Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Ratiometric dual-emitting MOF⊃dye thermometer with tunable operating range and sensitivity

Dian Zhao, Dan Yue, Ke Jiang, Yuanjing Cui, Qi Zhang, Yu Yang and Guodong Qian**

State Key Laboratory of Silicon Materials, Cyrus Tang Center for Sensor Materials and Applications, School of Materials Science and Engineering, Zhejiang University, Hangzhou 310027, China

Corresponding Author:

cuiyj@zju.edu.cn, gdqian@zju.edu.cn

1. Crystallographic data, PXRD, TGA diagrams, and Spectra.

Table1 S1. Crystallographic Data collection and Refinement result for **ZJU-21**.

	ZJU-21
Chemical formula	$C_{22}H_6N_2O_{10}SZn_2$
Formula weight	621.09
Temperature (K)	296(2)
Wavelength (Å)	0.71073
Crystal system	Trigonal
Space group	*R -3 m :H*
a (Å)	19.1998(12)
b (Å)	19.1998(12)
c (Å)	c = 37.747(2)
α (º)	90.00
β (º)	90.00
γ (º)	120.00
V (Å^3)	12050.5(16)
Z	9
Density (calculated g/cm^{-3})	0.770
Absorbance coefficient (mm^{-1})	0.961
F(000)	2772
Crystal size (mm^3)	0.25×0.24×0.23
Goodness of fit on F_2	1.040
R1, wR2 (I>2σ(I)[a]	0.0807, 0.2248
R1, wR2 (all data)[a]	0.1734, 0.2979
Largest difference peak and hole (e/Å^3)	0.676, -0.539

[a]$R1 = \Sigma(|F_o| - |F_c|) / \Sigma|F_o|$; $wR2 = [\Sigma w(|F_o|-|F_c|^2) / \Sigma wF_o^2]^{1/2}$.

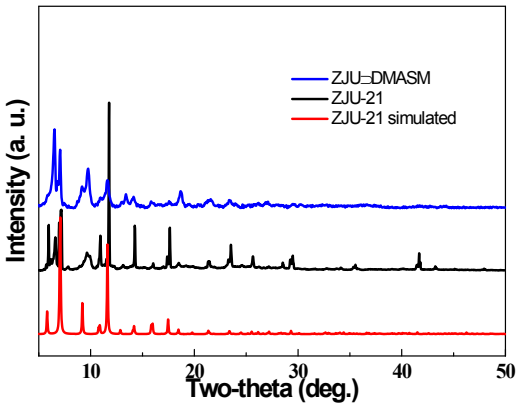


Fig. S1 PXRD patterns of **ZJU-21** and **ZJU-21⊃DMASM**.

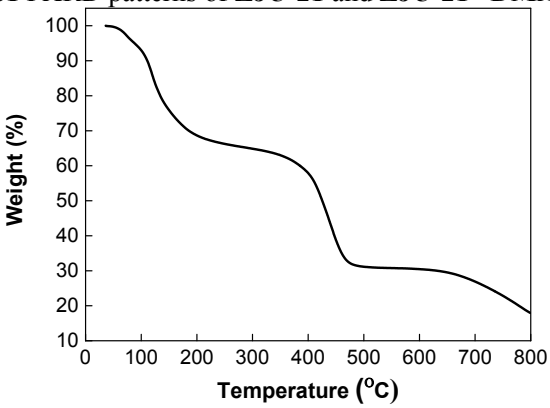


Fig. S2 TGA curve of **ZJU-21**.

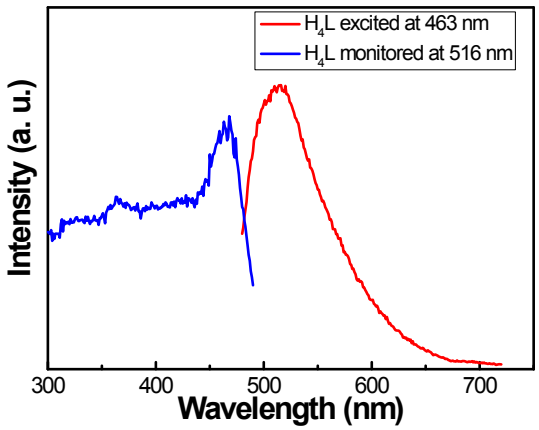


Fig. S3 Excitation and emission spectra of the H_4L ligand at room temperature.

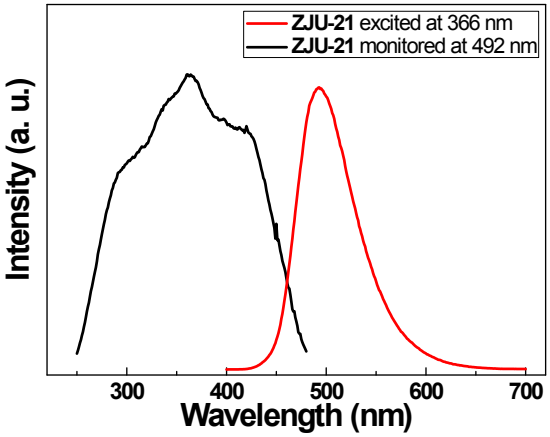
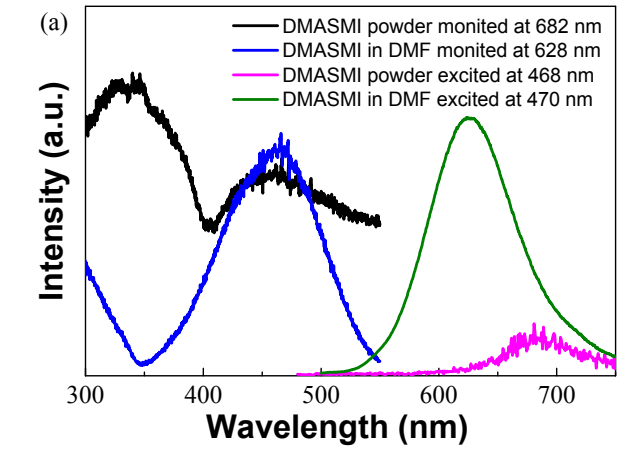


Fig. S4 Excitation and emission spectra of the **ZJU-21** at room temperature.



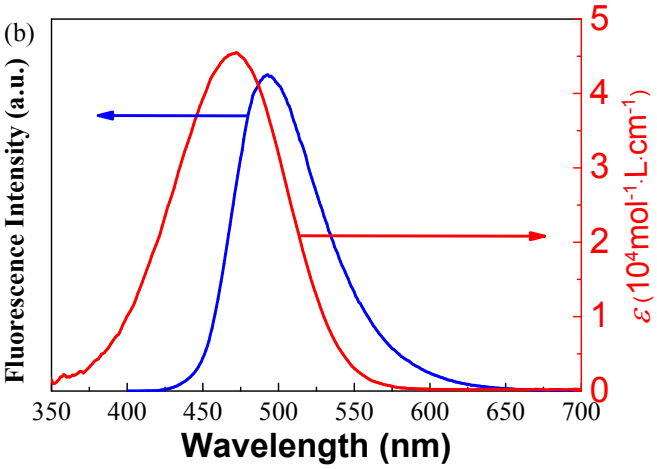


Fig. S5 (a) Excitation and emission spectra of DMASMI powder and DMASMI in DMF solutiou at room temperature. (b) Emission spectrum of **ZJU-21** (blue) and UV-vis absorption spectrum of DMASMI in DMF solution (red) at rom temperature.

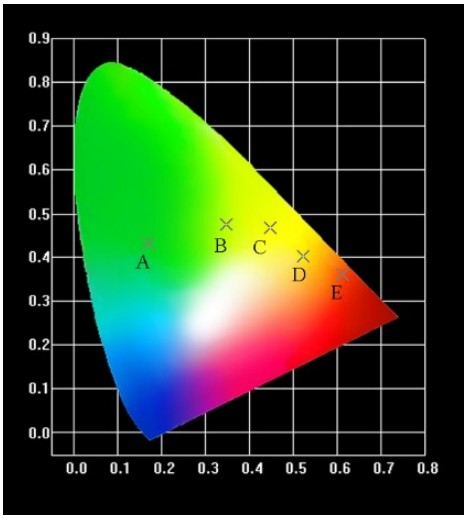


Fig. S6 CIE chromaticity diagram for **ZJU-21⊃DMASM** with increasing dye contents excited at 366 nm (A: 0%, B: 0.005%, C: 0.009%, D: 0.046%, E: 1.1%).

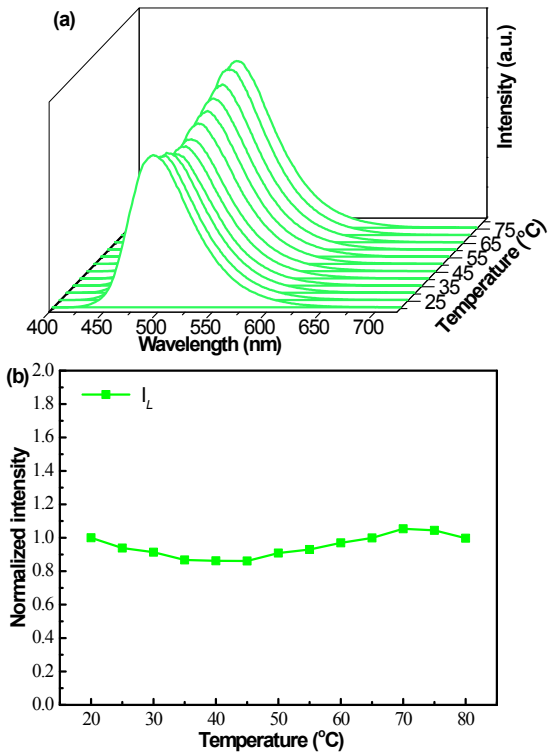
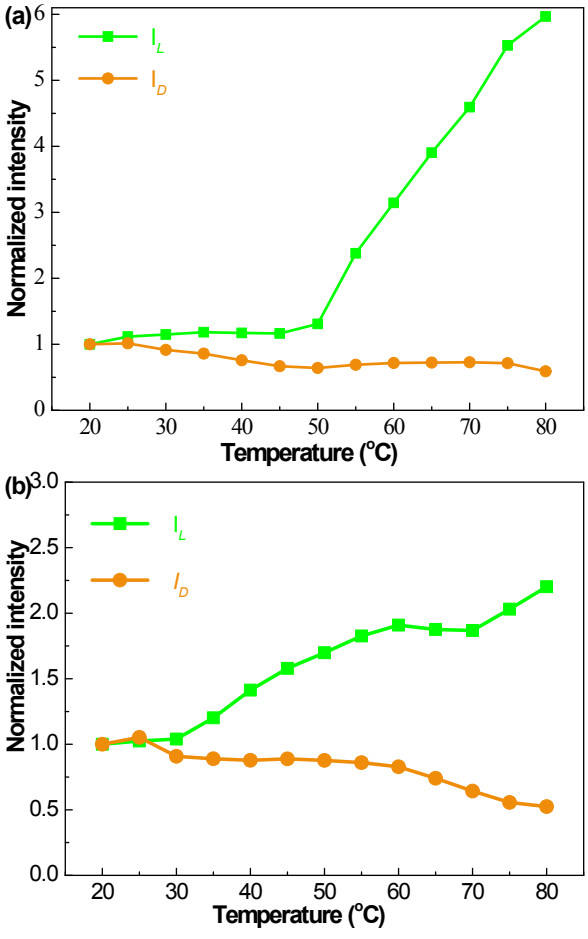


Fig. S7 (a) Emission spectra of **ZJU-21** between 20 and 80 °C excited at 366 nm. (b) Temperature-dependent intensity of the peak around 492 nm of **ZJU-21**.



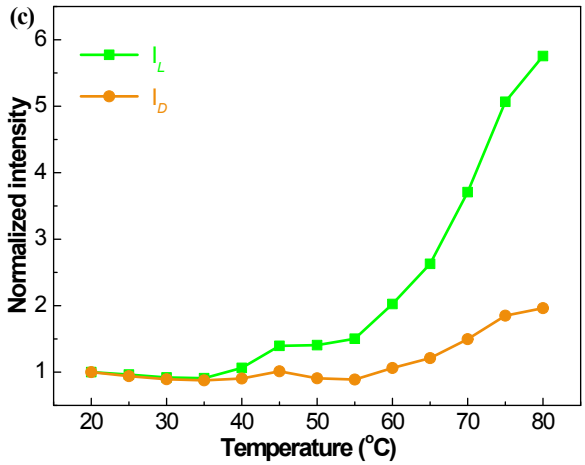


Fig. S8 Temperature dependence of normalized intensity of the rigidified linker and DMASM of composite (a) **1**, (b) **2**, and (c) **3** (**ZJU-21⊃DMASM** with three dye contents).

2. The calculation method of the amount of DMASM in MOFs.

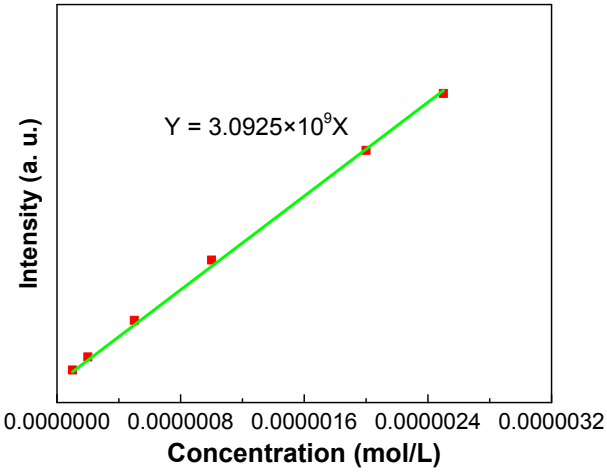


Fig. S9 The intensity-concentration diagram and the fitted curve for the DMASM solution in DMF.

The luminescent intensities of different concentration of DMASM in DMF solution were measured and repeated five times, and then the average values were calculated. Therefore, the relationship (Equation S1) for the intensity-concentration of DMASM in DMF solution could be obtained. Crystals (about 20 mg) of three different ZJU-21⊃DMASM composites were dissolved in 5 mL DMF solution containing 10 μL HCl (12 mol L^{-1}) to become clear solution. The luminescent intensity of the solution was measured, and the concentration was calculated through Equation S1.

$$Y = 3.0925\times10^{9} X \quad \text{(S1)}$$

Y – the luminescent intensity;

X – the DMASM concentration.

The contents of DMAMS in four different ZJU-21⊃DMASM composites were calculated to be 0.046, 0.009, 0.005 and 1.1%, respectively.