Electronic Supplementary Information for Dalton Transactions

Supporting Information

Highly Efficient Luminescent Hybrid Materials Covalently Linking with Europium(III) Complexes *Via* a Novel Fluorinated β-Diketonate Ligand: Synthesis, Characterization and Photo physical Properties

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Fig. S1 ^{1}H NMR spectrum of the ligand HBBPPF.

Fig. S2 ^{13}C NMR spectrum of the ligand HBBPPF.

Fig. S3 Thermo gravimetric curve for (1) $Eu(BBPPF)_3(DDXPO)$ and (2) $Eu(BBPPF\text{-}Si)_3(DDXPO)$/MCM-41.

Fig. S4 ^{1}H NMR spectrum of the ligand SiBBPPF-Na.

Fig. S5 Solid-state ^{29}Si NMR spectra of MCM-41.

Fig. S6 FT-IR spectra of (a) SiBBPPF-Na and (b) $Eu(SiBBPPF)_3(DDXPO)$/MCM-41.

Fig. S7 N_2 adsorption-desorption isotherms for complex **2**.

Fig. S8 DLS particle size distribution curve of **2**.

Fig. S9 UV absorption spectra of DDXPO, HBBPPF and the complex (1) $Eu(BBPPF)_3(DDXPO)$ in acetonitrile solution ($c = 2 \times 10^{-5}$ M),. All spectra are normalized to a constant intensity at the maximum.

Fig. S10 Experimental luminescence decay profiles of (**1**) $Eu(BBPPF)_3(DDXPO)$ and (**2**) $Eu(BBPPF\text{-}Si)_3(DDXPO)$/MCM-41 monitored around 612 nm and excited at their maximum emission wave lengths.

Fig. S11 CIE (*x*,*y*) chromaticity diagram showing the emission colour coordinates of complexes **1** and **2**.

Fig. S12 Room-temperature emission spectrum of DDXPO (a), UV-vis absorption spectra of HBBPPF (b), room-temperature emission spectrum of HBBPPF (c), 77 K phosphorescence spectra of $Gd(BBPPF)_3(H_2O)(C_2H_5OH)$ (d), 77 K phosphorescence spectra of $Gd(DDXPO)(NO_3)_3$ (e); All spectra are in solid state and normalized to a constant intensity at the maximum.

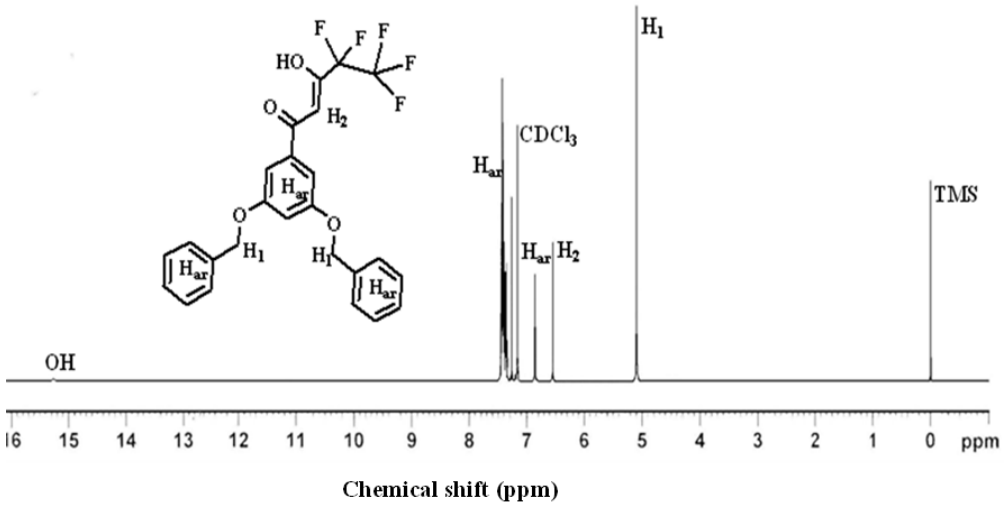
Fig. S13 Phosphorescence spectra of (a) $Gd(SiBBPPF)_3(H_2O)(C_2H_5OH)$ and (b) $Gd(BBPPF)_3(H_2O)(C_2H_5OH)$ at 77K.

Fig. S14 Schematic energy level diagram and energy transfer processes for complex **1**. S_1 represents the first excited singlet state and T_1 represents the first excited triplet state.

Table S1. FT-IR data of SiBBPPF-Na and complex **2**.

Determination of absolute quantum yield

The Xe-arc lamp was used to excite the samples placed in the sphere. Samples were prepared by drop casting the material placed between two quartz cover slips. The quantum yield was determined by comparing the spectral intensities of the lamp and the sample emission as reported in the literature. Using this experimental setup and the integrating sphere system,[1] the solid-state quantum yield of thin film of the standard green OLED material tris-8-hydroxyquinolinolato aluminum (Alq_3) was determined to be 0.19,[2] which is consistent with previously reported values. Each sample was measured several times under slightly different experimental conditions. The estimated error for quantum yields is (±10%).[3]



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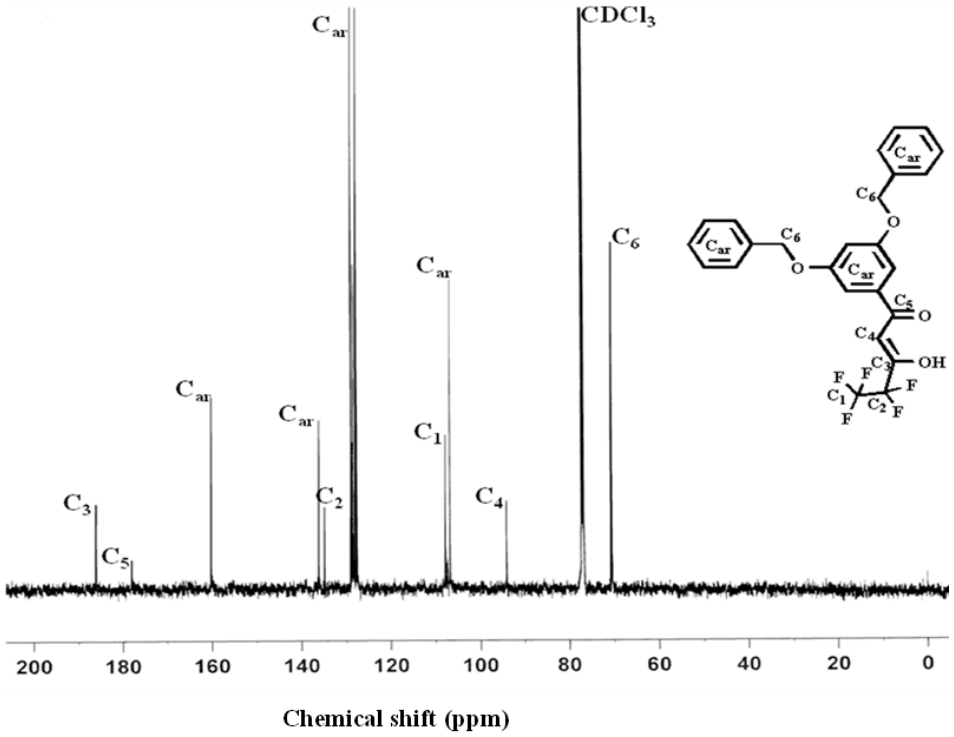
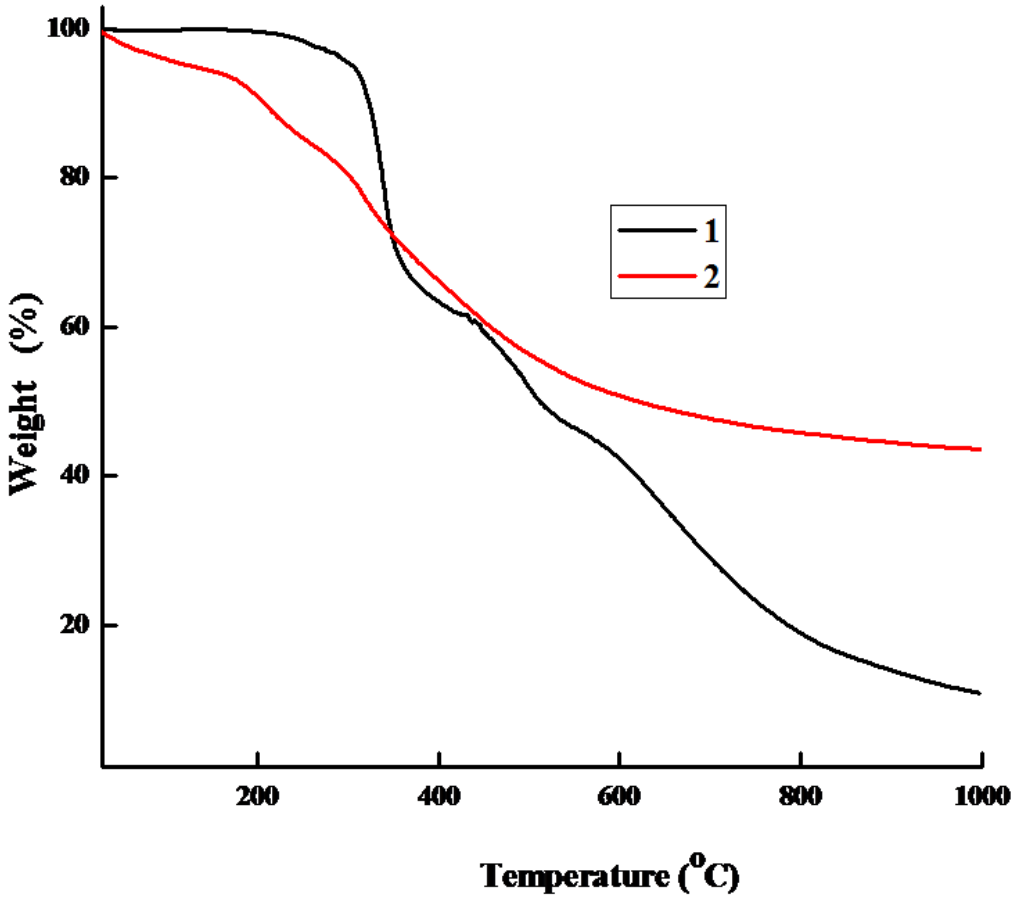


Fig. S2 ^{13}C NMR spectrum of the ligand HBBPPF.



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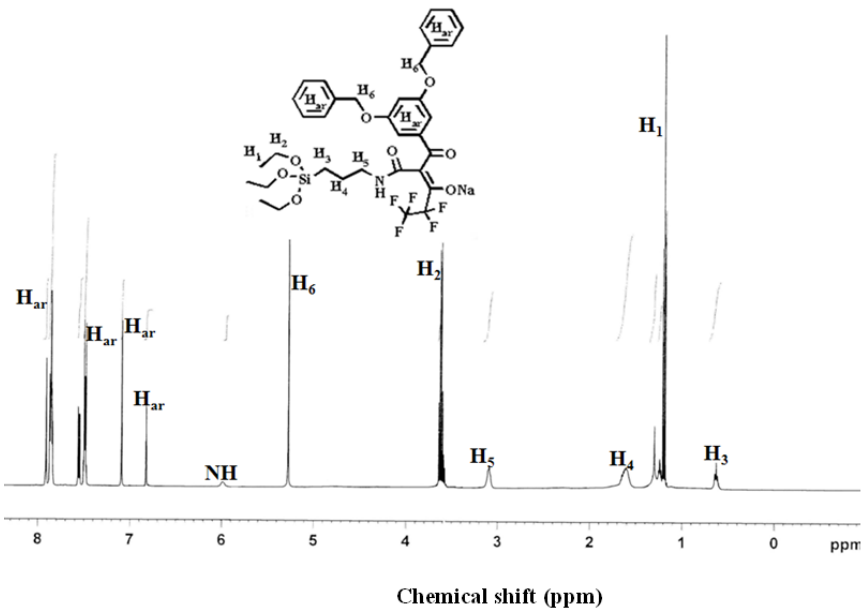


Fig. S4 ^{1}H NMR spectrum of the ligand SiBBPPF-Na.

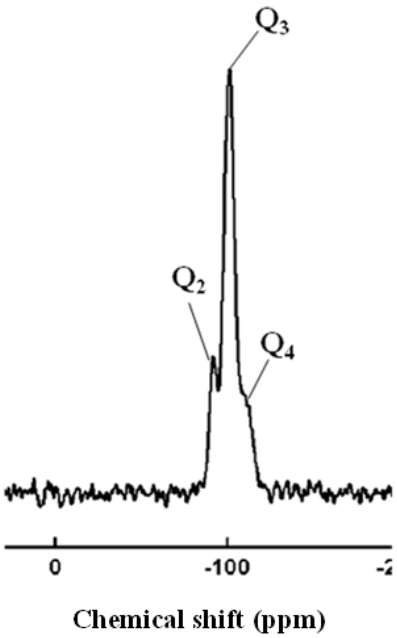


Fig. S5 Solid-state ^{29}Si NMR spectra of MCM-41.

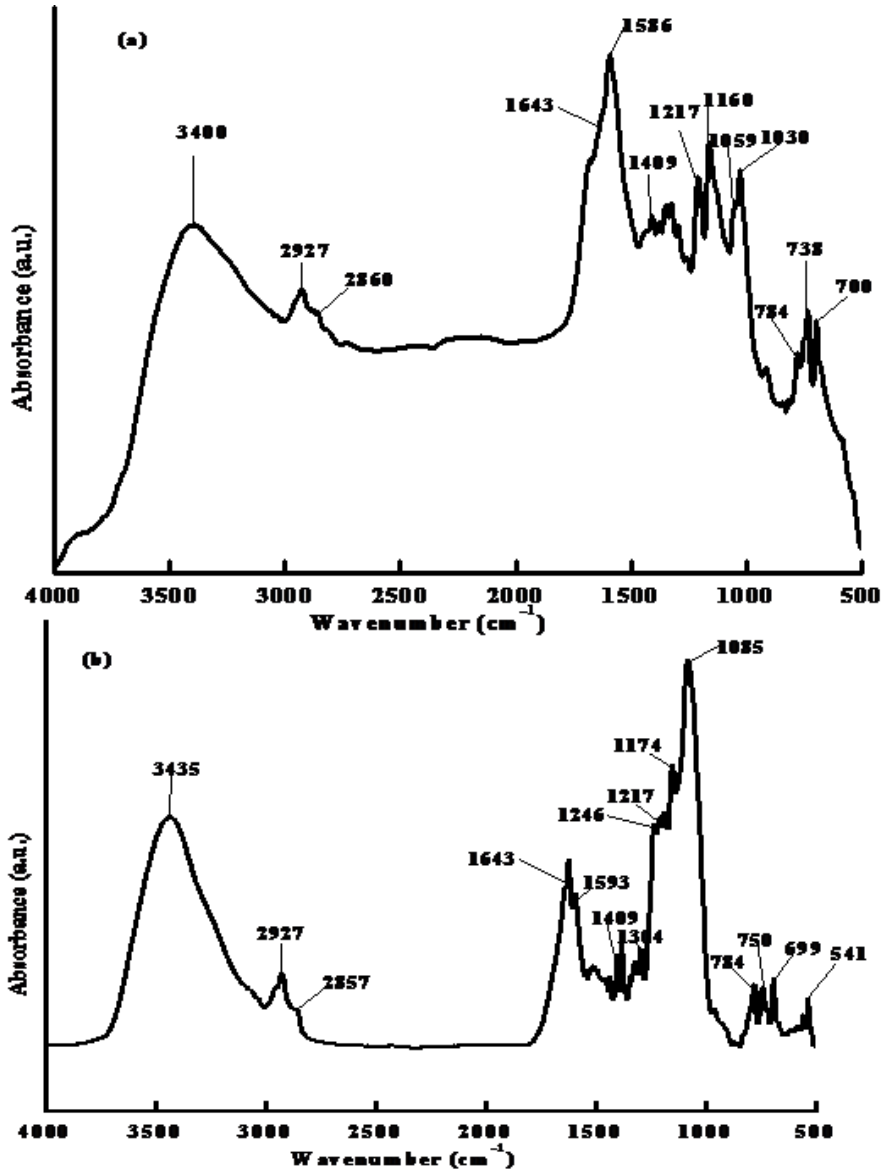


Fig. S6 FT-IR spectra of (a) SiBBPPF-Na and (b) $Eu(SiBBPPF)_3(DDXPO)$/MCM-41.

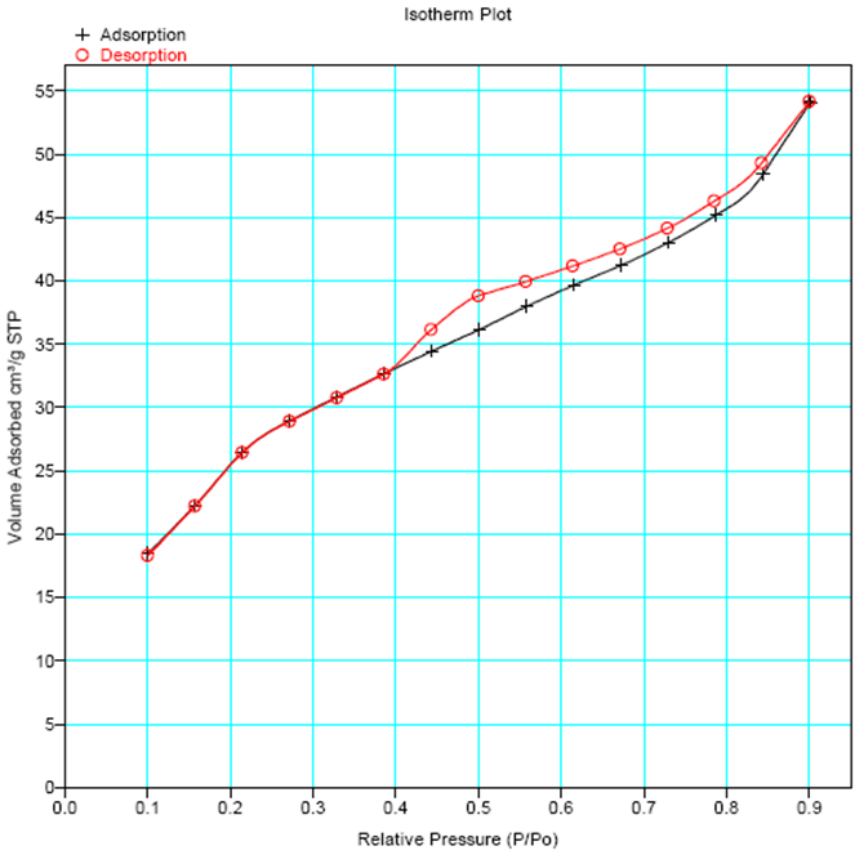


Fig. S7 N_2 adsorption-desorption isotherms for complex **2**.

			Diam. (nm)	% Intensity	Width (nm)
Z-Average (d.nm):	7865	Peak 1:	39.37	100.0	2.609
PdI:	0.096	Peak 2:	0.000	0.0	0.000
Intercept:	0.913	Peak 3:	0.000	0.0	0.000
Result quality :	Good				

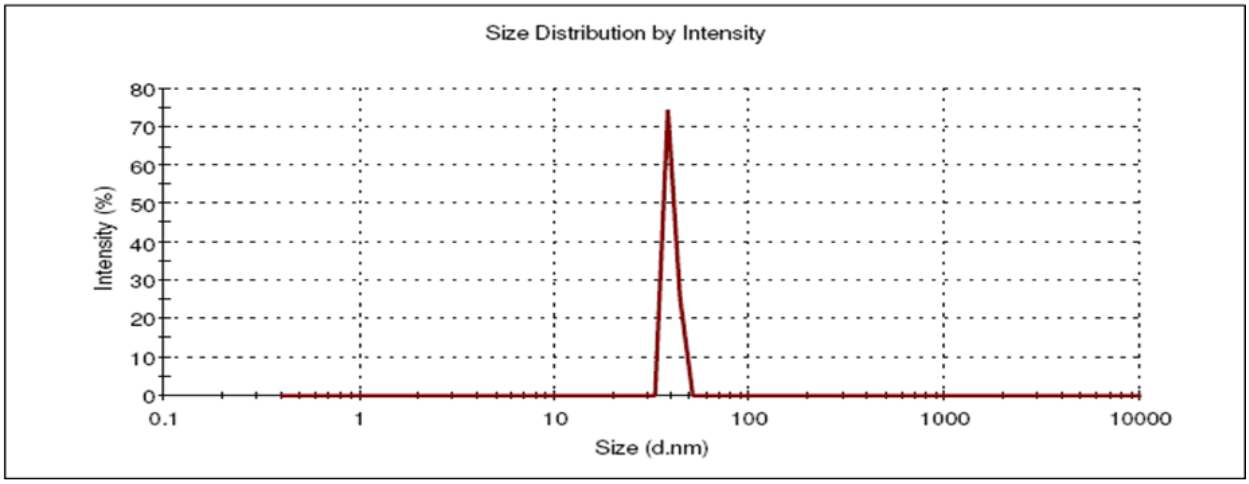
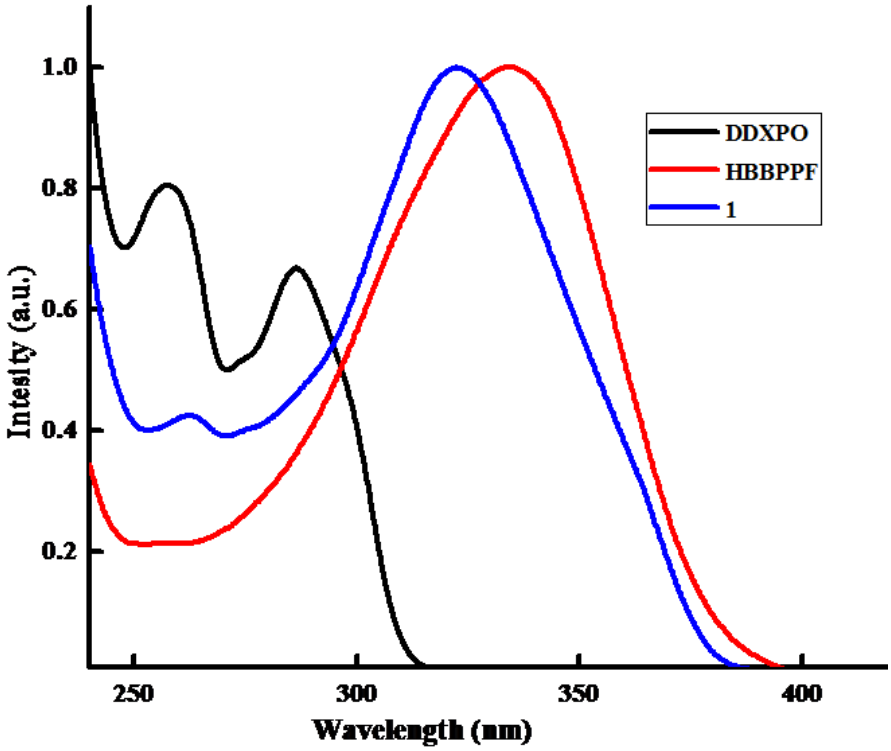


Fig. S8 DLS particle size distribution curve of **2**.



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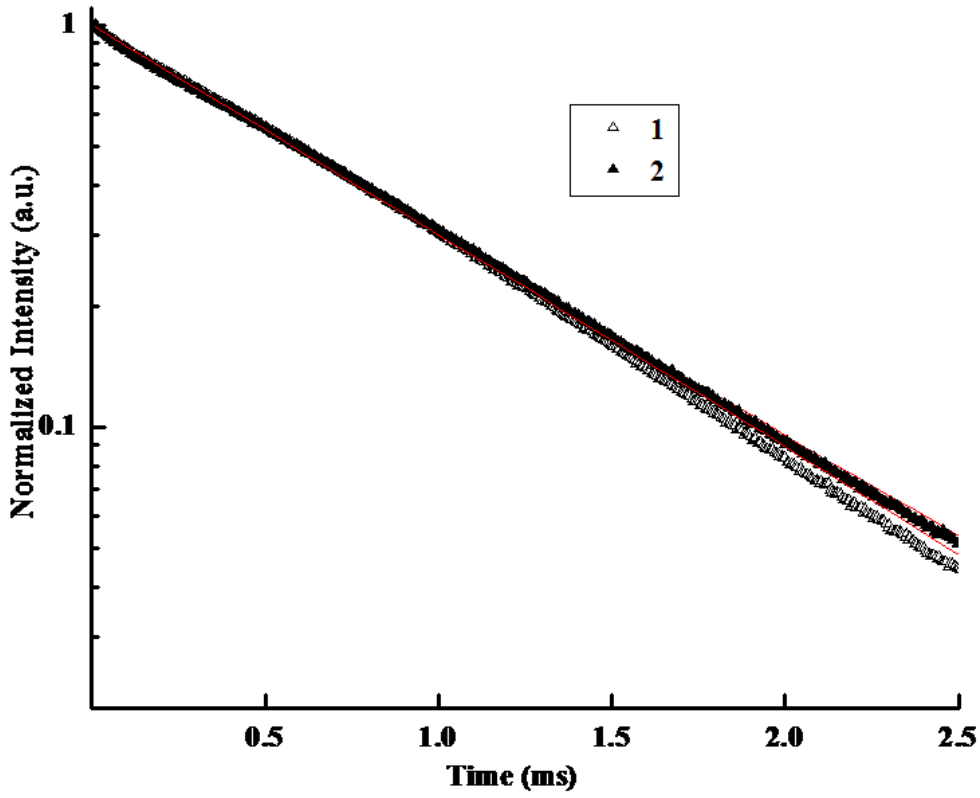

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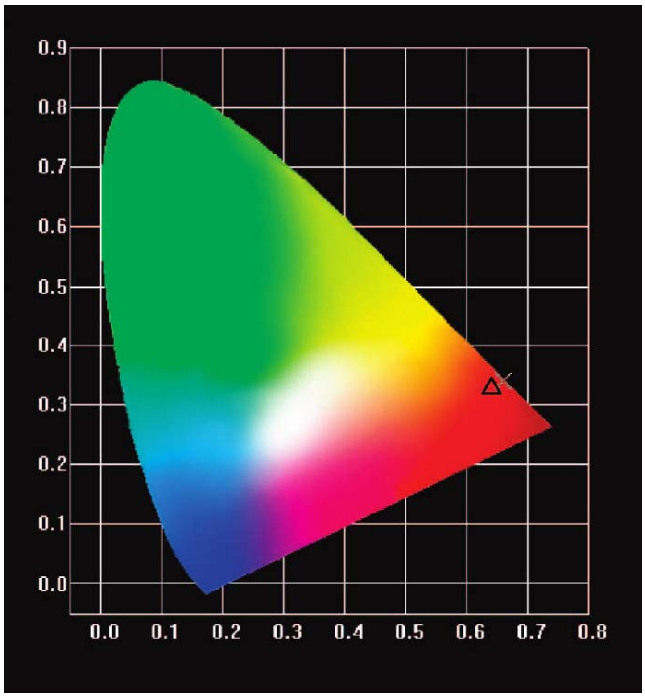

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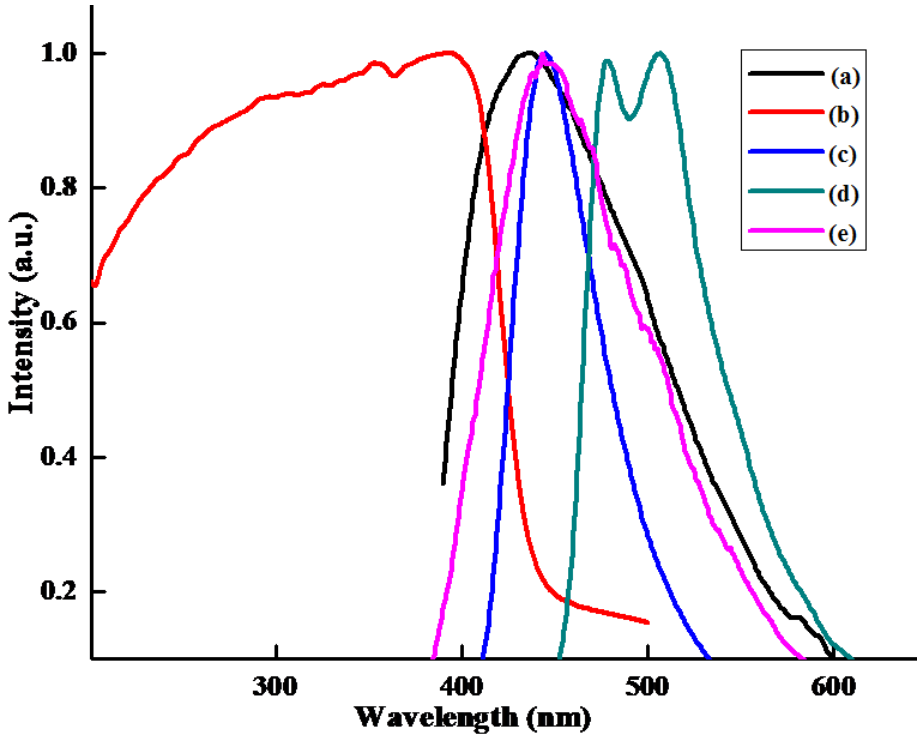

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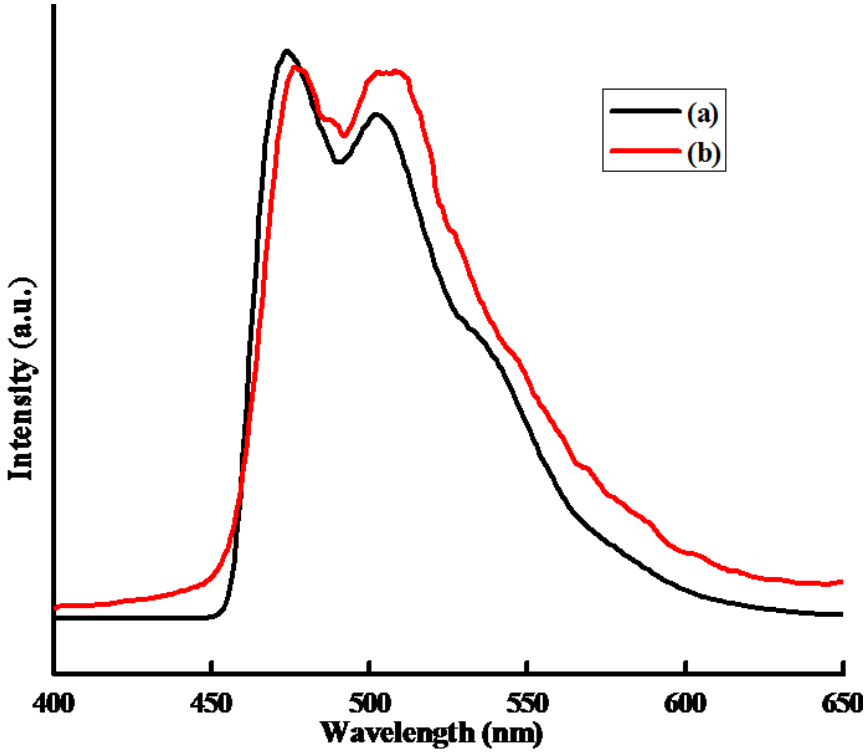

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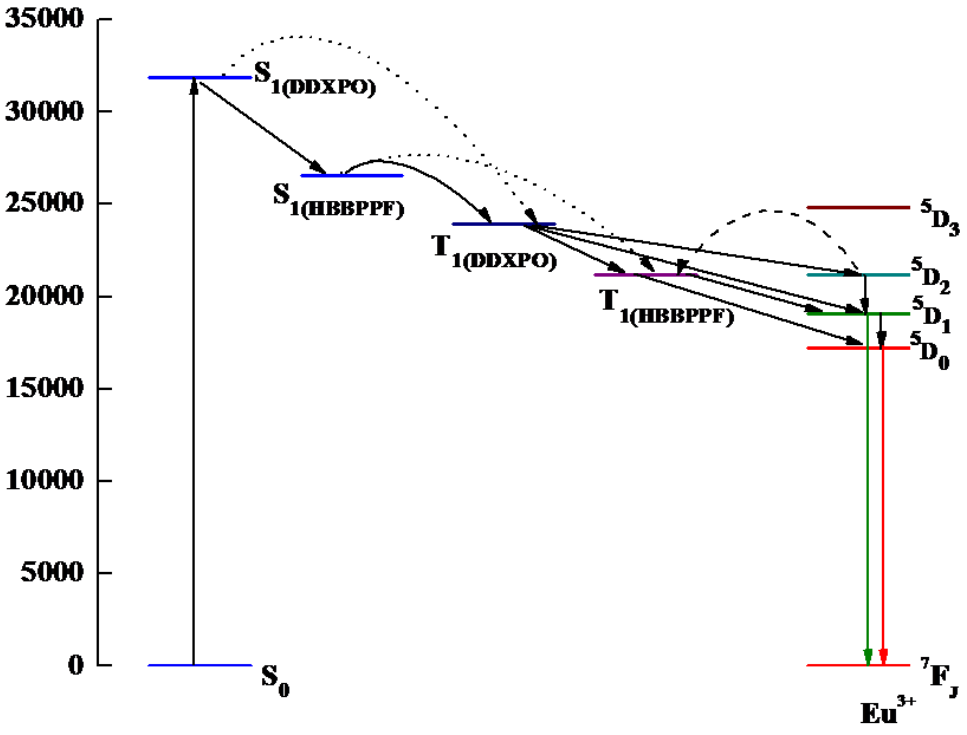

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Table S1 Wave numbers (cm^{-1}) observed in FT-IR spectra of SiBBPP-Na and $Eu(SiBBPP)_3(XPO)$/MCM-41 (**2**) and the respective vibrational assignments.

SiBBPPF-Na	**2**	Description
3400	3435	υ(NH)
2927	2927	υ($\mathbf{C}_{\mathbf{sp^3}}$ -H)
1643	1643	υ(C=O)
1586	1593	υ(C=O)
1409	1409	δ NH
1217	1217	υ(C-Si)
1059	1059	υ(Si-O-Si)

References

1 M. S. Wrighton, D. S. Ginley and D. L. Morse, *J.Phys.Chem.*, 1974, **78**, 2229.

2 (a) M. Colle, J. Gmeiner, W. Milius, H. Hillebrecht and W. Brütting, *Adv. Funct. Mater*., 2003, ***13***, 108; (b) N. S. SaleeshKumar, S. Varghese, N. P. Rath and S. Das, *J. Phys. Chem. C*, 2008, **112**, 8429.

3 S. V. Eliseeva, O. V. Kotova, F. Gumy, S. N. Semenov, V. G. Kessler, L. S. Lepnev, J. -C. G. Bünzli, N. P. Kuzmina, *J. Phys. Chem. A*, 2008, **112**, 3614.