Supporting information

Eu$^{3+}$ functionalized robust membrane based on the post-synthetic copolymerization of metal-organic framework and ethyl methacrylate

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Figure S1 PXRD patterns of solid-state (a) MOF1 and (b) MOF2.
**Figure S2** The undulating network of MOF1 with polymerizable groups.

**Figure S3** The coordination modes of fma (fumaric acid) ligands in MOF1 and MOF2.
**Figure S4** (a) SEM image of MOF1 particles. (scale bar: 4 μm); corresponding length distribution (b) and diameter distribution (c).

**Figure S5** The NMR analysis of (a) PEMA, (b) MOF1-Eu^{3+}@PEMA membrane and (c) ligands of MOF1. The spectra were recorded with the solutions obtained by degrading corresponding material in HF/CDCl₃ (1/10, v/v).
Figure S6 Excitation and emission spectra of solid-state (a) MOF1 and (b) MOF2 at room temperature.

Figure S7 Fluorescence emission of MOF1-PEMA membrane and MOF2-PEMA membrane at room temperature.
Figure S8 Excitation and emission spectra of (a) MOF1-Tb\(^{3+}\)@PEMA membrane and (b) MOF1-Eu\(^{3+}\)@PEMA membrane at room temperature.

Figure S9 Decay curve of MOF1-PEMA membrane monitored at its maximum emission wavelength of 374 nm.
**Figure S10** Decay curve of MOF1-Eu\(^{3+}\)@PEMA membrane monitored at its maximum emission wavelength of 616 nm.

**Figure S11** PXRD profile of MOF1 powders after immersion in water for 24 hours.
**Figure S12** PXRD patterns of MOF1-Eu\(^{3+}\)@PEMA membrane after immersion in various pH aqueous solutions for 24 hours.

**Figure S13** (a) Day-to-day fluorescence stability of MOF1-Eu\(^{3+}\)@PEMA membrane under excitation at 349 nm; (b) Corresponding variation of emission intensity at 616 nm with time.
**Figure S14** Excitation spectra of MOF1-Eu$^{3+}$@PEMA membrane before and after the 30 minutes exposure to gaseous toluene at 50 °C ($\lambda_{em} = 616$ nm).

**Figure S15** Decay curves of MOF1-Eu$^{3+}$@PEMA membrane before and after the 30 minutes exposure to gaseous toluene at 50 °C ($\lambda_{em} = 616$ nm) under its maximum emission wavelength of 616 nm.