Dual Response Organogel Based on Irdium Complex and Eu（Ⅲ） hybrid for Volatile Acid and Organic Amine Vapors

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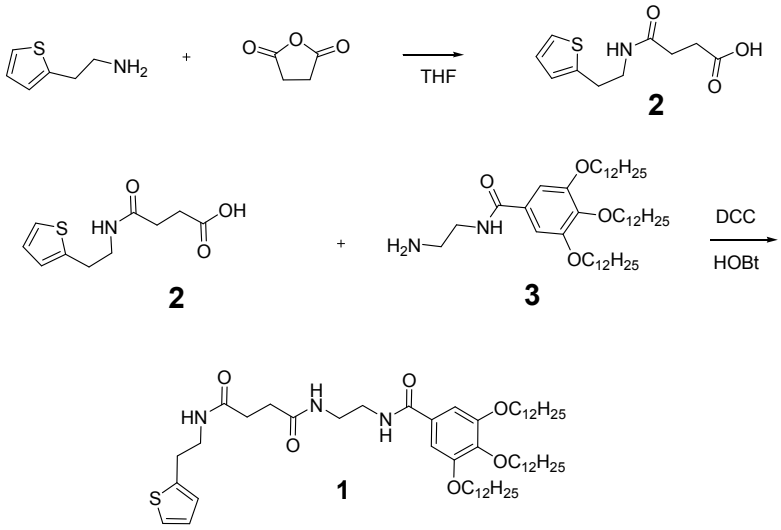


Scheme S1 Synthesis route of compound **1**.

Synthesis of compound 2: Thiophene-2-ethylamine (2.17 g, 17.08 mmol) and maleic anhydride (1.79 g, 17.94 mmol) were added to anhydrous THF (100 ML) and stirred overnight. The reaction was monitored by TLC. After the reaction was over, the large amount precipitate was appeared. The precipitate was filtered and washed by THF. The compound **2** was obtained with high yield of 85%. ^{1}HNMR (ppm, d_6-DMSO) δ: 12.061 (s, 1H), 8.006 (s, 1H), 7.331 (d, J = 4.8 Hz, 1H), 6.953 (d, J = 3.6 Hz, 1H), 6.880 (d, J = 2.4 Hz, 1H), 3.282 (t, J = 7.2 Hz, 2H), 2.916 (t, J = 7.2 Hz, 2H), 2.428 (t, J = 7.2 Hz, 2H), 2.318 (t, J = 7.2 Hz, 2H).^{13}CNMR (ppm, d_6-DMSO) δ: 174.29, 171.42, 142.00, 127.41, 125.61, 124.43, 30.51, 29.77, 29.59. ESI-MS (m/z): $[M+H]^+$ calcd for $C_{10}H_{14}NO_3S$: 228.0694. Found: 228.0687.

Synthesis of compound 1: Thiophene-2-ethylamine (2.17 g, 17.08 mmol) and maleic anhydride (1.79 g, 17.94 mmol) were added to anhydrous THF (100 ML) and stirred overnight. The reaction was monitored by TLC. After

the reaction was over, the large amount precipitate was appeared. The precipitate was filtered and washed by THF. The compound **2** was obtained with high yield of 85%. ^{1}HNMR (ppm, $CDCl_3$) δ: 7.320 (s, 1H), 7.141 (d, J = 4.2 Hz, 1H), 6.920 (d, J = 2.4Hz, 1H),6.791(s, 2H), 6.043 (s, 1H), 3.965-4.012 (m, 6H), 3.542 (s, 2H), 3.459 (d, J = 5.4Hz, 4H), 2.980 (t, J = 6.3Hz, 2H), 2.497 (s, 4H), 1.722-1.800 (m, 6H), 1.440-1.462 (m, 6H). 1.259-1.321 (m, 48H), 0.890 (t, J = 6.3Hz, 9H); ^{13}CNMR (ppm, $CDCl_3$) δ: 173.56, 167.78, 152.99, 140.97, 128.89, 127.07, 125.40, 123.99, 105.70, 73.47, 69.22, 40.97, 31.94, 31.54, 30.96, 30.33, 29.77, 29.75, 29.73, 29.71, 29.68, 29.61, 29.45, 29.41, 29.39, 26.13, 26.10, 14.14. ESI-MS (m/z): $[M+H]^+$ calcd for $C_{55}H_{96}N_3O_6S$: 926.7020. Found: 926.7026.

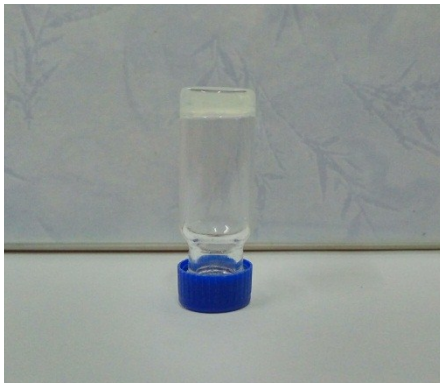


Figure S1 Image of gel **1** in DMSO with the critical gel concentration of 6.25 mg mL^{-1}

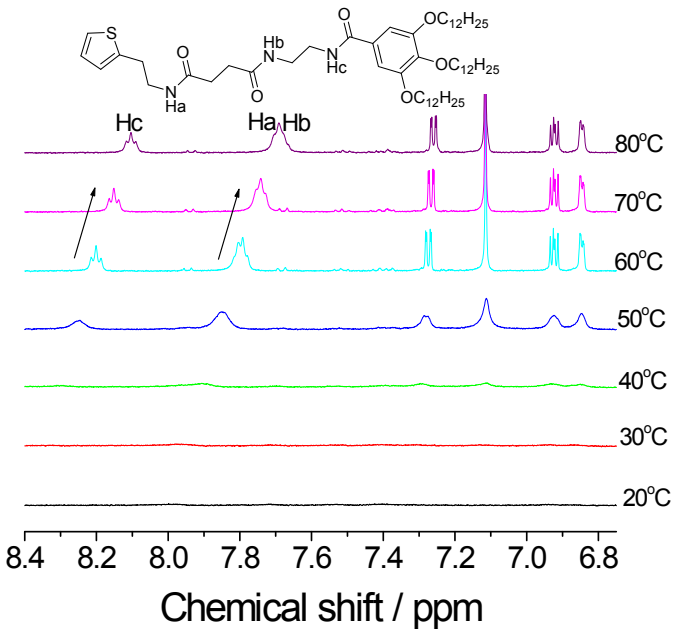


Figure S2 Temperature-dependent ^{1}H NMR spectra of gel **1** in d_6-DMSO (6.25 $mgmL^{-1}$). The positions of the labeled protons are marked in molecule structure **1**.

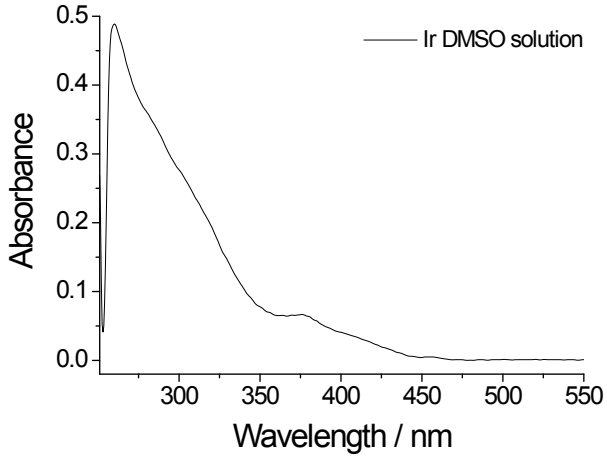


Figure S3 UV-Vis absorption spectra of complex **Ir** in DMSO solution with the concentration of 10^{-5} M.

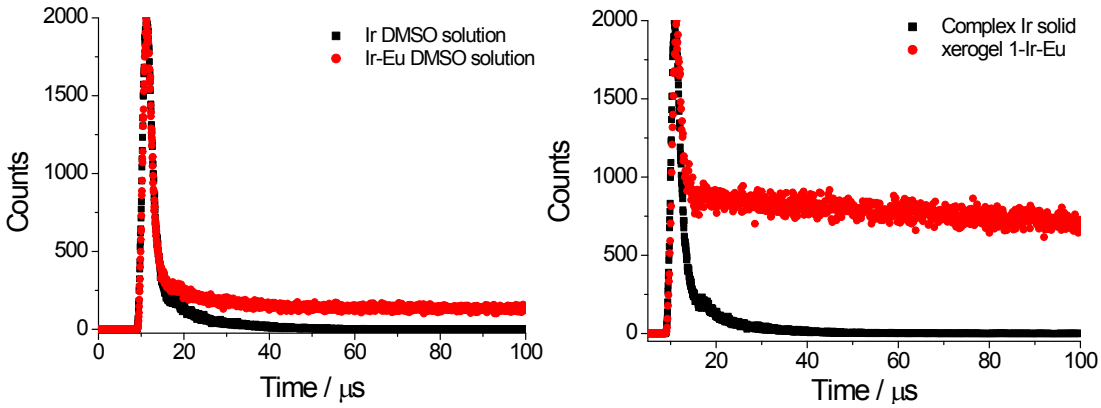


Figure S4 Lifetime decay profiles of **Ir** and **Ir-Eu** in DMSO solution and solid state. (λex = 370 nm, monitored at 494 nm for **Ir** DMSO solution and solid state, monitored at 613 nm for **Ir-Eu** DMSO solution and xerogel **Ir-Eu** solid)

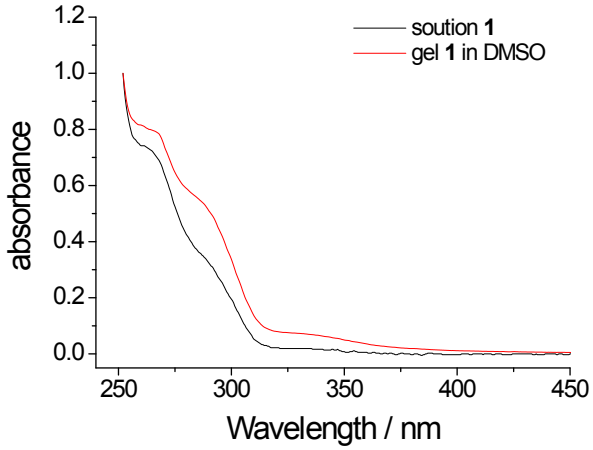
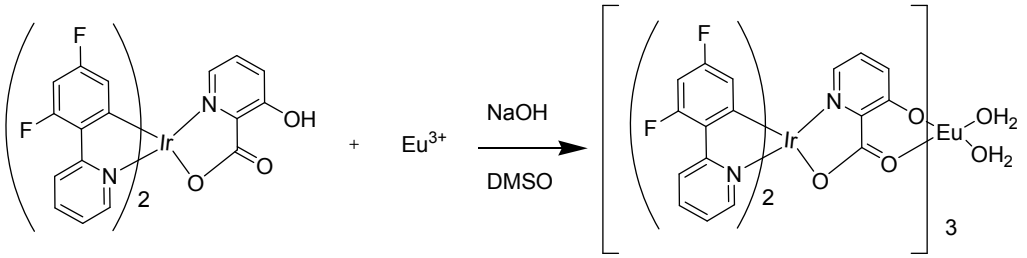


Figure S5 UV-Vis absorption spectra of compound **1** in DMSO solution (10^{-4} M) and gel state (6.25 mg / mL).



Scheme S2 Schematic illustration of the construction of new complex **Ir**.

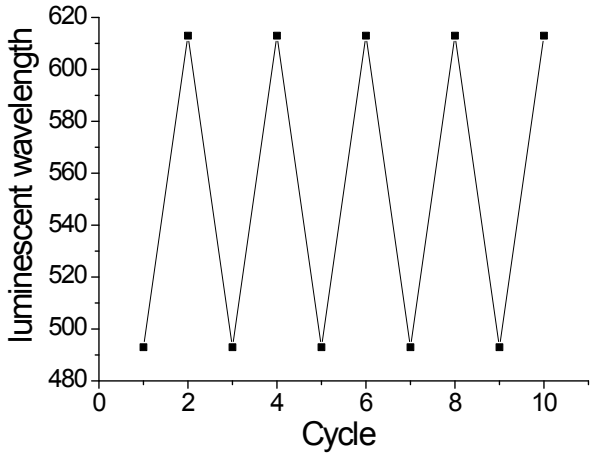


Figure S6 The luminescence changes of xerogel **1-Ir-Eu**+NaOH under response to gas CF_3COOH and Et_3N in turn.

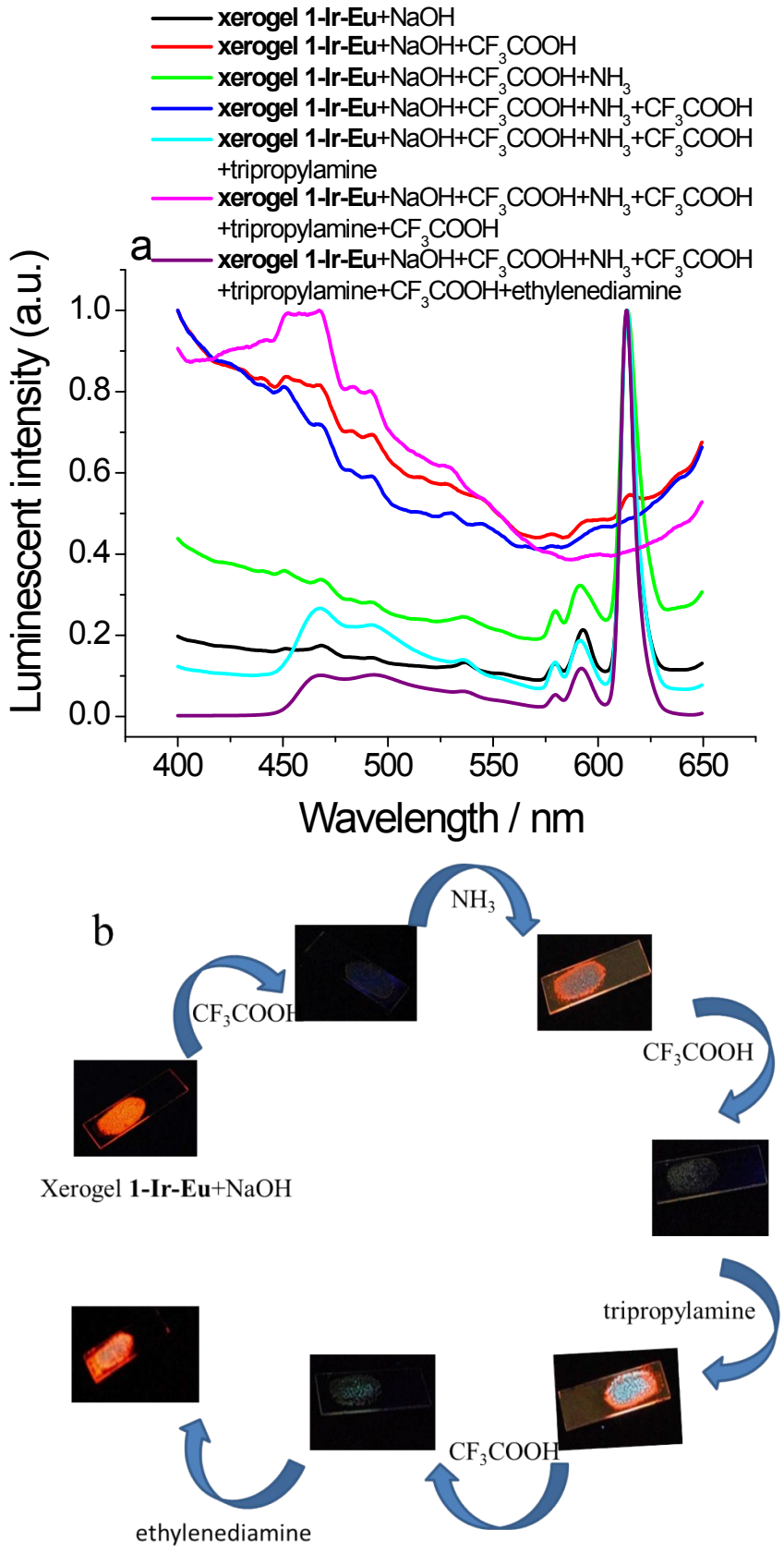


Figure S7 The luminescent spectra (a) and images (b) of the hybrid organogel **1-Ir-Eu** under response to ammonium hydroxide, tripropylamine and ethlenediamine. The excitation wavelength was at 365 nm.

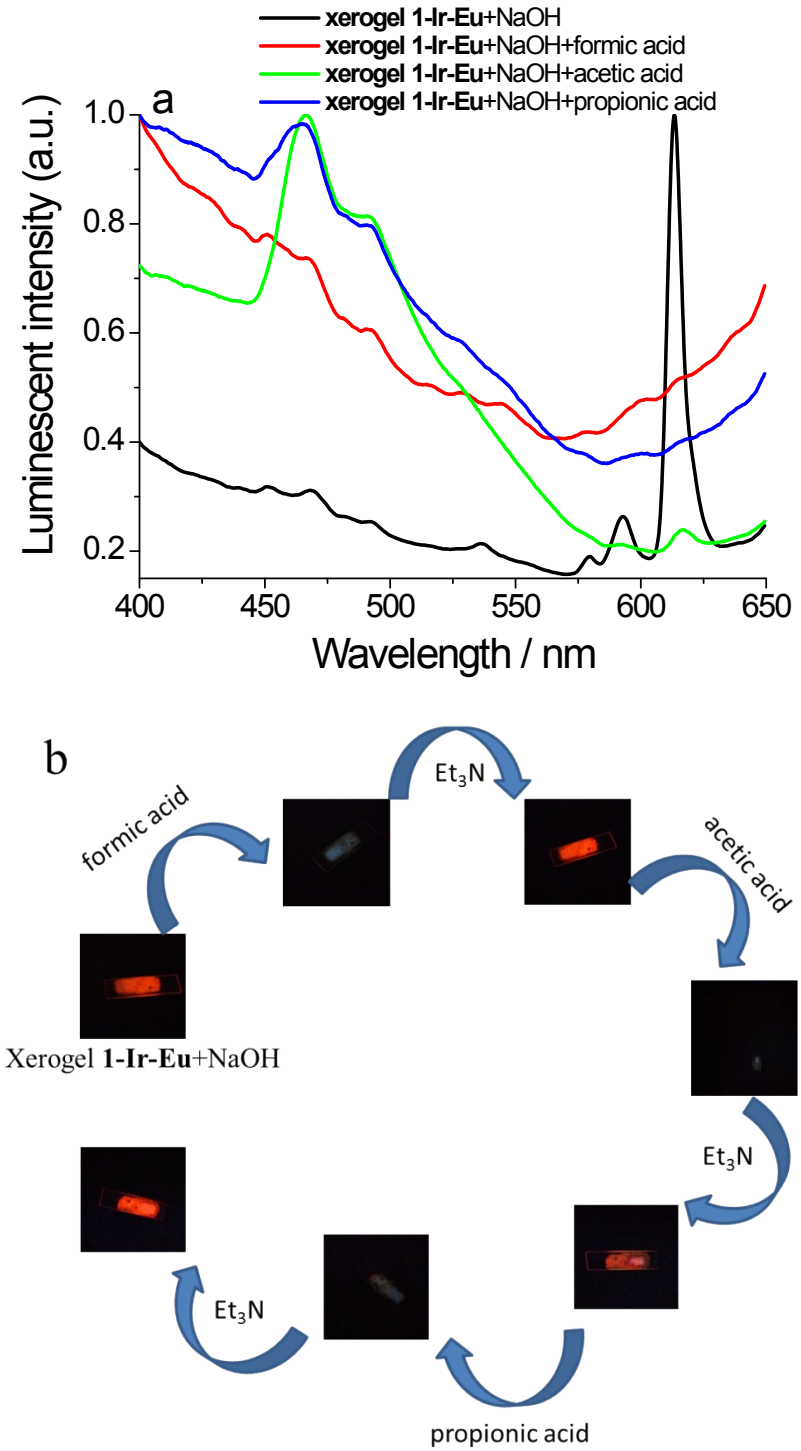


Figure S8 The luminescent spectra (a) and images (b) of the hybrid organogel **1-Ir-Eu** under response to formic acid, acetic acid and propionic acid. The excitation wavelength was at 365 nm.