig. S1 GPC traces of P_{55} particles prepared in CH_2Cl_2/*n*-heptane with varied ratio: 1/6; 1/7; 1/8; 1/9 (mL/mL).

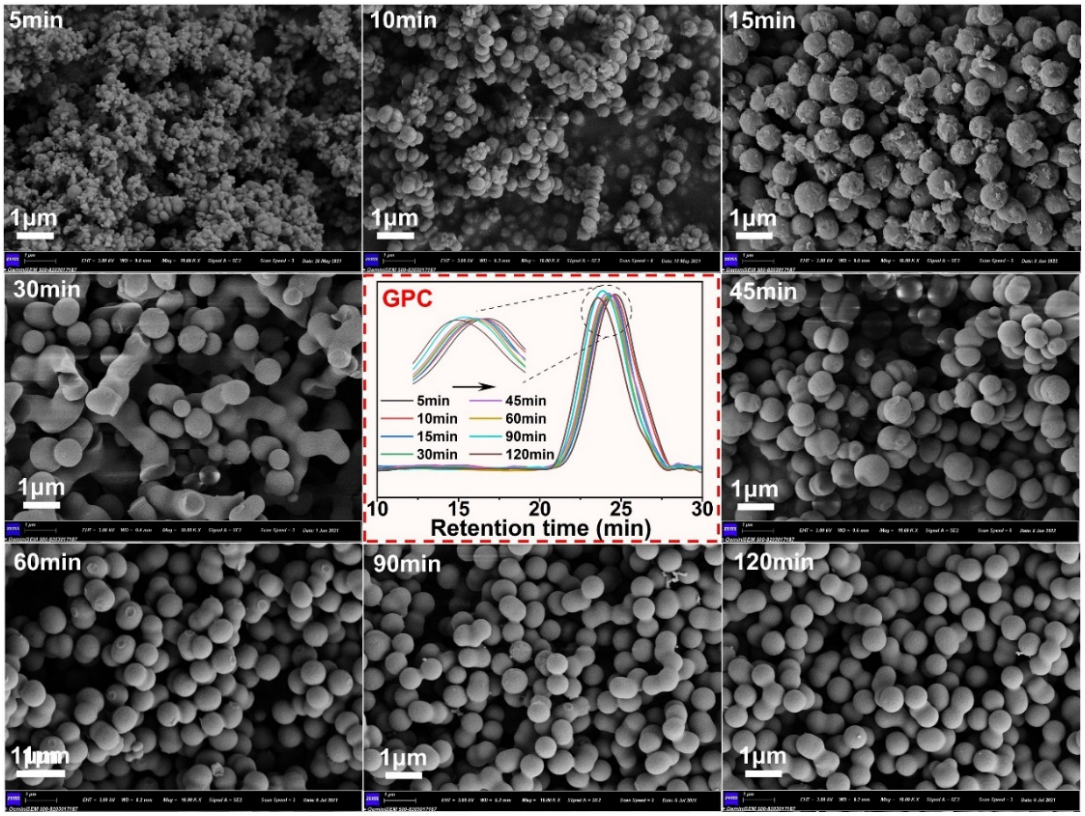

Fig. S2 SEM images and GPC traces (middle) of growth process of P_{55} particles as copolymerization time. Other copolymerization conditions as shown in Table S2.

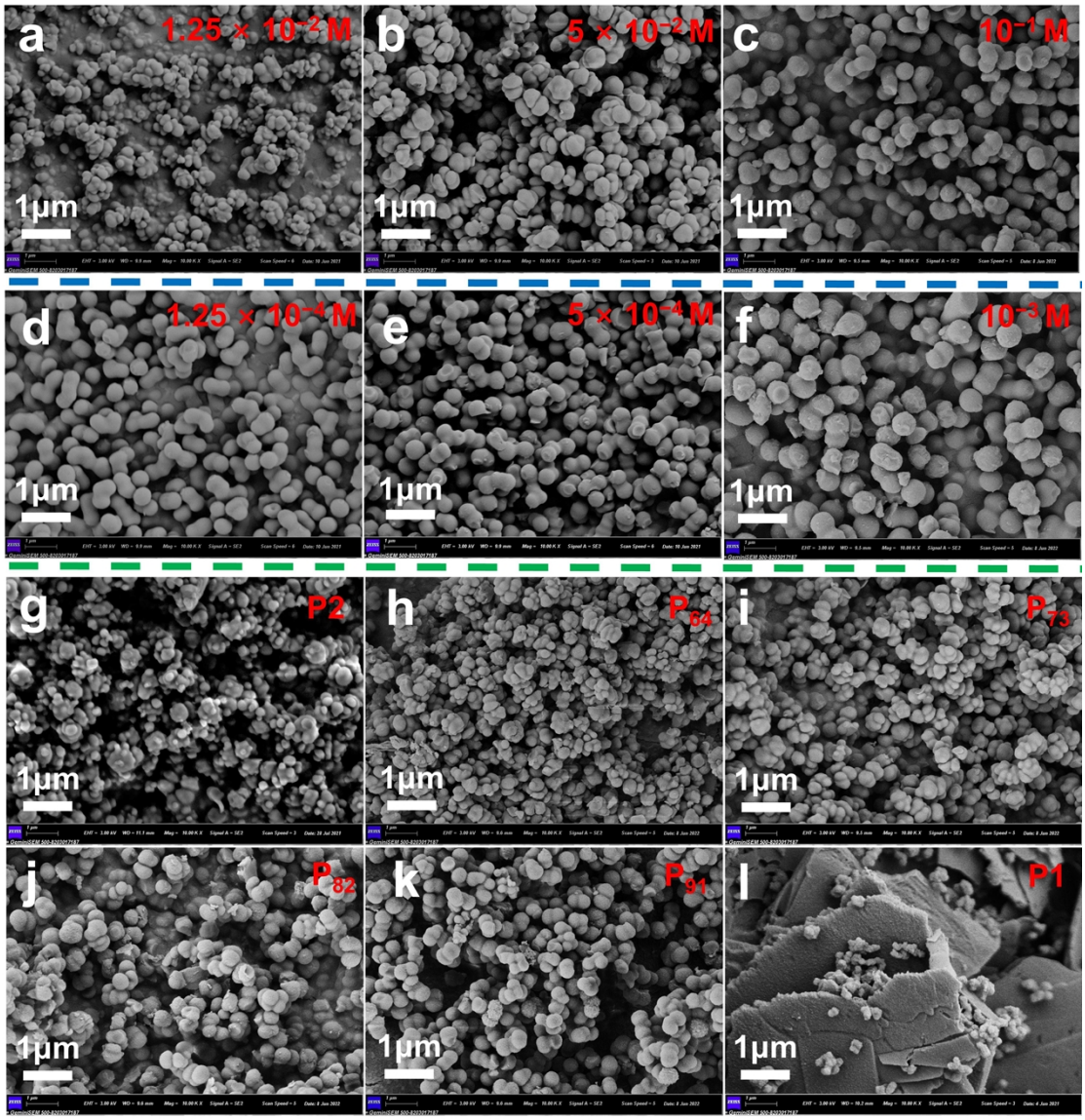

Fig. S3 SEM images of P_{55} particles with varied total monomer concentrations (a. 1.25 × 10^{-2} M; b. 5 × 10^{-2} M; c. 10^{-1} M; Other copolymerization conditions as shown in Table S3. For 2.5 × 10^{-2} M, see Fig. 1e), with varied Rh catalyst concentrations (d. 1.25 × 10^{-4} M; e. 5 × 10^{-4} M; f. 10^{-3} M; Other copolymerization conditions as shown in Table S4. For 2.5 × 10^{-4} M, see Fig.1e), and SEM images of copolymeric particles varied feed mass ratio of the two monomers M1/M2 (g. P2; h. P_{64}; i. P_{73}; j. P_{82}; k. P_{91}; l. P1; Other copolymerization conditions as shown in Table S5. For P_{55}, see Fig.1e).

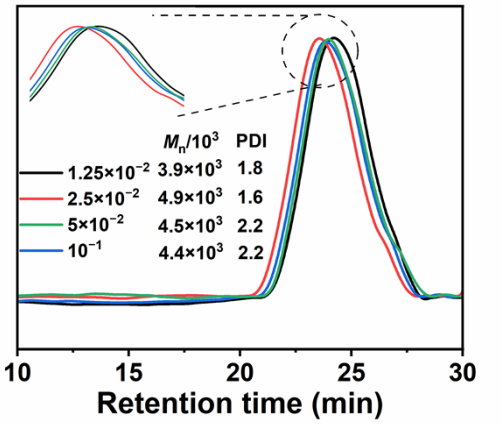

Fig. S4 GPC traces of P_{55} particles with varied total monomer concentrations.

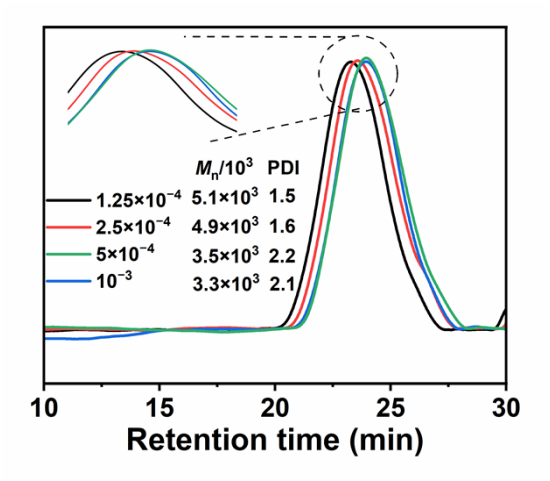

Fig. S5 GPC traces of P_{55} particles with varied Rh catalyst concentrations.

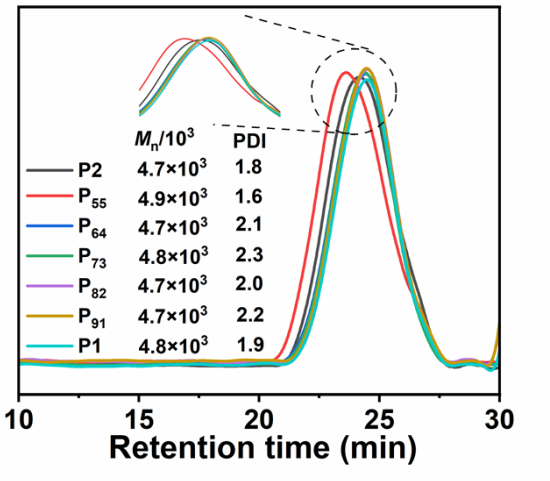

Fig. S6 GPC traces of P_X particles with the varied feed mass ratio of the two monomers M1/M2.

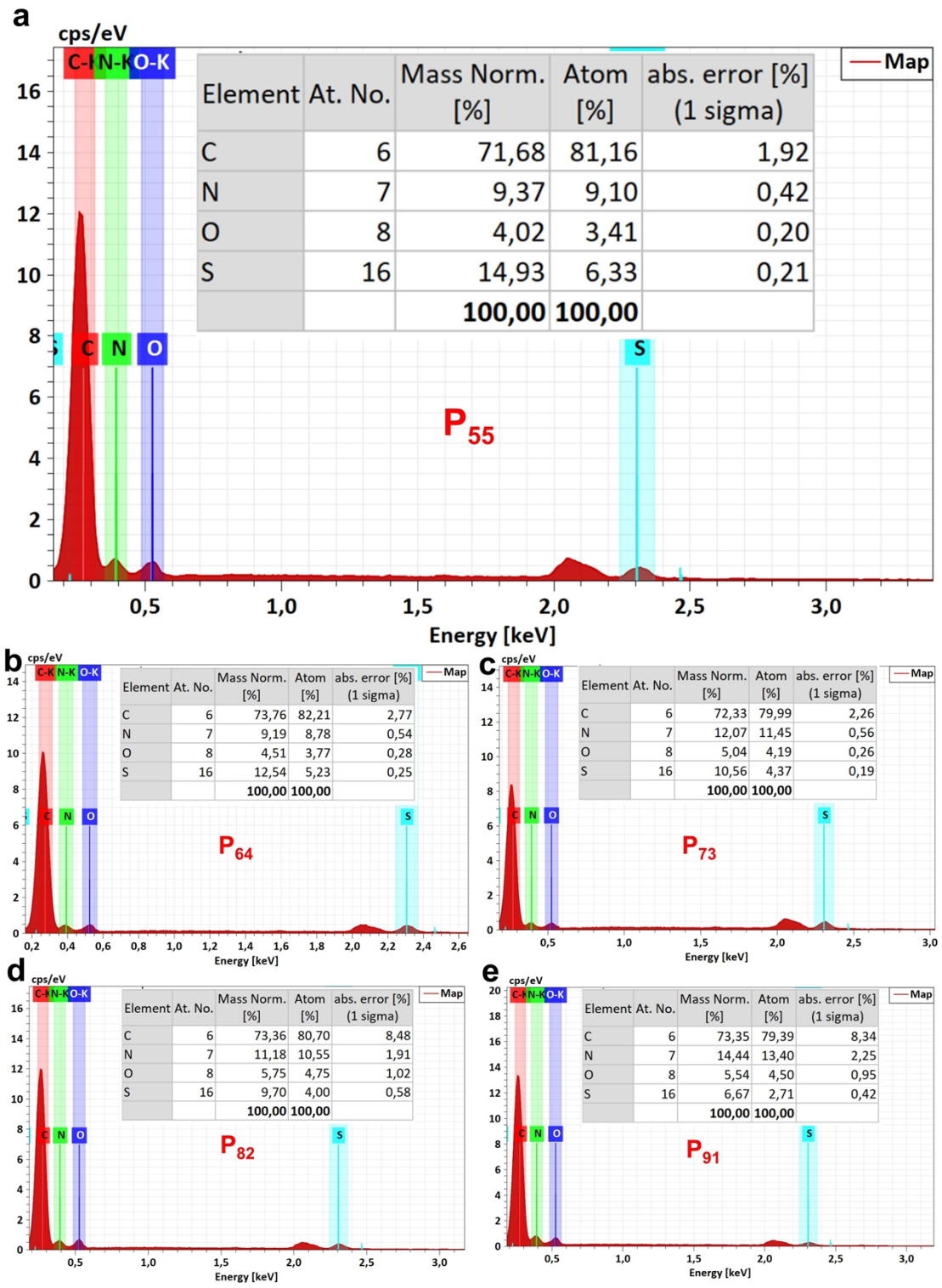

Fig. S7 SEM-EDS mapping of copolymeric particles P_X with varied M1/M2 (a. P_{55}; b. P_{64}; c. P_{73}; d. P_{82}; e. P_{91}; Other copolymerization conditions as shown in Table S5. For P_{55}, see Fig. S3).

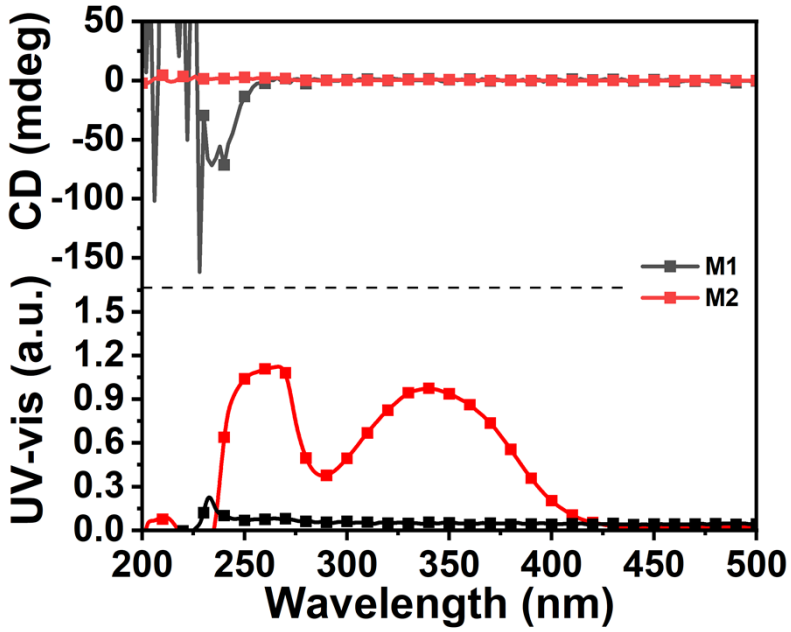

Fig. S8 CD and UV–Vis spectra of M1and M2 (0.5 mM, in $CHCl_3$).

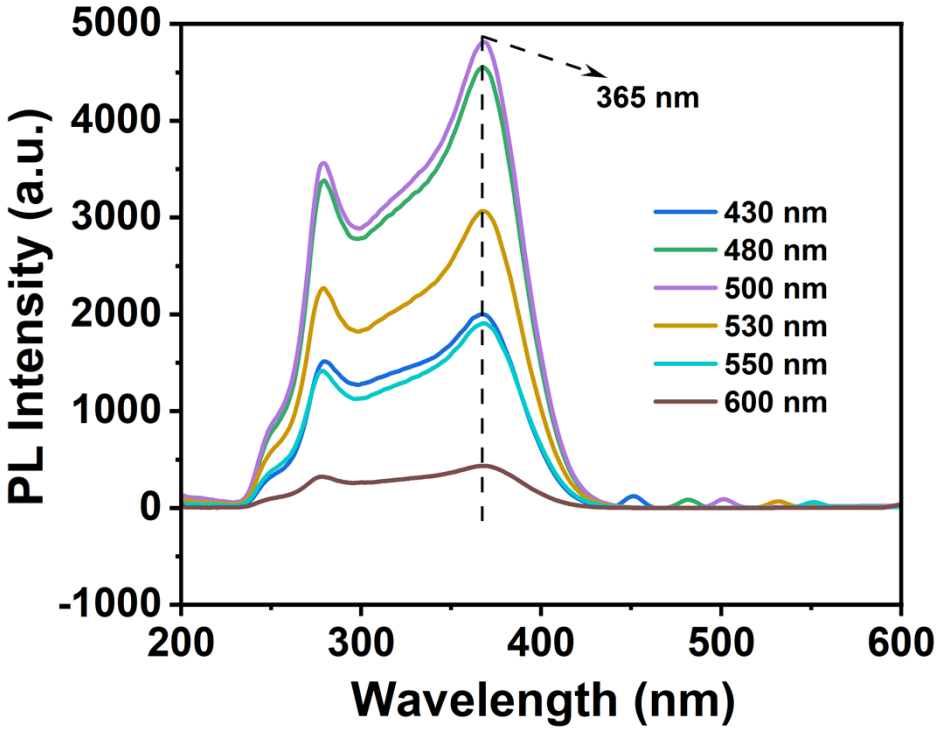

Fig. S9 Fluorescence excitation spectra of P_{55} monitored at 430, 480, 500, 530, 550 and 600 nm.

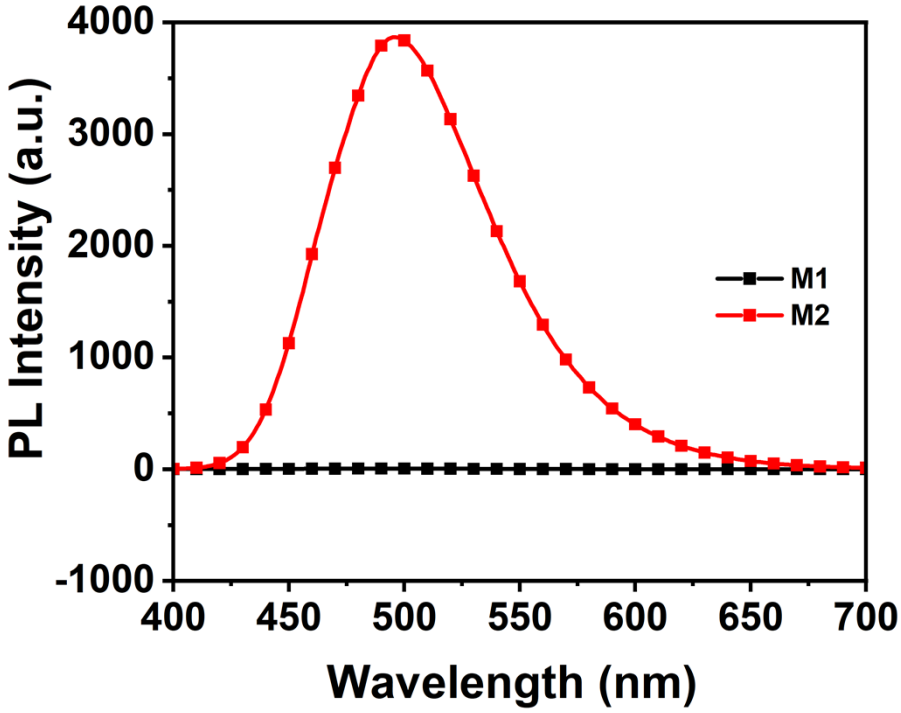

Fig. S10 Fluorescence spectra of M1 and M2 (0.5 mM, λ_{ex} = 365 nm, in $CHCl_3$).

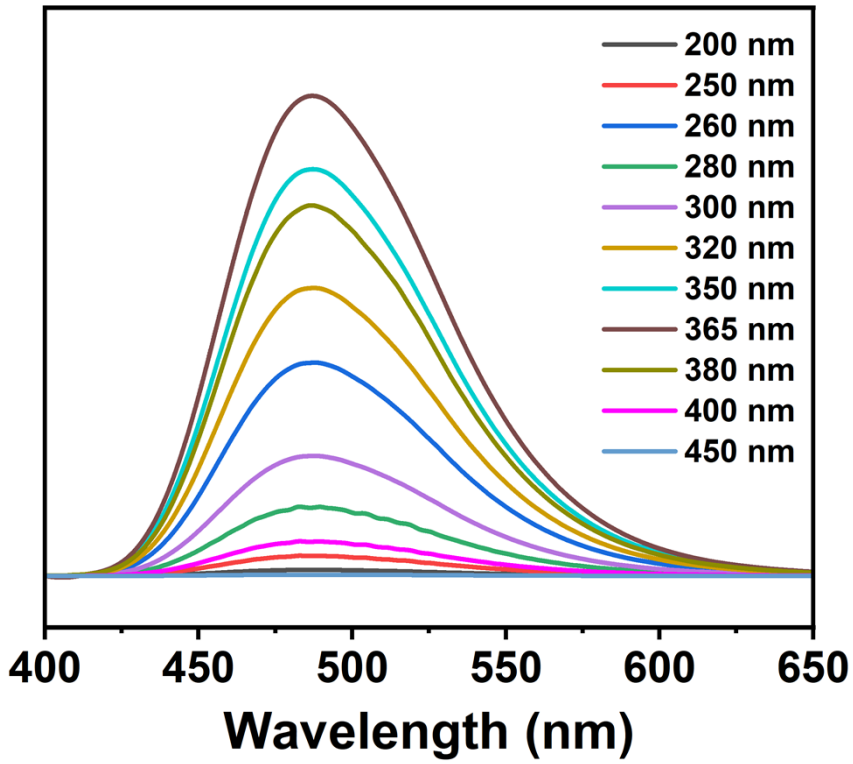

Fig. S11 Fluorescence spectra of P_{55} at different excitation wavelengths.

Table S1 Effects of the mixed solvent (CH_2Cl_2/*n*-heptane) ratio on copolymerization and formation of particles [a].

CH_2Cl_2/*n*-heptane (mL/mL)	$M_{n,\,exp}$ [b]/10^3 ($g\cdot mol^{-1}$)	PDI [b]	Yield [c] (%)	Particle diam [d] (nm)
1/6	5.1	1.7	85.4	640
1/7	4.9	1.6	87.3	630
1/8	4.8	1.7	88.7	610
1/9	4.6	1.7	89.2	_ [e]

[a] Copolymerization was performed under conditions: total concentration of monomers mixture, 2.5 × 10^{-2} M; [Rh], 2.5 × 10^{-4} M; at 30 °C for 3 h. [b] Det ermined by GPC trace and PDI was defined as M_w/M_n. [c] Determined gravimetrically. [d] Determined by SEM. [e] Only few regular microparticles.

Table S2 Copolymerization and growth of P_{55} particles [a] with time.

proceed time (min)	$M_{n,\,exp}$ [b]/10^3 ($g\cdot mol^{-1}$)	PDI [b]	Yield [c] (%)	Particle diam [d] (nm)
5	4.3	1.8	35.3	_ [e]
10	4.4	1.6	56.7	_ [e]
15	4.5	1.7	63.4	_ [e]
30	4.6	1.8	78.6	_ [e]
45	4.6	1.5	79.9	_ [e]
60	4.8	1.7	85.8	540
90	4.9	1.6	87.2	560
120	**4.9**	**1.6**	**87.3**	**630**

[a] Copolymerization was performed under conditions: total concentration of monomers mixture [M], 2.5 × 10^{-2} M; [Rh], 2.5 × 10^{-4} M; CH_2Cl_2/*n*-heptane, 1/7 (mL/mL); at 30 °C for 2 h. [b] Determined by GPC trace and PDI was defined as M_w/M_n. [c] Determined gravimetrically. [d] Determined by SEM. [e] Only few regular particles.

Table S3 Effects of total monomer concentration on P_{55} particles [a].

[M]/10^{-2} (M)	$M_{n,\,exp}$ [b]/10^3 ($g\cdot mol^{-1}$)	PDI [b]	Yield [c] (%)	Particle diam [d] (nm)
1.25	3.9	1.8	85.4	_ [e]
2.5	**4.9**	**1.6**	**87.3**	**630**
5	4.5	2.2	70.5	_ [e]
10	4.4	2.2	68.7	_ [e]

[a] Copolymerization was performed under conditions: [Rh], 2.5 × 10^{-4} M; CH_2Cl_2/*n*-heptane, 1/7 (mL/mL); at 30 °C for 2 h. [b] Determined by GPC. [c] Determined gravimetrically. [d] Determined by SEM. [e] Only few regular particles.

Table S4 Effects of Rh catalyst concentration on P_{55} particles [a].

[Rh]/10^{-4} (M)	$M_{n,\ exp}$ [b]/10^3 ($g \cdot mol^{-1}$)	PDI[b]	yield[c] (%)	Particle diam[d] (nm)
1.25	5.1	1.5	85.4	_ [e]
2.5	**4.9**	**1.6**	**87.3**	**630**
5	3.5	2.2	88.6	_ [e]
10	3.3	2.1	87.9	_ [e]

[a] Copolymerization was performed under conditions: total concentration of monomers mixture [M], 2.5×10^{-2} M; CH_2Cl_2/*n*-heptane, 1/7 (mL/mL); at 30 °C for 2 h. [b] Determined by GPC. [c] Determined gravimetrically. [d] Determined by SEM. [e] Only few regular particles.

Table S5 Effects of feed mass ratio of the two monomers M1/M2 on copolymeric particles [a].

Sample NO.	M1/M2 (mg/mg)	$M_{n,\ exp}$ [b]/10^3 ($g \cdot mol^{-1}$)	PDI [b]	Yield [c] (%)	Particle diam [d] (nm)	$[\alpha]_D$[f] (deg)	Φ_F [g]	g_{abs} [h]/10^{-2}	g_{lum}[i]/10^{-2}
P1	10:0	4.7	1.9	87.9	_ [e]	−1300	_	−1.15	_
P_{91}	9:1	4.7	2.2	84.6	610	−1240	7.3	−0.91	−1.333
P_{82}	8:2	4.7	2.0	85.4	_ [e]	−890	10.5	−0.68	−1.239
P_{73}	7:3	4.8	2.3	86.5	_ [e]	−560	23.4	−0.45	−1.087
P_{64}	6:4	4.7	2.1	87.1	_ [e]	−250	30.6	−0.31	−0.970
P_{55}	**5:5**	**4.9**	**1.6**	**87.3**	**630**	−120	39.8	−0.23	−0.815
P2	0:10	4.8	1.8	88.7	_ [e]	2	64.3	_	_

[a] Copolymerization was performed under conditions: total concentration of monomers mixture [M], 2.5×10^{-2} M; [Rh], 2.5×10^{-4} M; CH_2Cl_2/*n*-heptane, 1/7 (mL/mL); at 30 °C for 2 h. [b] Determined by GPC. [c] Determined gravimetrically. [d] Determined by SEM. [e] Only few regular particles. [f] Measured by polarimetry at 25 ℃, c=0.1 g/dL, in $CHCl_3$. [g] Absolute fluorescence quantum yield of composite film obtained using the calibrated integrating sphere system. [h] Determined by the CD and UV-vis spectra of composite film. [i] Determined by the CPL spectra of composite film.