

Electronic Supplementary Information

Highly Emissive Poly(maleic anhydride-*a/t*-vinyl pyrrolidone) with Molecular Weight-dependent and Excitation-dependent Fluorescence

Cong Shang, Nan Wei, Hongmei Zhuo, Yumei Shao, Qin Zhang, Zexian Zhang, Huiliang Wang*

Beijing Key Laboratory of Energy Conversion and Storage Materials, College of Chemistry, Beijing Normal University, Beijing 100875, P. R. China.

*E-mail: wanghl@bnu.edu.cn

Supporting Figures

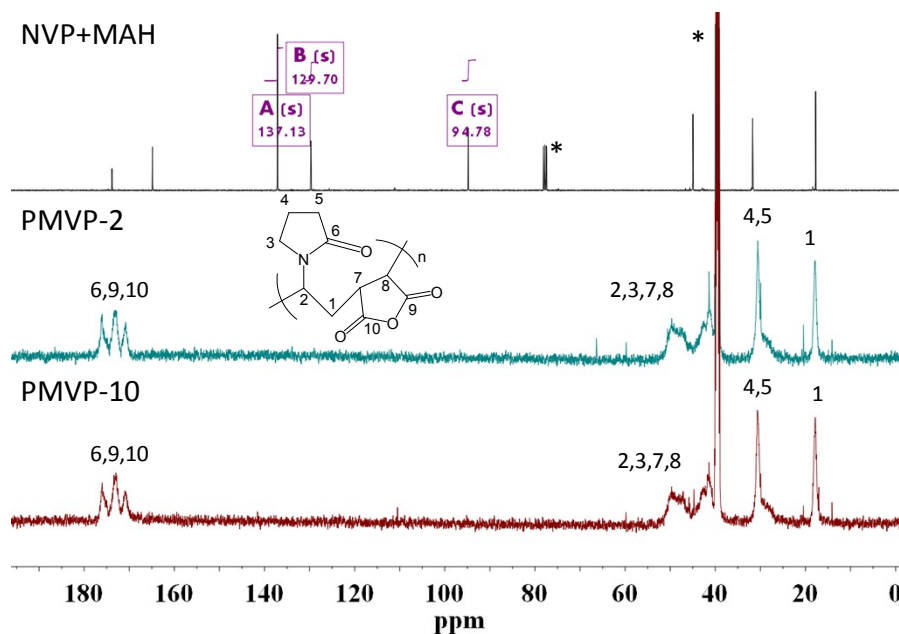


Figure S1 ^{13}C NMR spectra of PMVP-2 and PMVP-10 in *d*-DMSO

The ^{13}C NMR spectra of PMVP-2 and PMVP-10 show that the chemical shifts corresponding to the C in C=C double bond of MAh ($\delta = 137.13$) and NVP ($\delta = 94.78$, 129.70) disappear, while broad peaks assigned to the C atoms in the copolymers appear, which indicates the formation of PMVPs.

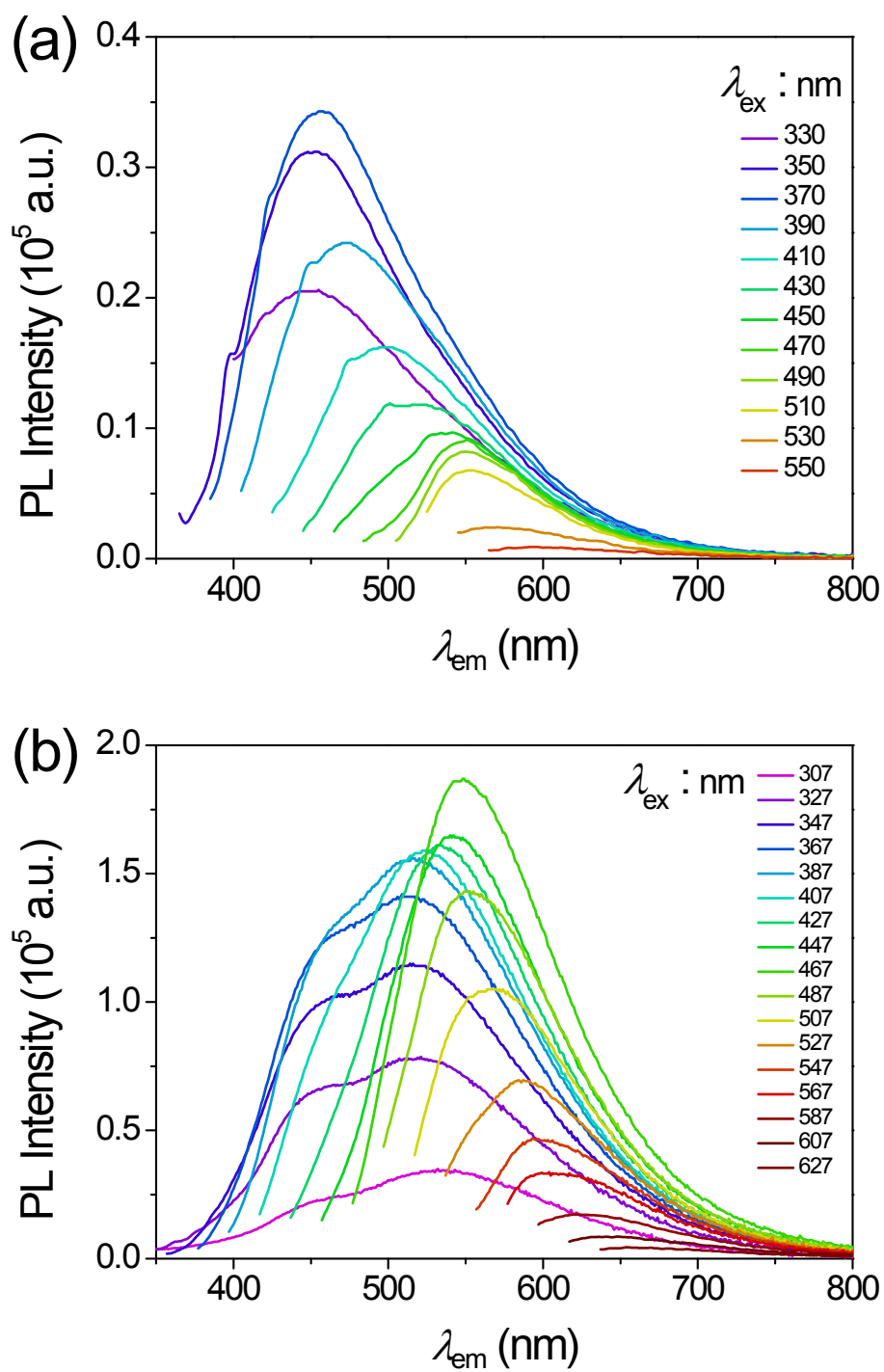


Figure S2. PL spectra of PMVP-2 (a) and PMVP-10 (b) in DMSO solutions. The excitation and emission slit widths are 5 nm and 1.5 nm, respectively. $C_{PMVPs} = 5 \times 10^{-3}$ g/mL for the solutions.

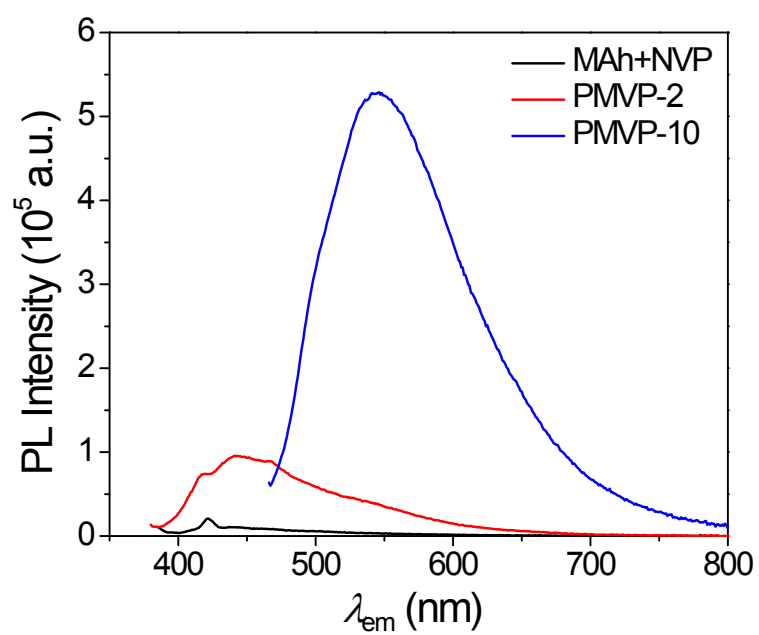


Figure S3. PL spectra of PMVP-2, PMVP-10 and NVP-MAh blend in DMSO solutions. $C = 1 \times 10^{-3}$ g/mL, $n(\text{MAh}) = n(\text{NVP})$.

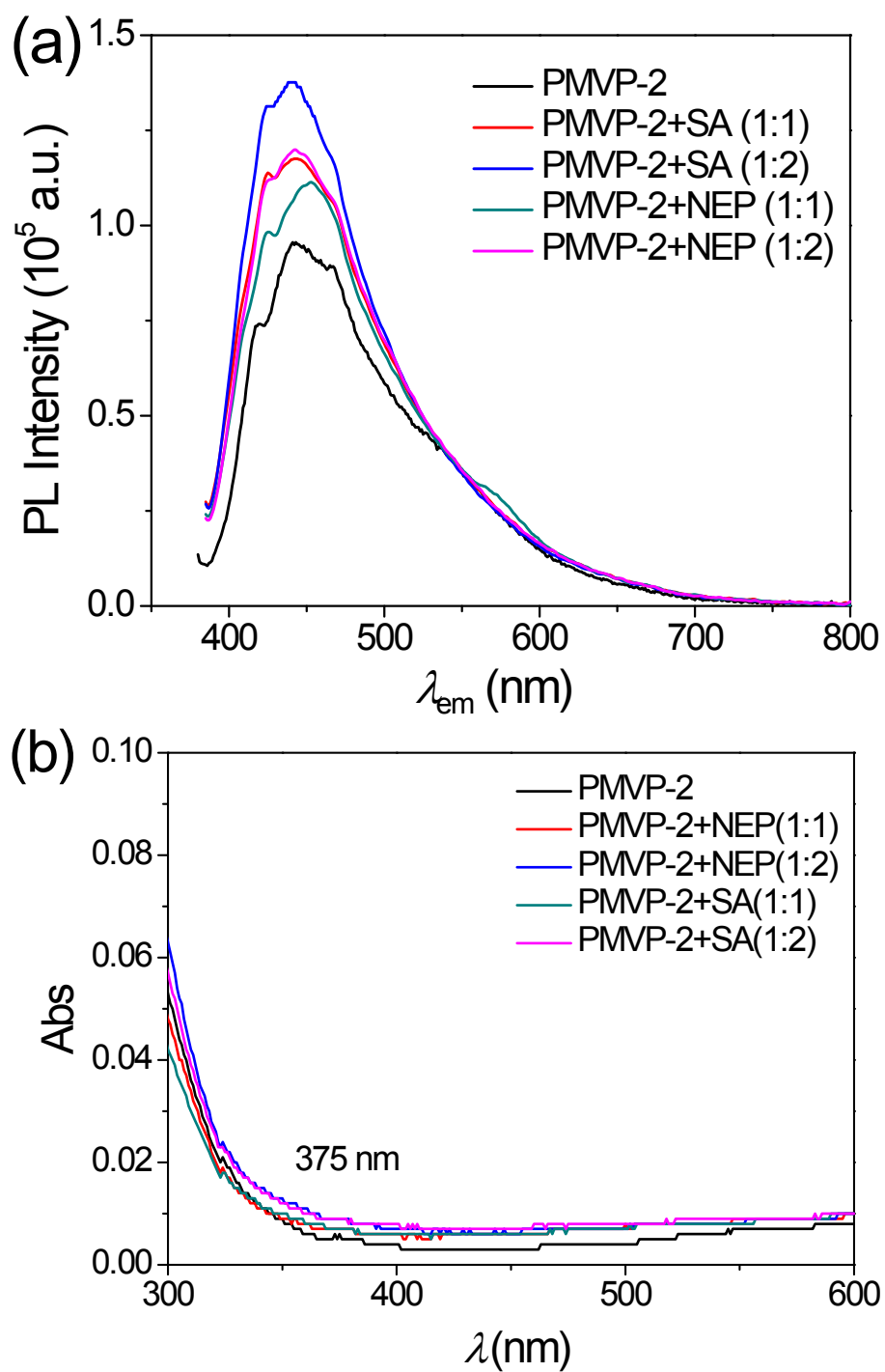


Figure S4. PL spectra (a) and UV-vis spectra (b) of PMVP-2 DMSO solutions added with succinic anhydride (SA) and *N*-ethyl pyrrolidone (NEP). $C_{\text{PMVP-2}} = 1 \times 10^{-3}$ g/mL, and the mass ratios of SA and NEP to PMVP-2 are 1:1 or 2:1. $\lambda_{ex} = 375$ nm (PMVP-2).

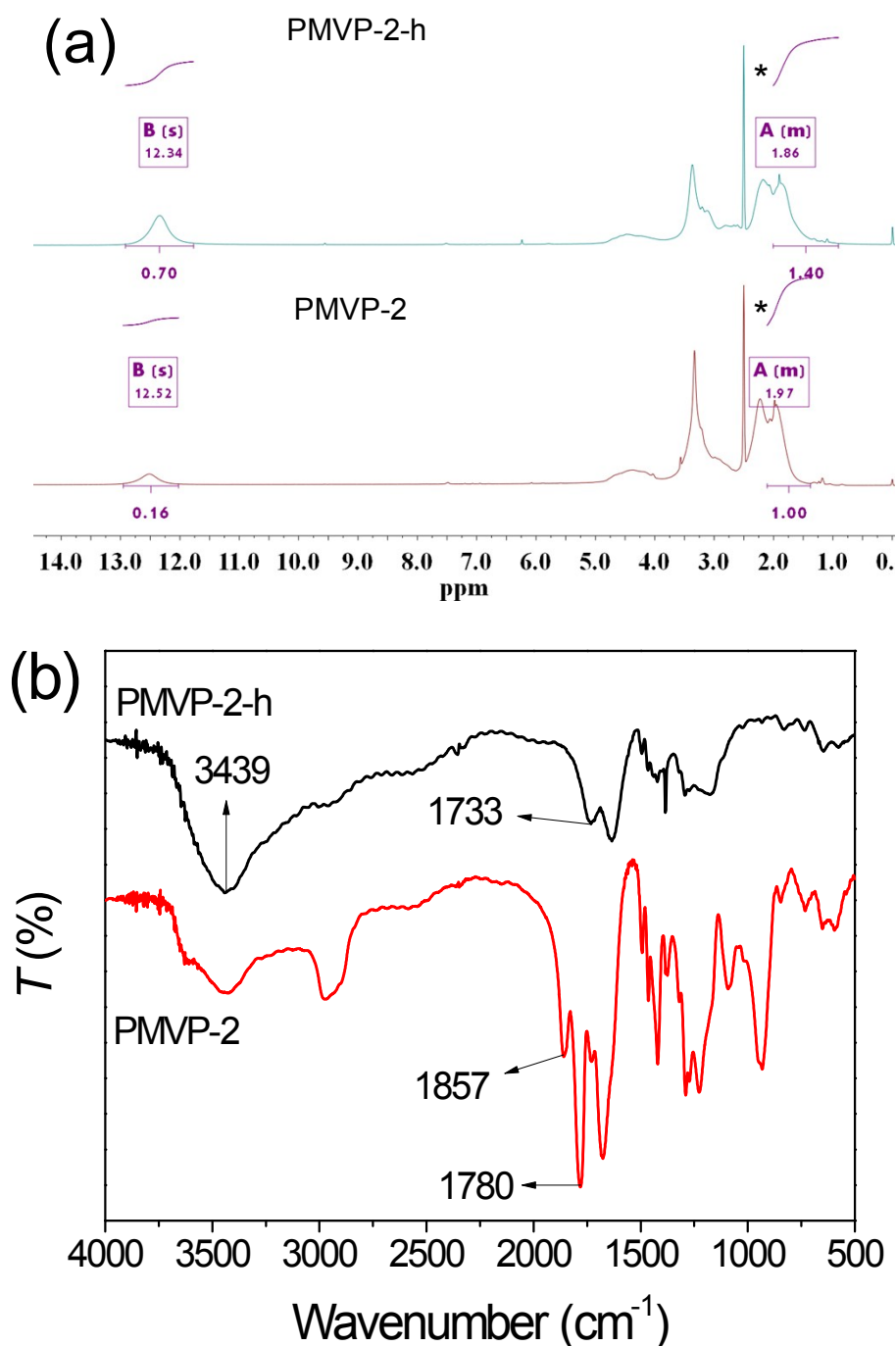


Figure S5. ^1H NMR spectra (a) and FTIR spectra (b) of PMVP-2-h and PMVP-2.

Fig. S5a shows the ^1H NMR spectra of both PMVP-2-h and PMVP-2. A strong peak corresponding to the chemical shift of the H in $-\text{COOH}$ in the hydrolyzed copolymer PMVP-2-h appears at 12.34 ppm. Note that a weak peak attributed to the chemical shift of the H in $-\text{COOH}$ also appears at 12.52 ppm in the original PMVP-2, due to the easy hydrolysis of anhydride even in contact with water in air. Fig. S5b shows the FTIR spectra of PMVP-2-h and PMVP-2, the spectrum of PMVP-2 shows the characteristic anhydride absorption bands at 1857 and 1780 cm^{-1} , but these characteristic bands disappear in the spectrum of PMVP-2-h, indicating the hydrolysis of anhydride rings.

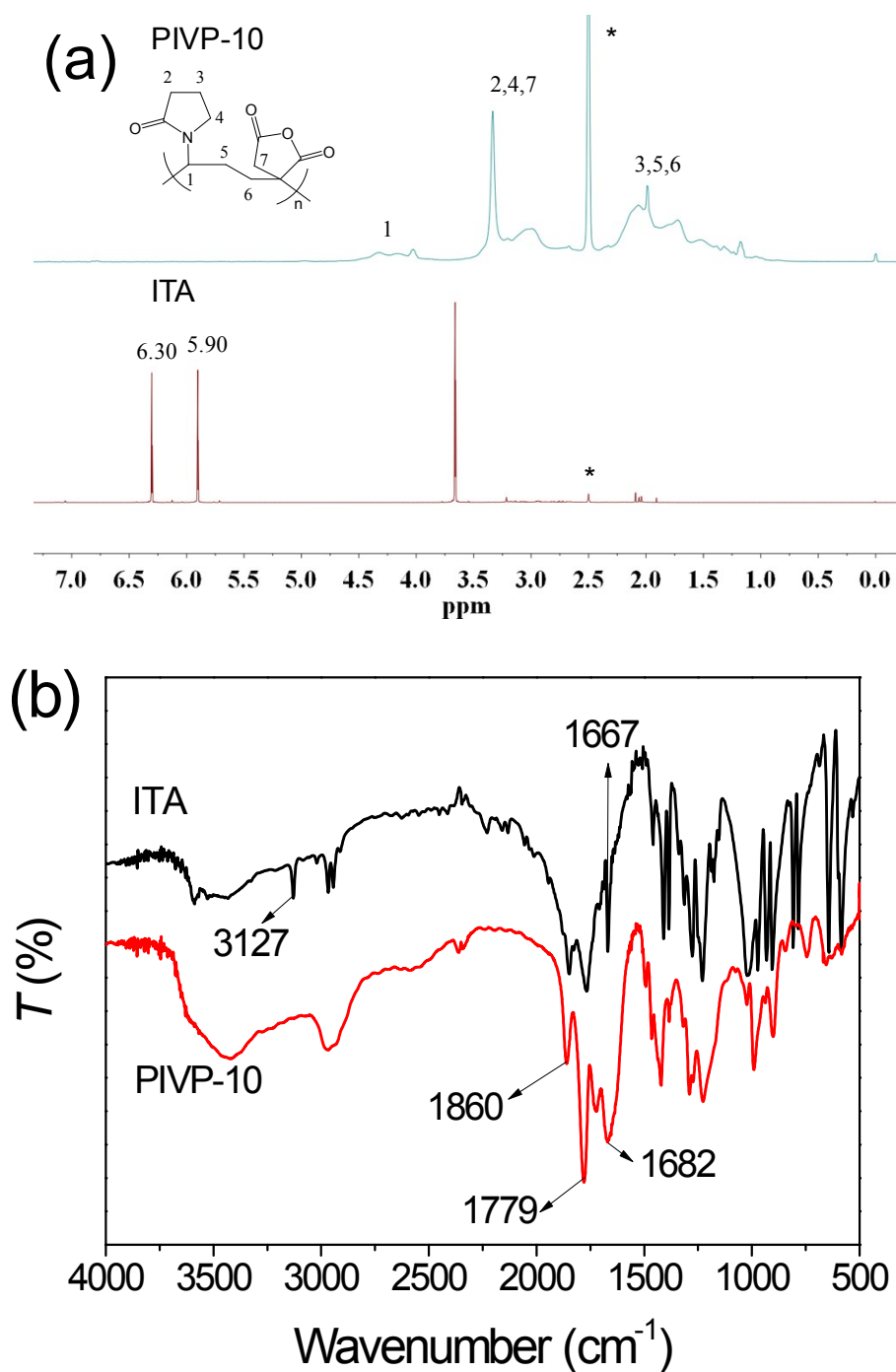


Figure S6. ¹H NMR spectra (a) and FTIR spectra (b) of ITA and PIVP-10.

The ¹H NMR spectrum shows that the chemical shifts corresponding to the H in C=C double bonds of ITA ($\delta = 5.90, 6.30$) and NVP ($\delta = 4.41, 6.97$) disappear, while broad peaks assigned to the H atoms in the copolymers appear, which indicates the formation of PIVP-10. Fig. S6b shows the FTIR spectra of PIVP-10, the characteristic anhydride absorption bands at 1860 and 1779 cm⁻¹ still exist, but the C=C absorption bands of ITA (3127 cm⁻¹, 1667 cm⁻¹) and NVP (3117 cm⁻¹, 1625 cm⁻¹) shown in the FTIR spectrum of the ITA and NVP disappear in the FTIR spectra of PIVP-10.