Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information for

Amphiphilic Copolymer Self-assembly of Magnetic Nanoparticles for Construction of Magnetically Responsive Photonic Crystals Based on Steric Hindrance

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1. FTIR Characterization:

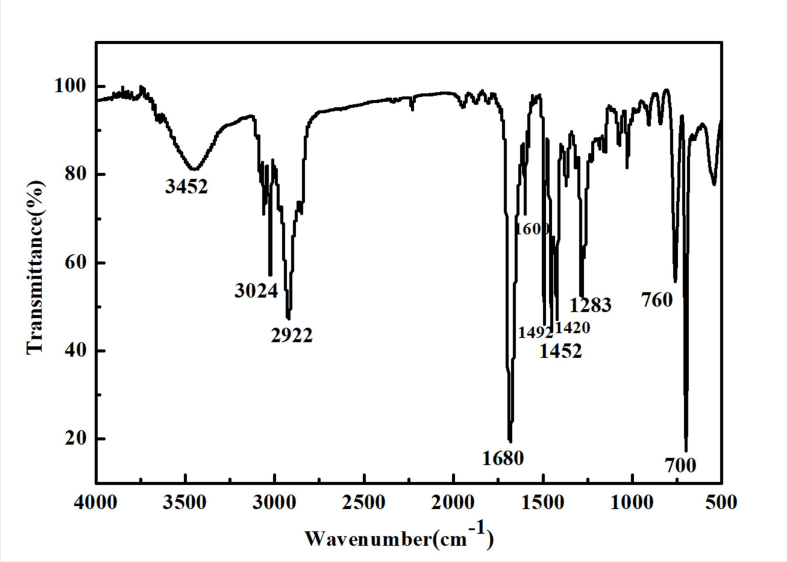

Figure S1. FTIR spectrum of the P(St-co-VP) (1:9).

From the FTIR spectrum, we can see the obvious characteristic absorption peaks of PS and PVP. Among them, the absorption peaks at 1600 cm^{-1} and 1492 cm^{-1} is the vibration characteristic absorption peaks of the benzene ring framework. The absorption peaks at 760 cm^{-1} and 700 cm^{-1} are the C-H out-of-plane bending vibration of monosubstitute benzene. The absorption peak at 1680 cm^{-1} is the stretching vibration absorption peak of C=O on pyrrole ring. The absorption peak at 1283 cm^{-1} is the characteristic absorption peak of the C-N bond in pyrrole ring. Therefore, the product is a copolymer containing St and N-VP.

2. GPC Characterization:

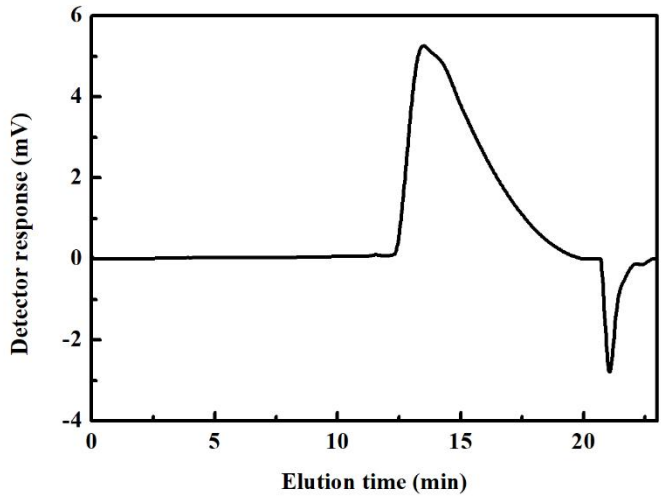

Figure S2 GPC of the P(St-*co*-VP).

Condition: chromatographic column: styragel@HR4 DMF (7.8×300 mm); column temperature: 35 ℃ ; detector: differential refractive index detector; mobile phase: DMF (spectrographic grade); volume flow rate: 1.0 mL/min; sample concentration: 10.0 mg/mL.

Table 1 The molecular weight and distribution of P(St-*co*-VP).

P(St-*co*-VP)	Mn×10^4 (Daltons)	Mw ×10^4 (Daltons)	Mz ×10^4 (Daltons)	Polydispersity
	10.08	14.29	18.73	1.42

According to calibration curve using polystyrene (PS) as the standards, the number-average molecular weight (M_n) was 100800, the weight-average molecular weight (M_w) was 142900, and the polydispersity (M_w/M_n) of the copolymer was 1.42.

3. ^{1}H NMR Characterization:

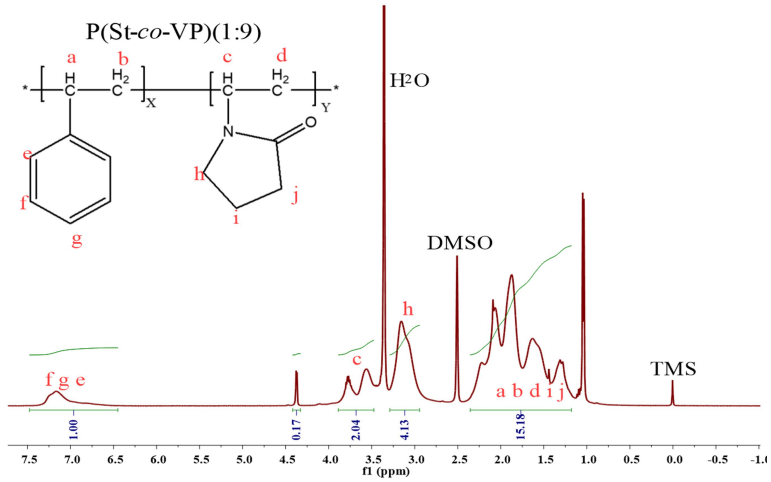

Figure S3. 1 H NMR spectroscopy of the P(St-co-VP).

The deuterated dimethyl sulfoxide (DMSO-d_6) was used as a solvent and tetramethylsilane (TMS) as an internal standard, and the measurement was carried out using ^{1}H NMR apparatus at 500 MHz at room temperature. From the ^{1}H NMR spectrum, the chemical shift of protons (δ) could be determined by comparing the molecular formula of the copolymer. Where, 7.1 ppm was the absorption peak (e, f, g) of protons on the mono-substituted benzene. The absorption peak (h) of methylene protons connected to N in pyrrole ring was at 3.15 ppm. Therefore, according to the integral area of characteristic proton absorption peak, the molar ratio of St and N-VP could be calculated as 1:10. The calculated result was very close to the actual feed ratio of 1:9.