

**Fluorescent magnetic ionic liquids with multi-responses to
temperature, humidity and organic vapors**

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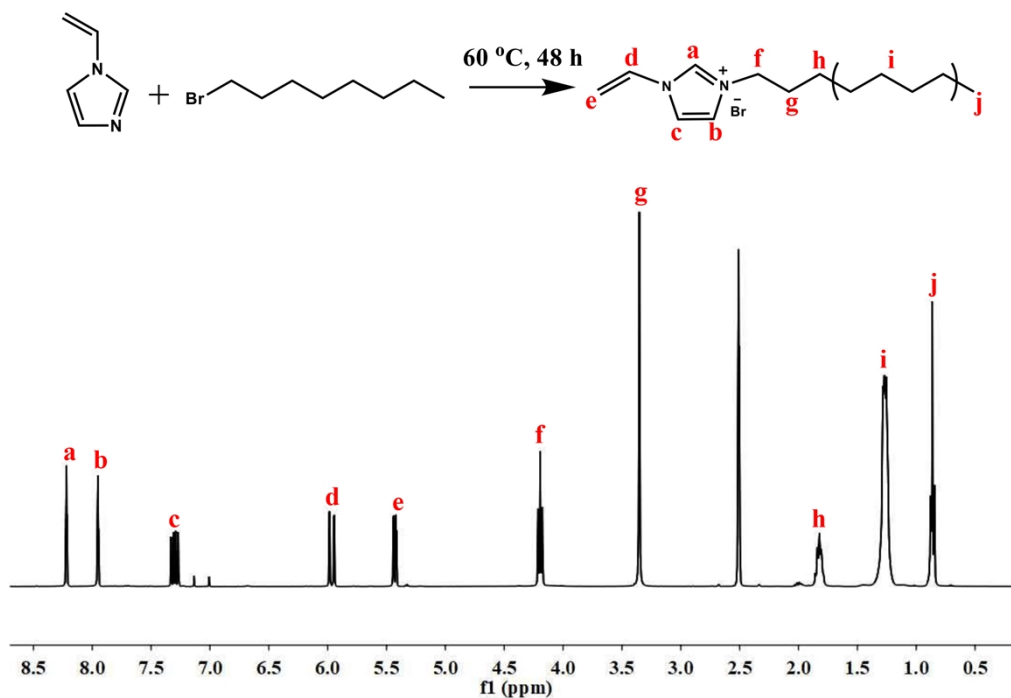


Fig. S1 ^1H NMR spectrum of $[\text{C}_8\text{VIM}]\text{Br}$ ($\text{DMSO-}d_6$, δ , ppm): 9.52 (1H), 8.21 (1H), 7.95 (1H), 7.29 (1H), 5.96 (1H), 5.43 (1H), 4.19 (2H), 1.81 (2H), 1.26 (10H), 0.86 (3H).

Table S1. Elemental analysis results of C, H and N of $[\text{C}_4\text{VIM}]\text{Mn}_1$, $[\text{C}_8\text{VIM}]\text{Mn}_2$ and $[\text{C}_{12}\text{VIM}]\text{Mn}_3$.

	C		H		N	
	Calculated	Found	Calculated	Found	Calculated	Found
$[\text{C}_4\text{VIM}]\text{Mn}_1$	30.2%	29.4%	4.20%	4.38%	7.84%	7.94%
$[\text{C}_8\text{VIM}]\text{Mn}_2$	37.8%	36.6%	5.81%	5.64%	6.78%	6.71%
$[\text{C}_{12}\text{VIM}]\text{Mn}_3$	43.5%	43.2%	7.03%	6.87%	5.97%	5.94%

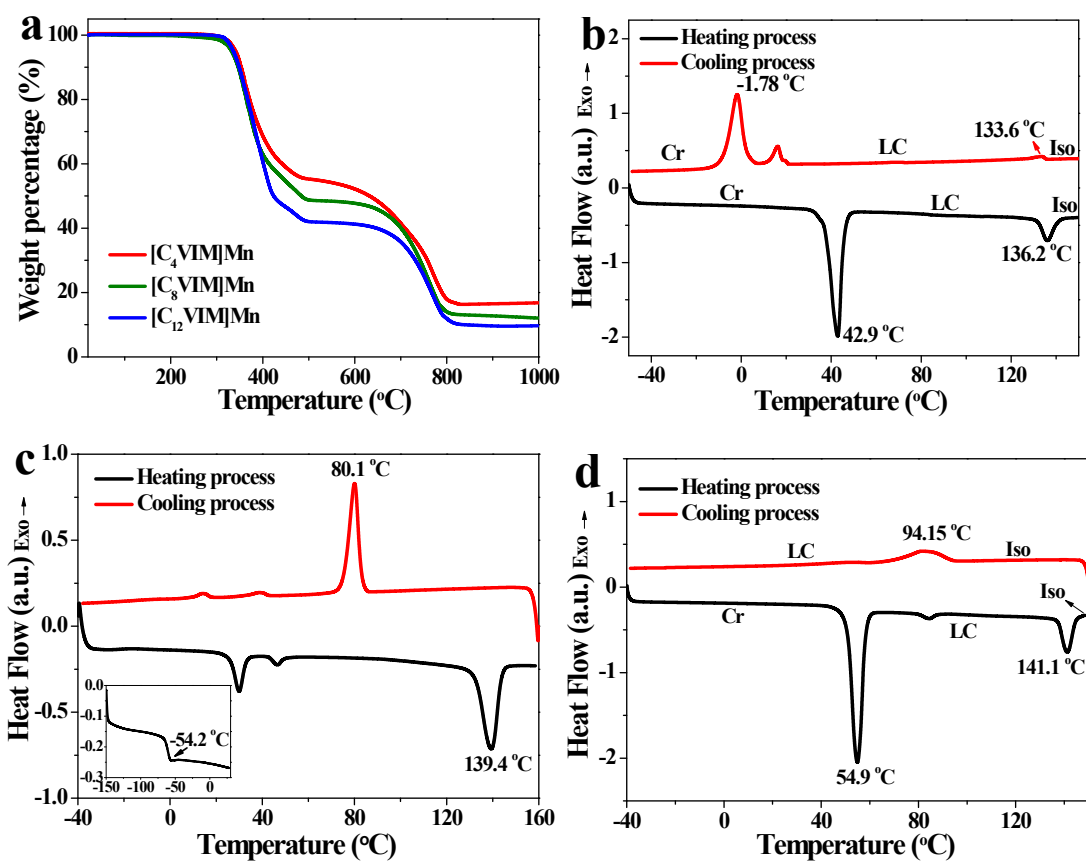


Fig. S2 (a) TGA results of $[C_4VIM]Mn_1$, $[C_8VIM]Mn_2$ and $[C_{12}VIM]Mn_3$; DSC results of $[C_4VIM]Mn_1$ (b), $[C_8VIM]Mn_2$ (c) and $[C_{12}VIM]Mn_3$ (d).

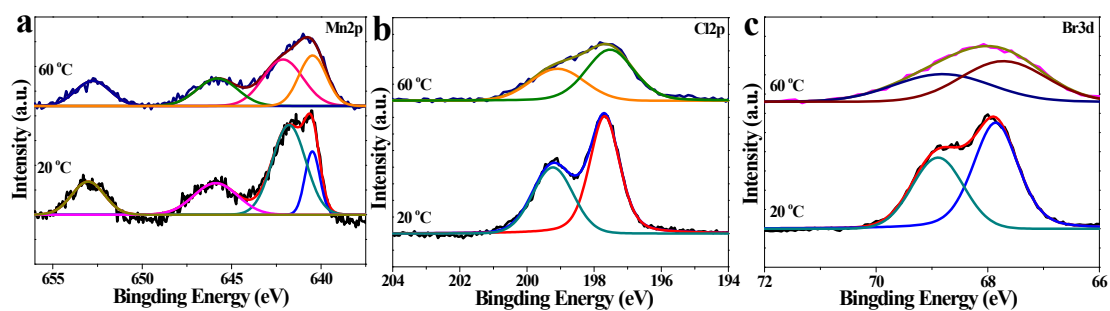


Fig. S3 XPS spectra of Mn2p (a), Cl2p (b) and Br3d (c) of $[C_{12}VIM]Mn_3$ at different temperatures.



Fig. S4 Poly(ionic liquid) films of $[\text{C}_4\text{VIM}]\text{Mn}_1$ (a), $[\text{C}_8\text{VIM}]\text{Mn}_2$ (b) and $[\text{C}_{12}\text{VIM}]\text{Mn}_3$ (c).

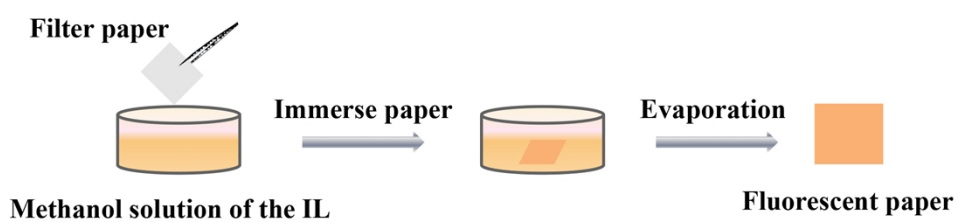


Fig. S5 Preparation process of the fluorescent papers.

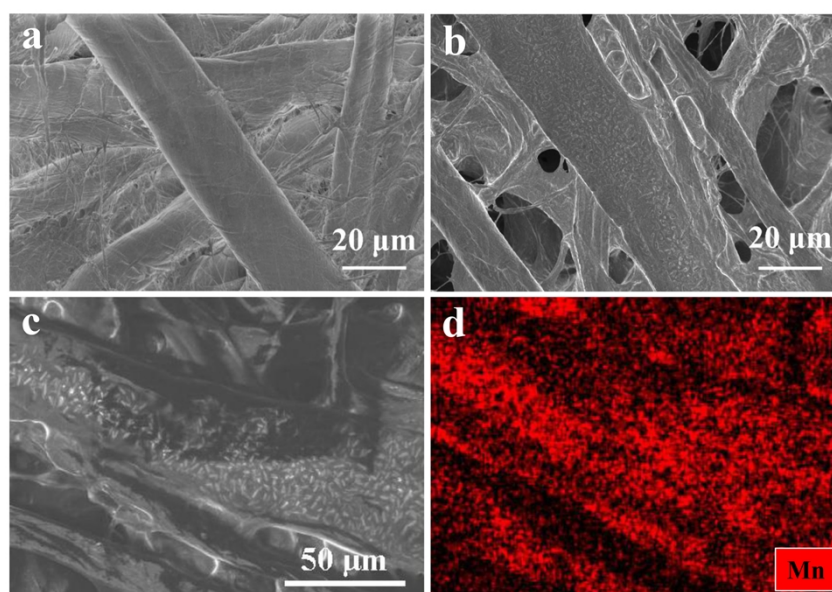


Fig. S6 SEM images of the filter papers without (a) and with (b) $[\text{C}_4\text{VIM}]\text{Mn}_1$; (c) the magnified image from (b), which was used for EDS-mapping detection of Mn element (d).

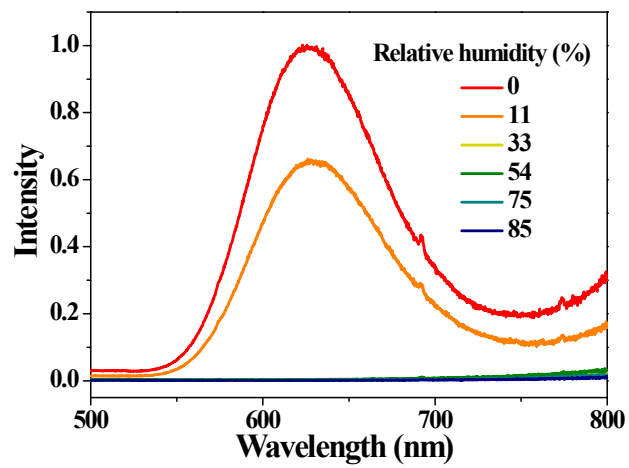


Fig. S7 Emission spectra of the fluorescent papers loaded with $[C_8VIM]Mn_2$ at various RH.