

## Electronic Supplementary Information

### Highly Emissive Poly(maleic anhydride-*alt*-vinyl pyrrolidone) with Molecular Weight-dependent and Excitation-dependent Fluorescence

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## Supporting Figures

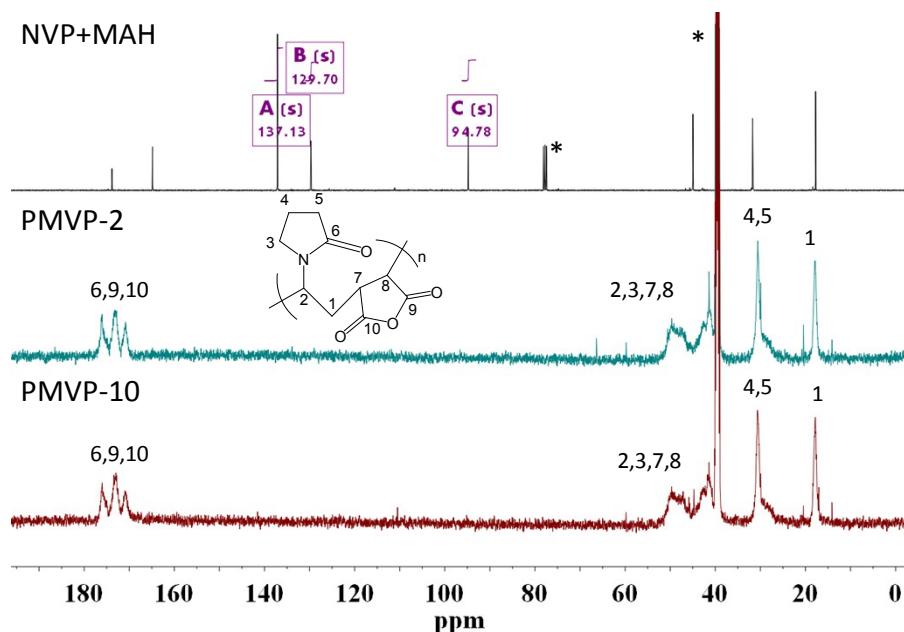


Figure S1  $^{13}\text{C}$  NMR spectra of PMVP-2 and PMVP-10 in *d*-DMSO

The  $^{13}\text{C}$  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.

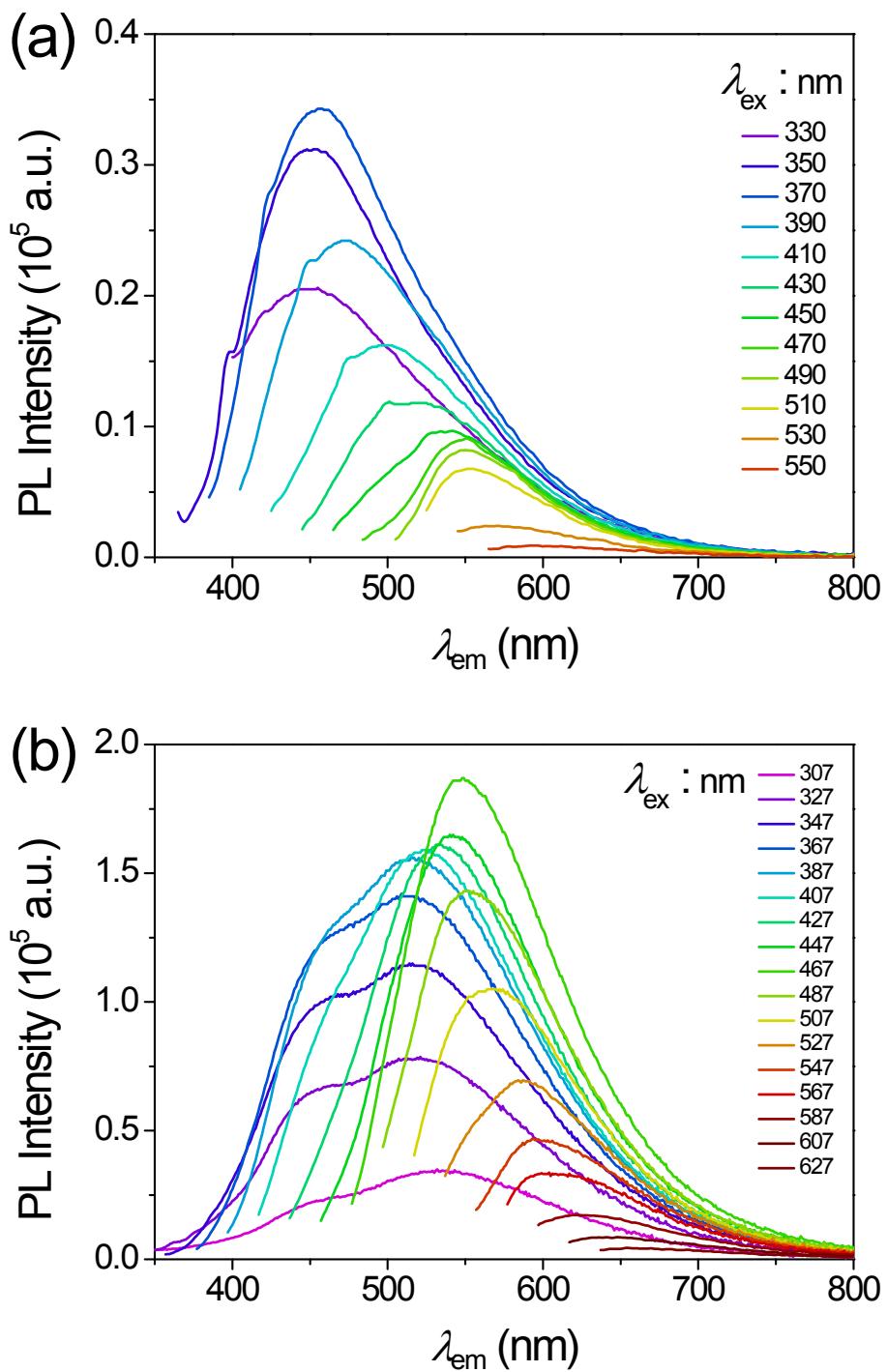


Figure S2. PL spectra of PMVP-2 (a) and PMVP-10 (b) in DMSO solutions. The excitation and emission slit widths are 5 nm and 1.5 nm, respectively.  $C_{\text{PMVPs}} = 5 \times 10^{-3}$  g/mL for the solutions.

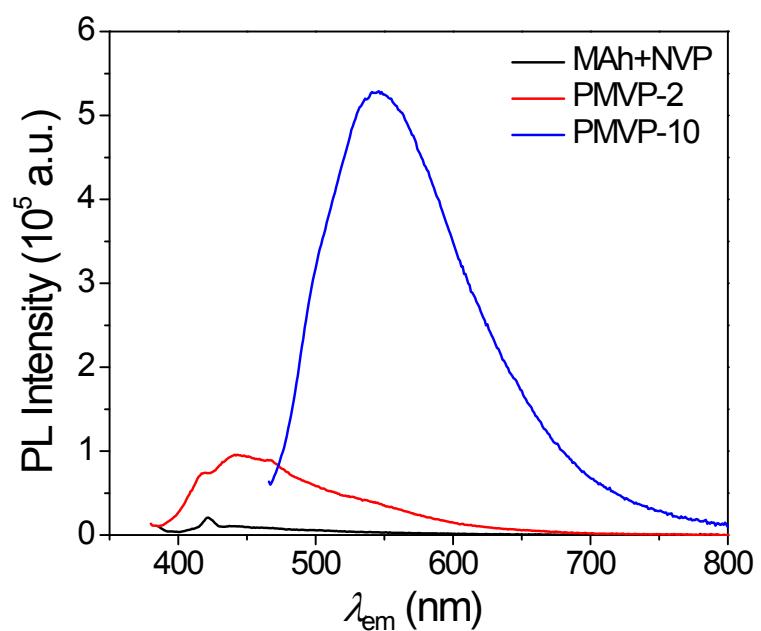


Figure S3. PL spectra of PMVP-2, PMVP-10 and NVP-MAh blend in DMSO solutions.  $C = 1 \times 10^{-3}$  g/mL,  $n(\text{MAh}) = n(\text{NVP})$ .

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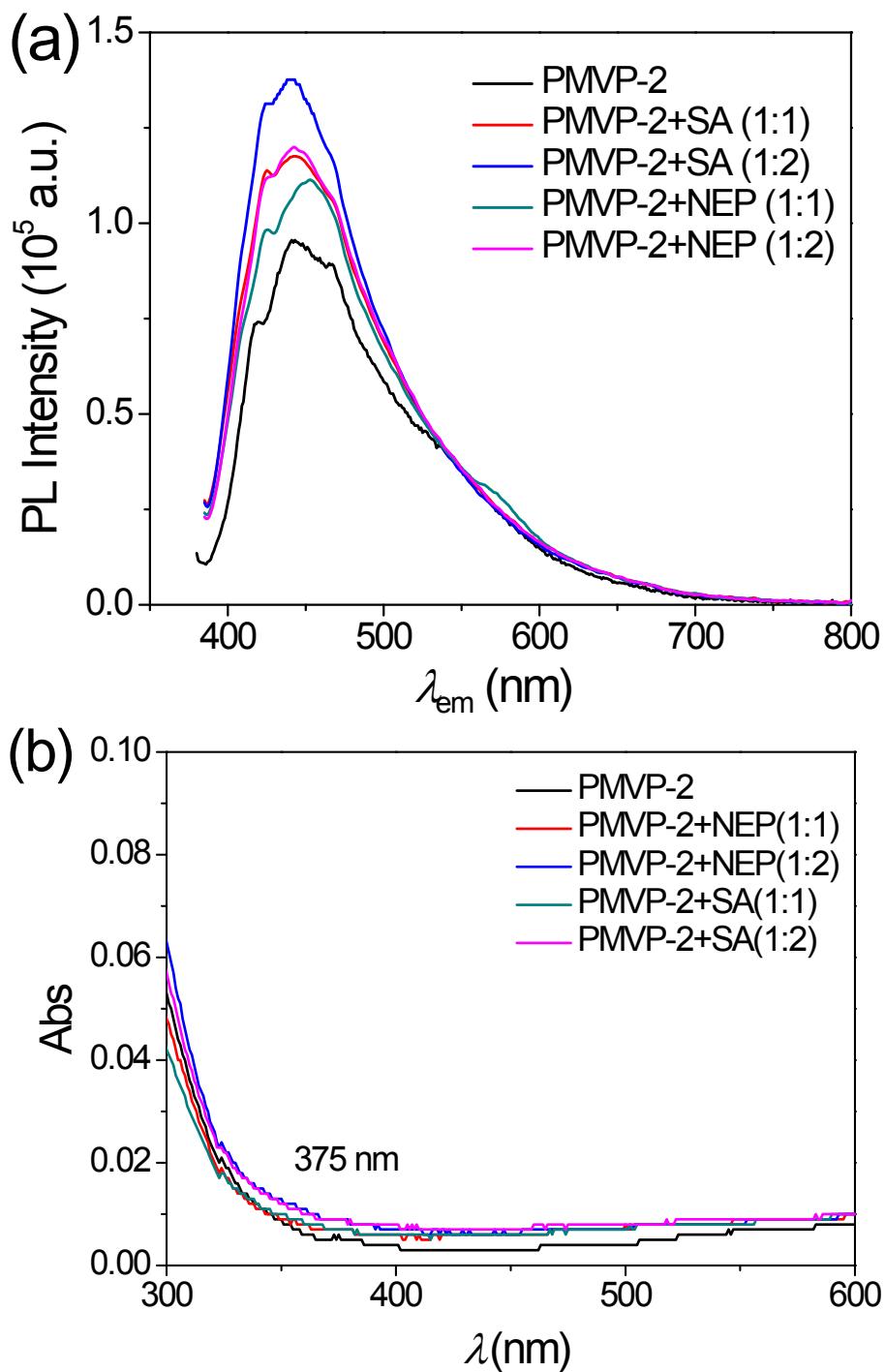


Figure S4. PL spectra (a) and UV-vis spectra (b) of PMVP-2 DMSO solutions added with succinic anhydride (SA) and *N*-ethyl pyrrolidone (NEP).  $C_{\text{PMVP-2}} = 1 \times 10^{-3}$  g/mL, and the mass ratios of SA and NEP to PMVP-2 are 1:1 or 2:1.  $\lambda_{\text{ex}} = 375$  nm (PMVP-2).

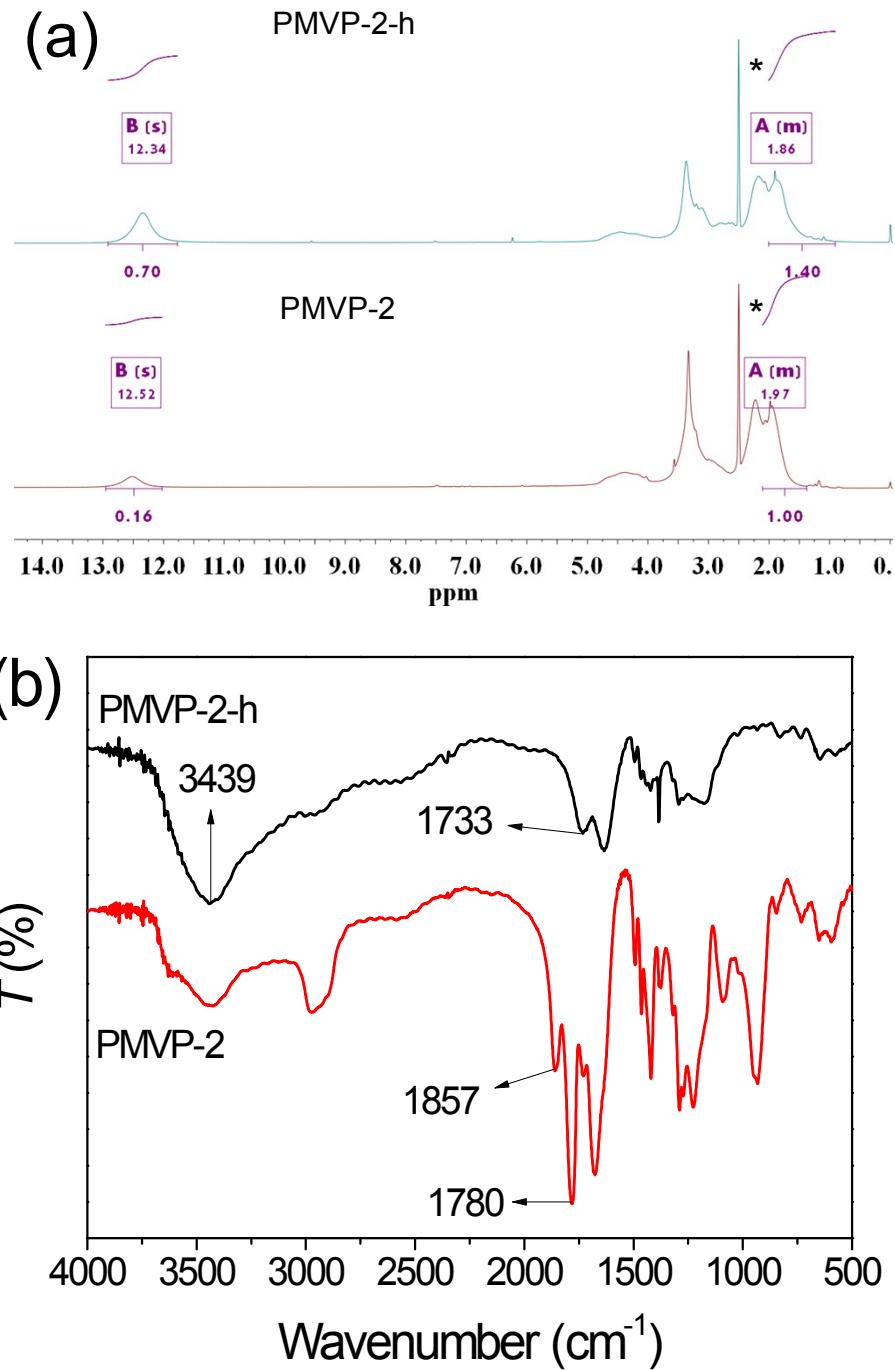


Figure S5. <sup>1</sup>H NMR spectra (a) and FTIR spectra (b) of PMVP-2-h and PMVP-2.

Fig. S5a shows the <sup>1</sup>H 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<sup>-1</sup>, but these characteristic bands disappear in the spectrum of PMVP-2-h, indicating the hydrolysis of anhydride rings.

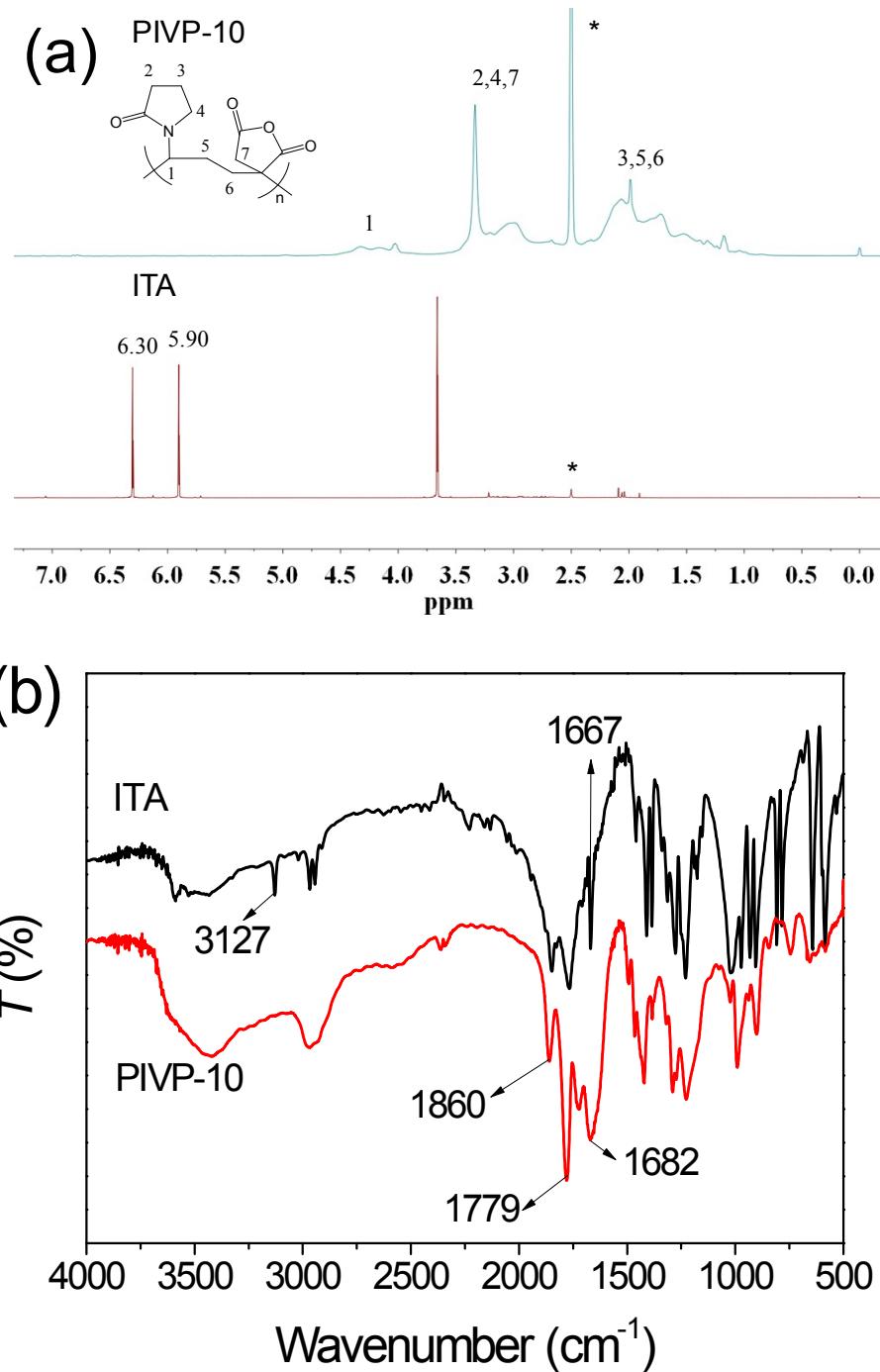


Figure S6.  $^1\text{H}$  NMR spectra (a) and FTIR spectra (b) of ITA and PIVP-10.

The  $^1\text{H}$  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  $1779\text{ cm}^{-1}$  still exist, but the C=C absorption bands of ITA ( $3127\text{ cm}^{-1}$ ,  $1667\text{ cm}^{-1}$ ) and NVP ( $3117\text{ cm}^{-1}$ ,  $1625\text{ cm}^{-1}$ ) shown in the FTIR spectrum of the ITA and NVP disappear in the FTIR spectra of PIVP-10.