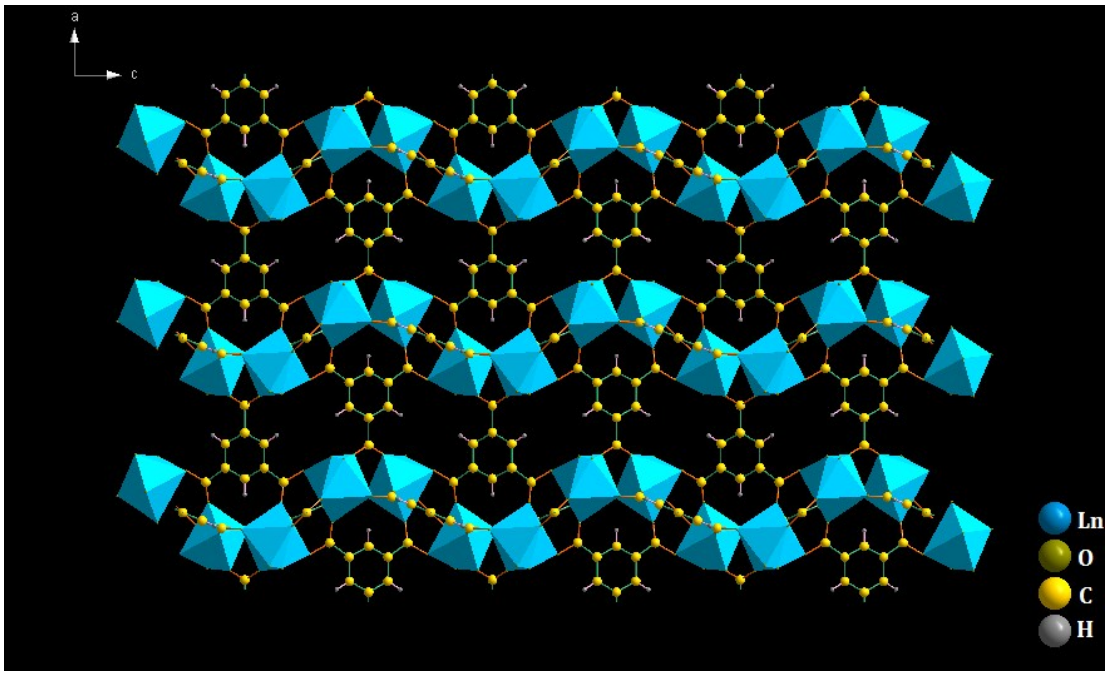
Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

A lanthanide metal–organic framework (MOF-76) for adsorbing dyes and fluorescence detecting aromatic pollutants

Xiao Lian, Bing Yan*

Department of Chemistry, Tongji University, Siping Road 1239, Shanghai 200092, China



Scheme S1. The structure and typical coordination environment of MOF-76(Ln).

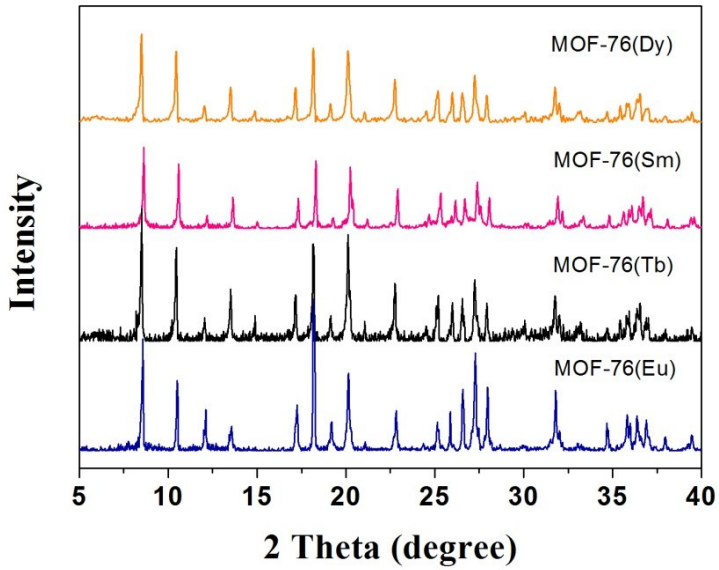


Fig. S1 PXRD pattern of the as-synthesized MOF-76(Eu), MOF-76(Tb), MOF-76(Sm) and MOF-76(Dy).

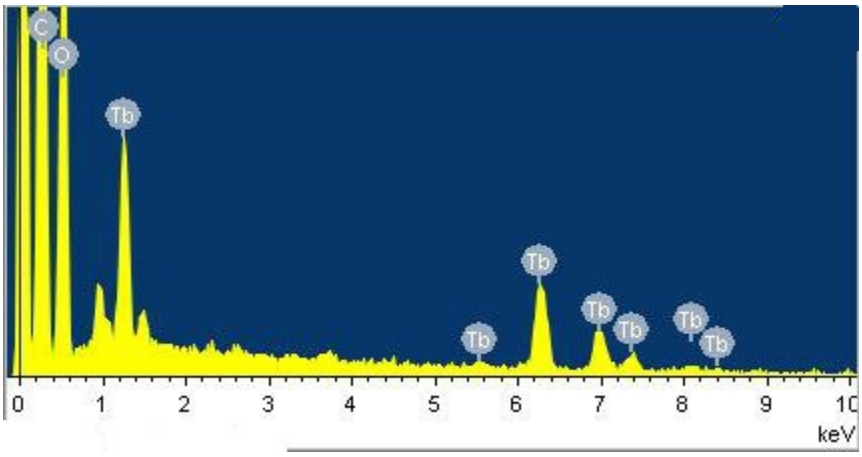


Fig. S2 Energy dispersive analysis by X-rays (EDX) spectroscopy of MOF-76(Tb).

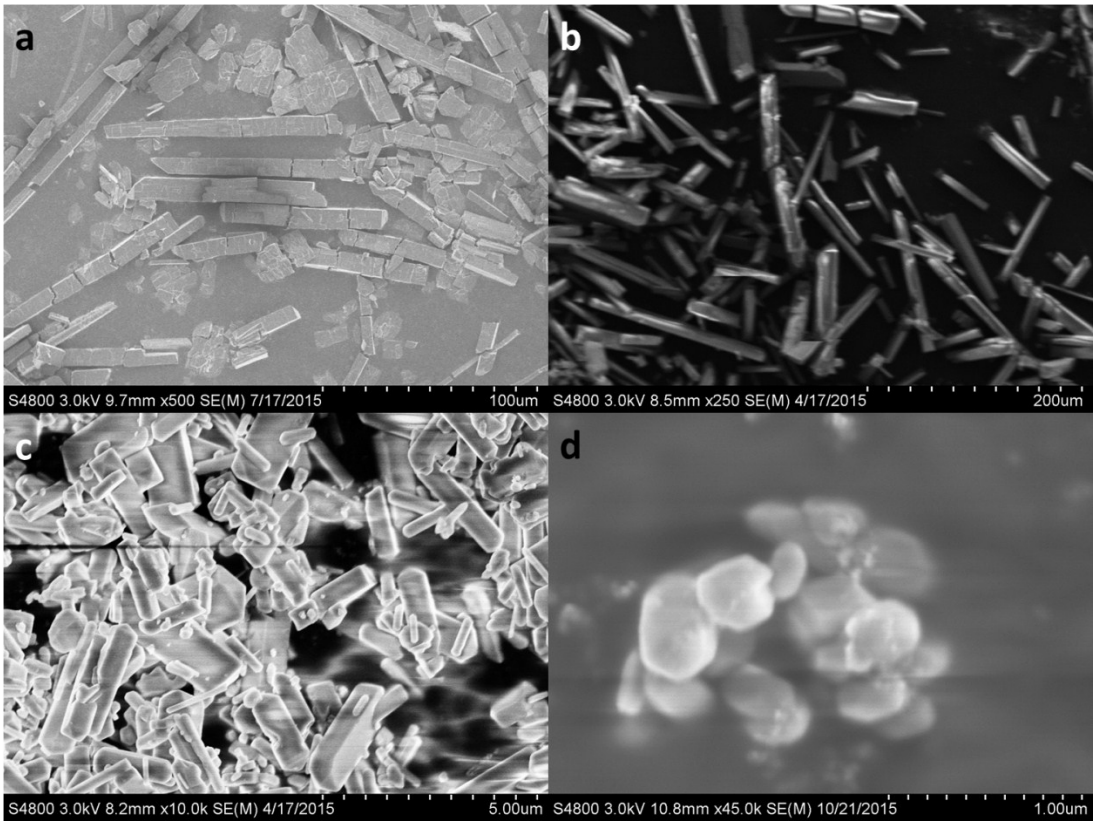


Fig. S3 The selected SEM images of materials **1** (a-b), **2** (c) and **3** (d).

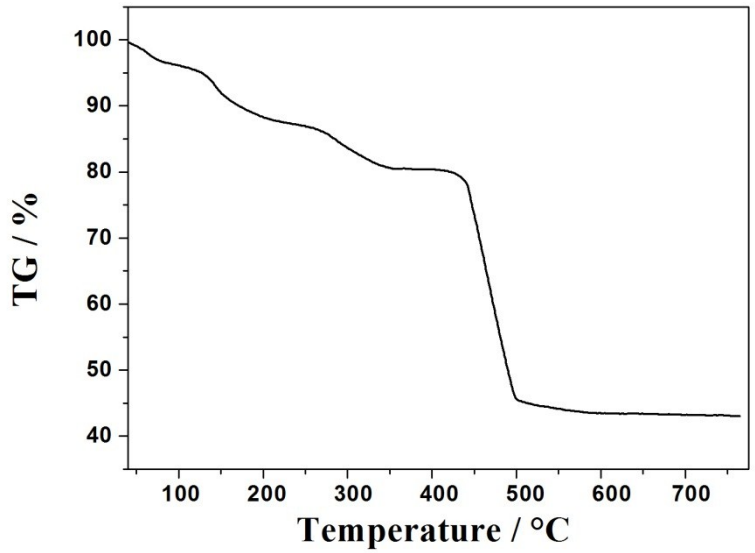


Fig. S4 Thermal gravimetric analysis (TGA) of MOF-76(Tb).

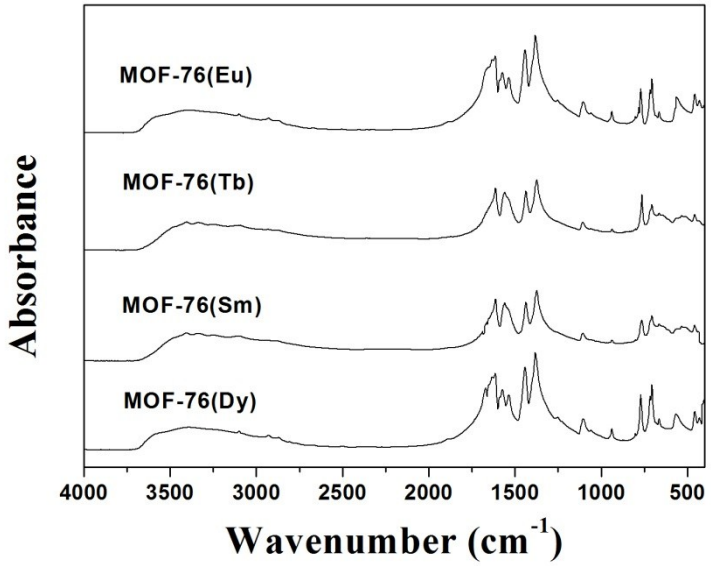


Fig. S5 Fourier transform infrared spectra (FT-IR) of MOF-76(Eu), MOF-76(Tb), MOF-76(Sm) and MOF-76(Dy).

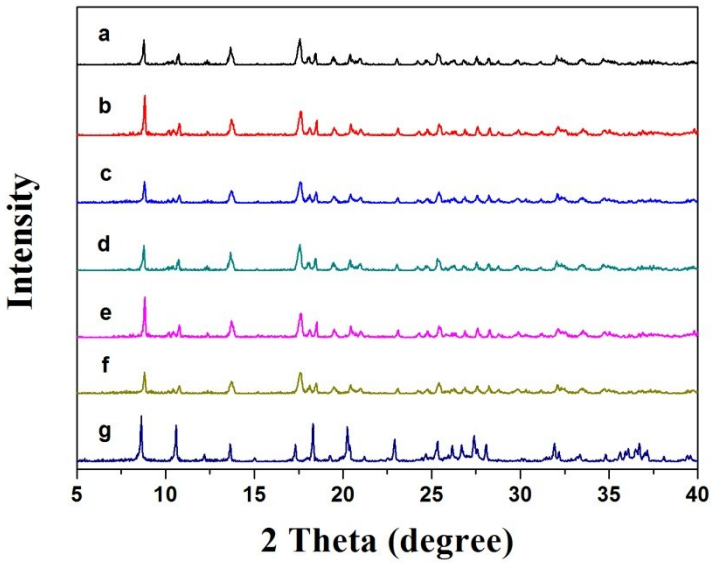


Fig. S6 (a-f) PXRD patterns of the materials **3** after soaked in different dye soultions (methyl orange, methylene blue, rhodamine B, crystal violet, semixylenol orange, and basic red 2) for 48 h; (g) PXRD pattern of the original materials **3**.

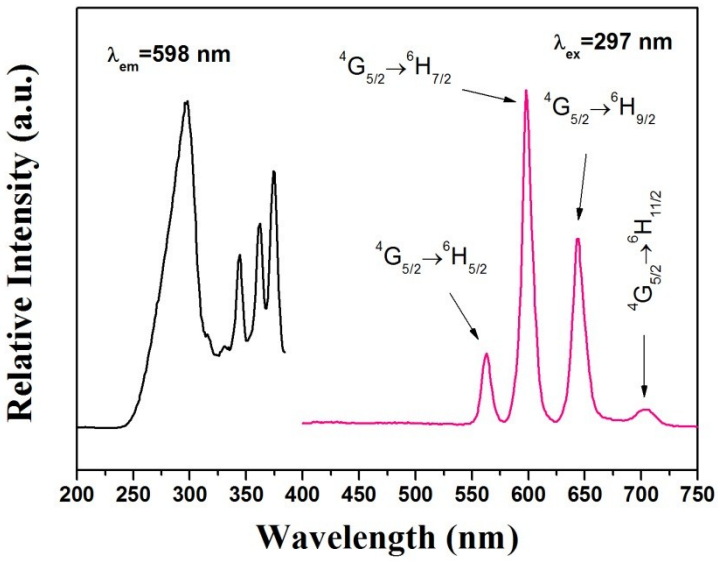


Fig. S7 Excitation spectrum and emission spectrum of MOF-76(Sm).

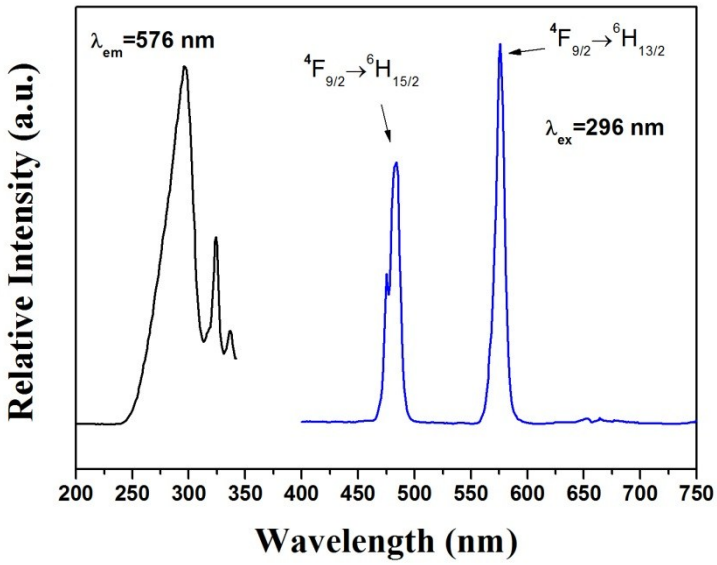


Fig. S8 Excitation spectrum and emission spectrum of MOF-76(Dy).

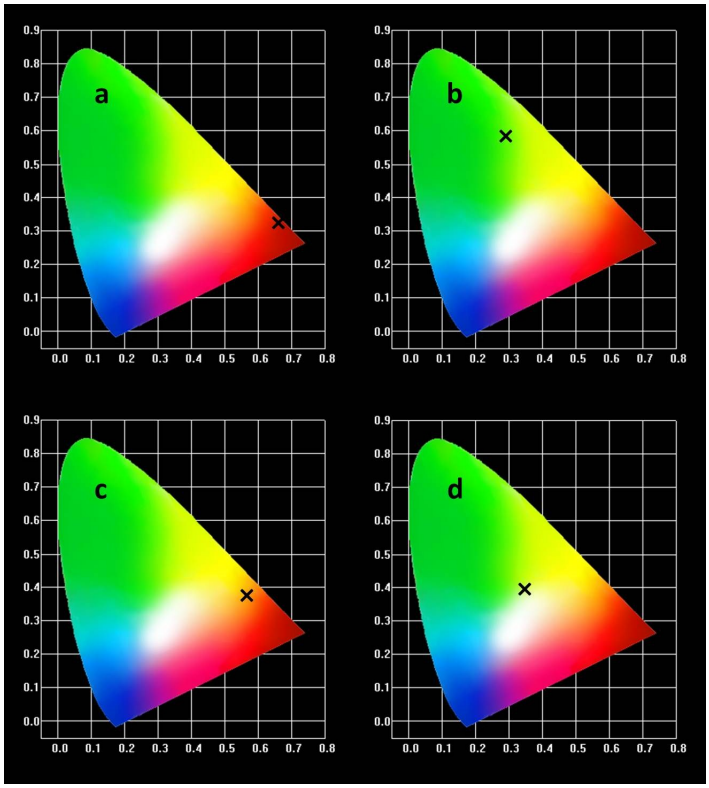


Fig. S9 CIE chromaticity diagram of (a) MOF-76(Eu); (b) MOF-76(Tb); (c) MOF-76(Sm); (d) MOF-76(Dy).

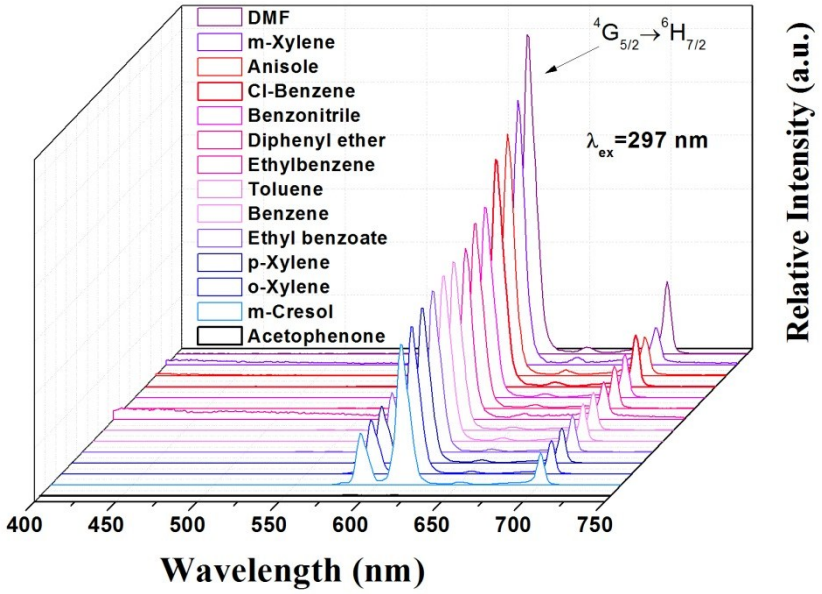


Fig. S10 Emission spectra of MOF-76(Eu) introduced into various pure BTEX solvents when excited at 297 nm.

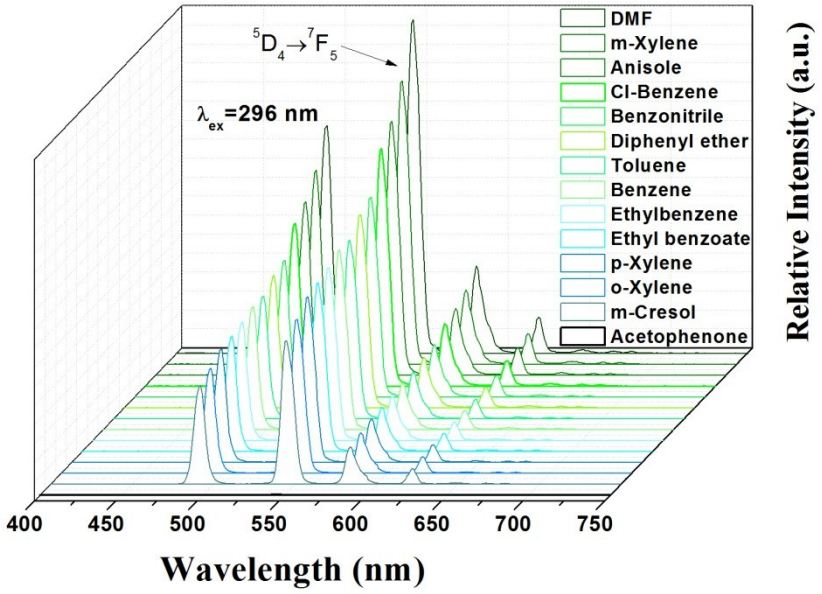


Fig. S11 Emission spectra of MOF-76(Tb) introduced into various pure BTEX solvents when excited at 296 nm.

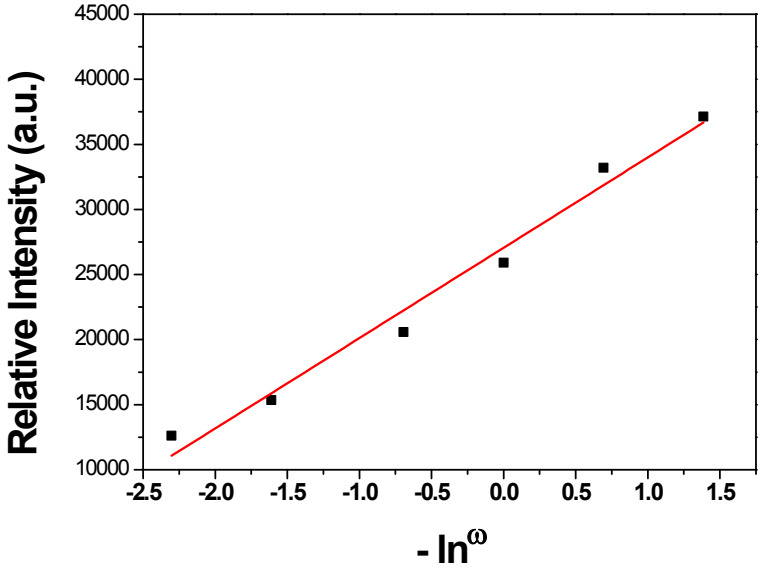


Fig. S12 The fitting curve of the emission intensity (545 nm) of MOF-76(Tb) vs. acetophenone content.

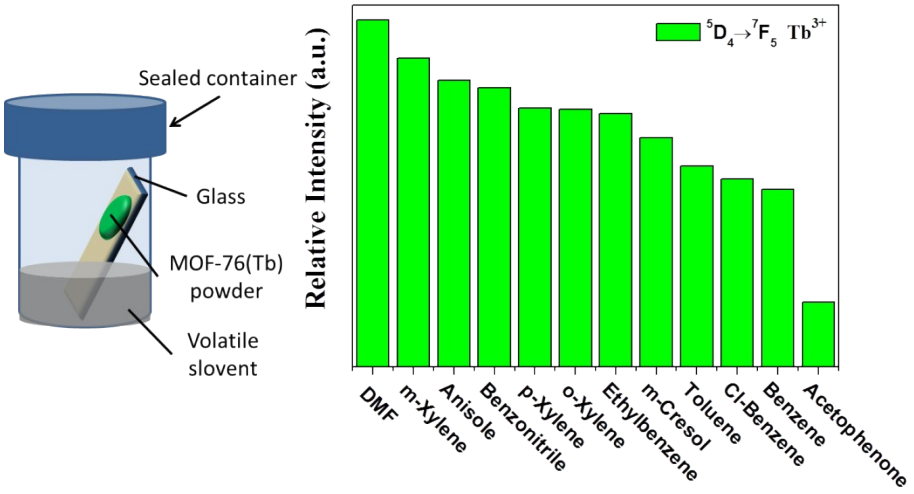


Fig. S13 The setup for sensing BTEX volatiles (left); the $_5D^4 \rightarrow {}_7F^5$ transition intensity ratios from the emission spectra of MOF-76(Tb) after exposed to various volatile BTEX solvents for 1 h, and the excite wavelength is 296 nm (right).

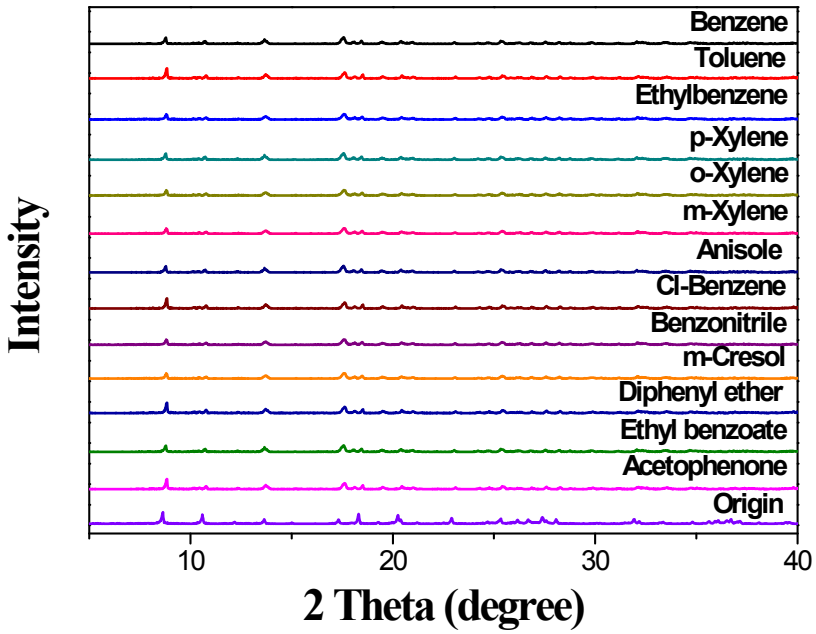


Fig. S14 PXRD patterns of the MOF-76(Tb) treated by various BTEX solvents.

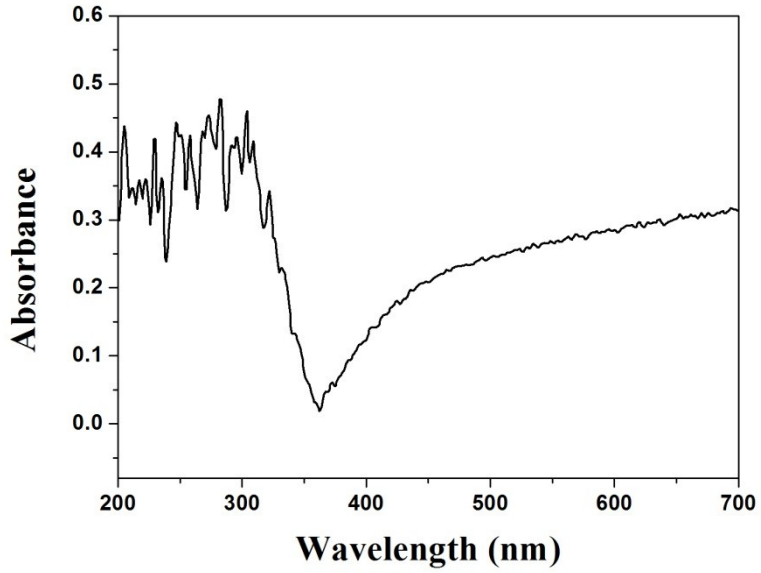


Fig. S15 Ultraviolet diffuse-reflectance spectra of 1,3,5-benzenetricarboxylic acid.

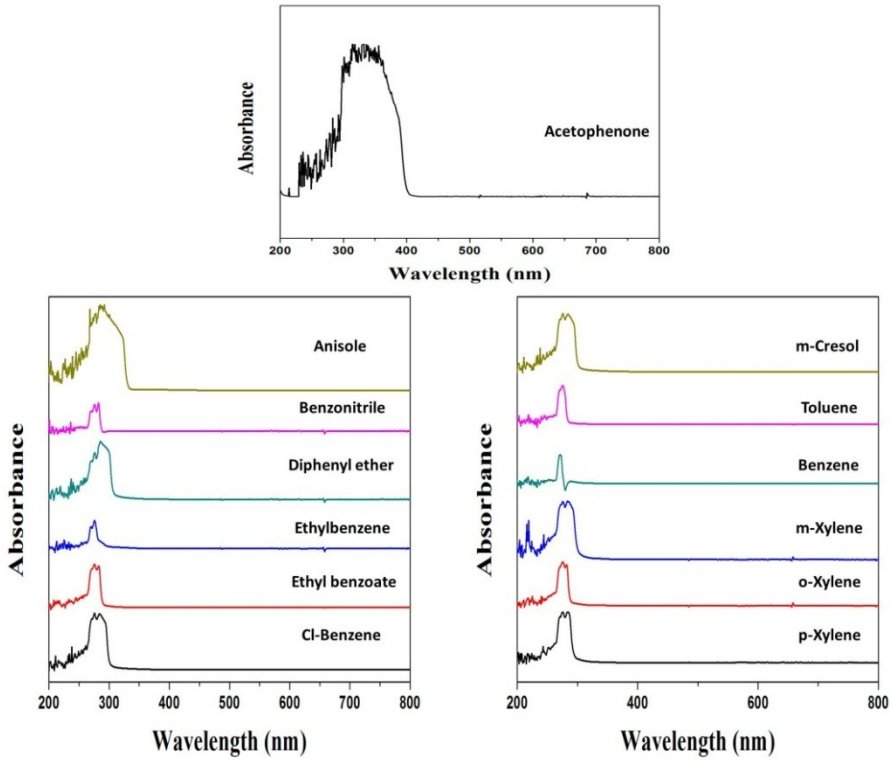


Fig. S16 UV–vis absorption spectroscopy of different BTEX slovents.

Table S1. The luminescent data of MOF-76(Ln) materials.

	Lifetime (μs)	*Efficiency* (%)	*Excitation wavelength* (nm)
MOF-76(Eu)	1082	55.6	297
MOF-76(Tb)	1719	72.3	296
MOF-76(Sm)	204	16.7	297
MOF-76(Dy)	231	17.1	296

Table S2. Responses of luminescence lifetimes of MOF-76(Tb) towards various BTEX solvents.

BTEX solvents	*Lifetime* (μs)
Benzene	1586
Toluene	1569
Ethylbenzene	1503
p-Xylene	1523
o-Xylene	1506
m-Xylene	1556
Anisole	1593
Cl-Benzene	1540
Benzonitrile	1521
m-Cresol	1561
Diphenyl ether	1515
Ethyl benzoate	1494
Acetophenone	1518