# *Electronic Supplementary Information*

## Luminescent Modulation, Near White Light Emission, Selective Luminescence Sensing, and Anticounterfeit via a Series of Ln-MOFs with π-Conjugated and Uncoordinated Lewis Basic Triazolyl Ligand

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# Contents

**Section S1. Materials and General Methods**. All materials were purchased commercially and used directly without any treatment. Thermogravimetric analysis (TGA) was performed on a NETZSCH STA 449C equipment under a $N_2$ atmosphere (10 °C $min^{-1}$). Powder X-ray diffraction (PXRD) was carried out on a Bruker D8 ADVANCE powder X-ray diffractometer with Cu-Kα radiation (λ=1.5418 Å) at room temperature. Fourier transform infrared (FT-IR) spectroscopy was recorded as KBr pellets on an EQUINOX55 FT-IR spectrometer in 4000-400 $cm^{-1}$. Elemental analyses (C, H, and N) were obtained with a PerkinElmer 2400C elemental analyzer. Luminescent spectra were determined on an Edinburgh FLS920 fluorescence spectrometer. UV-vis spectroscopic data were collected on a Hitachi U-3310 spectrometer. The quantum efficiency was tested by an integrating sphere on a FluoroMax-4 spectrophotometer.

**Table S1.** Selected bond lengths (Å) and bond angles (°) for **1-Eu**, **1-Tb** and **1-Gd**.

| **1-Eu** | | | |
|---|---|---|---|
| Eu(1)-Eu(2) | 4.0710(4) | Eu(2)-O(4)#3 | 2.5059(17) |
| Eu(1)-O(7)#1 | 2.3347(18) | Eu(2)-O(12)#4 | 2.4327(19) |
| Eu(1)-O(1) | 2.5994(18) | Eu(2)-O(5) | 2.4424(17) |
| Eu(1)-O(5) | 2.5453(18) | Eu(2)-O(3)#3 | 2.3848(19) |
| Eu(1)-O(10)#1 | 2.3615(19) | Eu(2)-O(11)#4 | 2.4309(19) |
| Eu(1)-O(2) | 2.4748(19) | O(7)-Eu(1)#4 | 2.3346(18) |
| Eu(1)-O(6) | 2.5601(18) | O(8)-Eu(2)#4 | 2.3188(18) |
| Eu(1)-O(13) | 2.412(2) | O(4)-Eu(2)#3 | 2.5059(17) |
| Eu(1)-N(3)#2 | 2.571(2) | O(12)-Eu(2)#1 | 2.4329(19) |
| Eu(1)-O(14) | 2.378(3) | O(3)-Eu(2)#3 | 2.3849(19) |
| Eu(2)-O(9) | 2.3050(18) | O(10)-Eu(1)#4 | 2.3616(18) |
| Eu(2)-O(8)#1 | 2.3189(18) | O(11)-Eu(2)#1 | 2.4309(19) |
| Eu(2)-O(1) | 2.4257(17) | N(3)-Eu(1)#2 | 2.571(2) |
| O(7)#1-Eu(1)-Eu(2) | 64.65(5) | O(14)-Eu(1)-O(13) | 144.10(9) |
| O(7)#1-Eu(1)-O(1) | 76.43(6) | O(14)-Eu(1)-N(3)#2 | 88.98(12) |
| O(7)#1-Eu(1)-O(5) | 81.27(6) | O(9)-Eu(2)-Eu(1) | 104.77(4) |
| O(7)#1-Eu(1)-O(10)#1 | 82.05(7) | O(9)-Eu(2)-O(8)#1 | 81.93(7) |
| O(7)#1-Eu(1)-O(6) | 129.43(6) | O(9)-Eu(2)-O(1) | 141.66(6) |
| O(7)#1-Eu(1)-O(13) | 80.45(8) | O(9)-Eu(2)-O(4)#3 | 74.15(6) |
| O(7)#1-Eu(1)-N(3)#2 | 152.05(7) | O(9)-Eu(2)-O(12)#4 | 121.97(6) |
| O(7)#1-Eu(1)-O(14) | 86.33(11) | O(9)-Eu(2)-O(5) | 78.22(6) |
| O(1)-Eu(1)-Eu(2) | 34.48(4) | O(9)-Eu(2)-O(3)#3 | 126.76(6) |
| O(5)-Eu(1)-Eu(2) | 34.47(4) | O(9)-Eu(2)-O(11)#4 | 88.87(7) |
| O(5)-Eu(1)-O(1) | 65.03(6) | O(8)#1-Eu(2)-Eu(1) | 68.37(5) |
| O(5)-Eu(1)-O(6) | 51.07(5) | O(8)#1-Eu(2)-O(1) | 77.40(6) |
| O(5)-Eu(1)-N(3)#2 | 124.07(6) | O(8)#1-Eu(2)-O(4)#3 | 77.83(6) |
| O(10)#1-Eu(1)-Eu(2) | 146.70(5) | O(8)#1-Eu(2)-O(12)#4 | 149.01(6) |

| | | | |
|---|---|---|---|
| O(10)#1-Eu(1)-O(1) | 139.62(6) | O(8)#1-Eu(2)-O(5) | 88.13(6) |
| O(10)#1-Eu(1)-O(5) | 144.13(6) | O(8)#1-Eu(2)-O(3)#3 | 79.26(7) |
| O(10)#1-Eu(1)-O(2) | 129.77(7) | O(8)#1-Eu(2)-O(11)#4 | 154.76(6) |
| O(10)#1-Eu(1)-O(6) | 125.28(7) | O(1)-Eu(2)-Eu(1) | 37.35(4) |
| O(10)#1-Eu(1)-N(3)#2 | 70.33(7) | O(1)-Eu(2)-O(4)#3 | 130.73(6) |
| O(10)#1-Eu(1)-O(14) | 71.75(9) | O(1)-Eu(2)-O(12)#4 | 71.69(6) |
| O(2)-Eu(1)-Eu(2) | 75.43(4) | O(1)-Eu(2)-O(5) | 69.24(6) |
| O(2)-Eu(1)-O(1) | 51.33(6) | O(1)-Eu(2)-O(11)#4 | 121.94(6) |
| O(2)-Eu(1)-O(5) | 85.22(6) | O(4)#3-Eu(2)-Eu(1) | 145.86(4) |
| O(2)-Eu(1)-O(6) | 71.43(6) | O(12)#4-Eu(2)-Eu(1) | 85.34(5) |
| O(2)-Eu(1)-N(3)#2 | 72.05(7) | O(12)#4-Eu(2)-O(4)#3 | 124.96(6) |
| O(6)-Eu(1)-Eu(2) | 79.87(4) | O(12)#4-Eu(2)-O(5) | 79.09(6) |
| O(6)-Eu(1)-O(1) | 94.50(6) | O(5)-Eu(2)-Eu(1) | 36.14(4) |
| O(6)-Eu(1)-N(3)#2 | 73.17(7) | O(5)-Eu(2)-O(4)#3 | 150.42(6) |
| O(13)-Eu(1)-Eu(2) | 99.77(5) | O(3)#3-Eu(2)-Eu(1) | 113.33(5) |
| O(13)-Eu(1)-O(1) | 69.60(7) | O(3)#3-Eu(2)-O(1) | 80.50(6) |
| O(13)-Eu(1)-O(5) | 133.84(7) | O(3)#3-Eu(2)-O(4)#3 | 53.37(6) |
| O(13)-Eu(1)-O(2) | 72.85(7) | O(3)#3-Eu(2)-O(12)#4 | 97.49(7) |
| O(13)-Eu(1)-O(6) | 143.12(7) | O(3)#3-Eu(2)-O(5) | 149.14(6) |
| O(13)-Eu(1)-N(3)#2 | 87.48(8) | O(3)#3-Eu(2)-O(11)#4 | 87.76(7) |
| N(3)#2-Eu(1)-Eu(2) | 142.84(5) | O(11)#4-Eu(2)-Eu(1) | 136.87(5) |
| N(3)#2-Eu(1)-O(1) | 122.65(6) | O(11)#4-Eu(2)-O(4)#3 | 77.05(6) |
| O(14)-Eu(1)-Eu(2) | 104.40(10) | O(11)#4-Eu(2)-O(12)#4 | 53.75(6) |
| O(14)-Eu(1)-O(1) | 138.85(10) | O(11)#4-Eu(2)-O(5) | 113.02(6) |
| O(14)-Eu(1)-O(5) | 75.69(9) | Eu(2)-O(1)-Eu(1) | 108.17(7) |
| O(14)-Eu(1)-O(2) | 138.91(9) | Eu(2)-O(5)-Eu(1) | 109.39(6) |
| O(14)-Eu(1)-O(6) | 68.23(8) | | |
| **1-Tb** | | | |
| Tb(2)-O(6) | 2.308(2) | Tb(1)-O(11) | 2.280(2) |
| Tb(2)-O(10)#1 | 2.531(2) | Tb(1)-O(13) | 2.406(2) |
| Tb(2)-O(9) | 2.531(2) | Tb(1)-O(1) | 2.496(2) |
| Tb(2)-O(3) | 2.590(2) | Tb(1)-O(9) | 2.412(2) |
| Tb(2)-O(12) | 2.344(2) | Tb(1)-O(3) | 2.402(2) |
| Tb(2)-O(4) | 2.444(2) | Tb(1)-O(5) | 2.288(2) |
| Tb(2)-O(7) | 2.384(3) | Tb(1)-O(2) | 2.360(2) |
| Tb(2)-O(8) | 2.359(3) | Tb(1)-O(14)#1 | 2.409(2) |
| Tb(2)-N(3)#2 | 2.541(3) | O(6)-Tb(2)-O(10)#1 | 129.65(8) |
| O(6)-Tb(2)-O(9) | 81.33(8) | O(8)-Tb(2)-O(10)#1 | 68.37(9) |
| O(6)-Tb(2)-O(3) | 76.46(8) | O(8)-Tb(2)-O(9) | 75.90(10) |
| O(6)-Tb(2)-O(12) | 81.36(8) | O(8)-Tb(2)-O(3) | 138.59(11) |
| O(6)-Tb(2)-O(4) | 127.04(8) | O(8)-Tb(2)-O(4) | 139.14(10) |
| O(6)-Tb(2)-O(7) | 81.04(10) | O(8)-Tb(2)-O(7) | 144.11(10) |
| O(6)-Tb(2)-O(8) | 85.82(12) | O(8)-Tb(2)-N(3)#2 | 88.53(13) |
| O(6)-Tb(2)-N(3)#2 | 151.71(9) | N(3)#2-Tb(2)-O(3) | 123.52(8) |

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|---|---|---|---|
| O(6)-Tb(2)-C(23)#1 | 106.58(9) | O(11)-Tb(1)-O(13) | 120.97(8) |
| O(6)-Tb(2)-C(5)#3 | 101.61(9) | O(11)-Tb(1)-O(1) | 74.22(8) |
| O(10)#1-Tb(2)-O(3) | 94.85(7) | O(11)-Tb(1)-O(9) | 78.14(8) |
| O(10)#1-Tb(2)-N(3)#2 | 72.66(8) | O(11)-Tb(1)-O(3) | 142.08(8) |
| O(10)#1-Tb(2)-C(23)#1 | 25.33(8) | O(11)-Tb(1)-O(5) | 82.35(9) |
| O(10)#1-Tb(2)-C(5)#3 | 84.59(9) | O(11)-Tb(1)-O(2) | 127.42(8) |
| O(9)-Tb(2)-O(10)#1 | 51.46(7) | O(11)-Tb(1)-O(14)#1 | 87.24(8) |
| O(9)-Tb(2)-O(3) | 64.71(7) | O(13)-Tb(1)-O(1) | 125.04(8) |
| O(9)-Tb(2)-N(3)#2 | 123.97(8) | O(13)-Tb(1)-O(9) | 78.82(8) |
| O(12)-Tb(2)-O(10)#1 | 125.58(9) | O(13)-Tb(1)-O(14)#1 | 54.21(8) |
| O(12)-Tb(2)-O(9) | 144.40(8) | O(9)-Tb(1)-O(1) | 150.35(8) |
| O(12)-Tb(2)-O(3) | 139.03(8) | O(3)-Tb(1)-O(13) | 71.88(8) |
| O(12)-Tb(2)-O(4) | 129.78(9) | O(3)-Tb(1)-O(1) | 130.78(8) |
| O(12)-Tb(2)-O(7) | 73.07(10) | O(3)-Tb(1)-O(9) | 69.40(8) |
| O(12)-Tb(2)-O(8) | 72.01(10) | O(3)-Tb(1)-O(14)#1 | 122.75(8) |
| O(12)-Tb(2)-N(3)#2 | 70.53(9) | O(5)-Tb(1)-O(13) | 149.47(8) |
| O(4)-Tb(2)-O(10)#1 | 71.47(8) | O(5)-Tb(1)-O(1) | 77.72(8) |
| O(4)-Tb(2)-O(9) | 85.12(8) | O(5)-Tb(1)-O(9) | 88.27(8) |
| O(4)-Tb(2)-O(3) | 51.66(7) | O(5)-Tb(1)-O(3) | 77.71(8) |
| O(4)-Tb(2)-N(3)#2 | 72.53(9) | O(5)-Tb(1)-O(2) | 80.08(9) |
| O(7)-Tb(2)-O(10)#1 | 142.70(9) | O(5)-Tb(1)-O(14)#1 | 154.31(8) |
| O(7)-Tb(2)-O(9) | 133.82(8) | O(2)-Tb(1)-O(13) | 97.11(9) |
| O(7)-Tb(2)-O(3) | 69.77(8) | O(2)-Tb(1)-O(1) | 53.74(8) |
| O(7)-Tb(2)-O(4) | 72.54(9) | O(2)-Tb(1)-O(9) | 149.32(8) |
| O(7)-Tb(2)-N(3)#2 | 87.57(10) | O(2)-Tb(1)-O(3) | 80.38(8) |
| O(14)#1-Tb(1)-O(1) | 76.86(8) | O(2)-Tb(1)-O(14)#1 | 87.90(9) |
| O(14)#1-Tb(1)-O(9) | 112.53(8) | | |
| **1-Gd** | | | |
| Gd(1)-Gd(2) | 4.0680(5) | Gd(2)-O(12)#1 | 2.421(4) |
| Gd(1)-O(8)#1 | 2.545(4) | Gd(2)-O(2) | 2.506(4) |
| Gd(1)-O(3)#2 | 2.612(4) | Gd(2)-O(1) | 2.375(4) |
| Gd(1)-O(6) | 2.314(4) | Gd(2)-O(11)#1 | 2.425(4) |
| Gd(1)-O(10)#3 | 2.372(4) | Gd(2)-O(5) | 2.306(4) |
| Gd(1)-O(7)#1 | 2.574(4) | O(8)-Gd(1)#3 | 2.545(4) |
| Gd(1)-O(4)#2 | 2.472(4) | O(3)-Gd(1)#2 | 2.612(4) |
| Gd(1)-N(3)#4 | 2.556(5) | O(3)-Gd(2)#2 | 2.442(4) |
| Gd(1)-O(14) | 2.378(5) | O(10)-Gd(1)#1 | 2.372(4) |
| Gd(1)-O(15) | 2.412(5) | O(7)-Gd(1)#3 | 2.574(4) |
| Gd(2)-O(3)#2 | 2.442(4) | O(7)-Gd(2)#3 | 2.431(4) |
| Gd(2)-O(9) | 2.296(4) | O(12)-Gd(2)#3 | 2.421(4) |
| Gd(2)-O(7)#1 | 2.431(4) | O(4)-Gd(1)#2 | 2.472(4) |
| O(8)#1-Gd(1)-Gd(2) | 79.78(9) | O(11)-Gd(2)#3 | 2.425(4) |
| O(8)#1-Gd(1)-O(3)#2 | 94.63(13) | N(3)-Gd(1)#5 | 2.556(5) |
| O(8)#1-Gd(1)-O(7)#1 | 50.86(13) | O(15)-Gd(1)-O(4)#2 | 71.97(17) |

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|---|---|---|---|
| O(8)#1-Gd(1)-N(3)#4 | 73.09(15) | O(15)-Gd(1)-N(3)#4 | 88.16(18) |
| O(3)#2-Gd(1)-Gd(2) | 35.00(9) | O(3)#2-Gd(2)-Gd(1) | 37.84(9) |
| O(6)-Gd(1)-Gd(2) | 64.31(11) | O(3)#2-Gd(2)-O(2) | 130.35(13) |
| O(6)-Gd(1)-O(8)#1 | 129.00(15) | O(9)-Gd(2)-Gd(1) | 104.87(10) |
| O(6)-Gd(1)-O(3)#2 | 76.51(14) | O(9)-Gd(2)-O(3)#2 | 142.31(14) |
| O(6)-Gd(1)-O(10)#3 | 81.92(15) | O(9)-Gd(2)-O(7)#1 | 77.76(14) |
| O(6)-Gd(1)-O(7)#1 | 81.06(15) | O(9)-Gd(2)-O(12)#1 | 120.75(15) |
| O(6)-Gd(1)-O(4)#2 | 126.47(15) | O(9)-Gd(2)-O(2) | 74.42(14) |
| O(6)-Gd(1)-N(3)#4 | 151.88(16) | O(9)-Gd(2)-O(1) | 127.13(15) |
| O(6)-Gd(1)-O(14) | 86.9(2) | O(9)-Gd(2)-O(11)#1 | 87.04(15) |
| O(6)-Gd(1)-O(15) | 81.00(19) | O(9)-Gd(2)-O(5) | 82.54(15) |
| O(10)#3-Gd(1)-Gd(2) | 146.23(10) | O(7)#1-Gd(2)-Gd(1) | 36.83(9) |
| O(10)#3-Gd(1)-O(8)#1 | 126.06(15) | O(7)#1-Gd(2)-O(3)#2 | 70.23(13) |
| O(10)#3-Gd(1)-O(3)#2 | 138.65(15) | O(7)#1-Gd(2)-O(2) | 150.38(14) |
| O(10)#3-Gd(1)-O(7)#1 | 144.57(15) | O(12)#1-Gd(2)-Gd(1) | 85.66(10) |
| O(10)#3-Gd(1)-O(4)#2 | 129.33(15) | O(12)#1-Gd(2)-O(3)#2 | 72.17(14) |
| O(10)#3-Gd(1)-N(3)#4 | 70.09(15) | O(12)#1-Gd(2)-O(7)#1 | 78.63(15) |
| O(10)#3-Gd(1)-O(14) | 71.60(18) | O(12)#1-Gd(2)-O(2) | 124.84(15) |
| O(10)#3-Gd(1)-O(15) | 73.22(17) | O(12)#1-Gd(2)-O(11)#1 | 53.20(14) |
| O(7)#1-Gd(1)-Gd(2) | 34.47(9) | O(2)-Gd(2)-Gd(1) | 145.83(10) |
| O(7)#1-Gd(1)-O(3)#2 | 65.42(12) | O(1)-Gd(2)-Gd(1) | 113.41(10) |
| O(4)#2-Gd(1)-Gd(2) | 75.63(10) | O(1)-Gd(2)-O(3)#2 | 80.09(14) |
| O(4)#2-Gd(1)-O(8)#1 | 71.84(15) | O(1)-Gd(2)-O(7)#1 | 149.82(14) |
| O(4)#2-Gd(1)-O(3)#2 | 50.98(13) | O(1)-Gd(2)-O(12)#1 | 97.78(16) |
| O(4)#2-Gd(1)-O(7)#1 | 85.41(14) | O(1)-Gd(2)-O(2) | 53.36(14) |
| O(4)#2-Gd(1)-N(3)#4 | 73.13(15) | O(1)-Gd(2)-O(11)#1 | 89.54(16) |
| N(3)#4-Gd(1)-Gd(2) | 143.57(11) | O(11)#1-Gd(2)-Gd(1) | 136.04(10) |
| N(3)#4-Gd(1)-O(3)#2 | 123.44(15) | O(11)#1-Gd(2)-O(3)#2 | 122.34(14) |
| N(3)#4-Gd(1)-O(7)#1 | 123.85(14) | O(11)#1-Gd(2)-O(7)#1 | 110.67(14) |
| O(14)-Gd(1)-Gd(2) | 105.35(17) | O(11)#1-Gd(2)-O(2) | 78.02(14) |
| O(14)-Gd(1)-O(8)#1 | 68.36(16) | O(5)-Gd(2)-Gd(1) | 67.94(11) |
| O(14)-Gd(1)-O(3)#2 | 140.31(19) | O(5)-Gd(2)-O(3)#2 | 77.26(14) |
| O(14)-Gd(1)-O(7)#1 | 76.64(18) | O(5)-Gd(2)-O(7)#1 | 88.33(15) |
| O(14)-Gd(1)-O(4)#2 | 139.18(17) | O(5)-Gd(2)-O(12)#1 | 149.27(15) |
| O(14)-Gd(1)-N(3)#4 | 86.9(2) | O(5)-Gd(2)-O(2) | 78.24(15) |
| O(14)-Gd(1)-O(15) | 144.02(18) | O(5)-Gd(2)-O(1) | 79.71(16) |
| O(15)-Gd(1)-Gd(2) | 99.60(13) | O(5)-Gd(2)-O(11)#1 | 155.88(15) |
| O(15)-Gd(1)-O(8)#1 | 142.72(17) | Gd(2)#2-O(3)-Gd(1)#2 | 107.16(14) |
| O(15)-Gd(1)-O(3)#2 | 68.89(15) | Gd(2)#3-O(7)-Gd(1)#3 | 108.71(15) |
| O(15)-Gd(1)-O(7)#1 | 133.59(16) | | |

**1-Eu:** #1 -x+1/2,y-1/2,-z+1/2; #2 -x+1,-y+1,-z+1; #3 -x+1,y,-z+1/2; #4 -x+1/2,y+1/2,-z+1/2; **1-Tb:** #1 -x+3/2,y-1/2,-z+1/2; #2 x,-y+1,z-1/2; #3 -x+1,y,-z+1/2; #4 -x+3/2,y+1/2,-z+1/2; #5 x,-y+1,z+1/2; **1-Gd:** #1 -x+1/2,y+1/2,-z+3/2; #2 -x+1,y,-z+3/2; #3 -x+1/2,y-1/2,-z+3/2; #4 x,-y+1,z+1/2; #5 x,-y+1,z-1/2;

**Table S2.** Summary of the quantum yields of the reported white-light-emission doped MOFs.

| Complex | Quantum yield | Ref. |
|---|---|---|
| $La_{0.6}Eu_{0.1}Tb_{0.3}$-BTPCA | 47.33 % | 1 |
| $Eu_{0.005}Tb_{0.995}$-BTPCA | 46.15 % | |
| $Eu_{0.01}Gd_{0.6015}Tb_{0.3885}$ | 36.49 % | **This work** |
| $Eu_{0.0855}Gd_{0.6285}Tb_{0.2860}$ | 22.4 % | 2 |
| HMA-$Tb_{10}Eu_1$ | 11.41 % | 3 |
| 0.5% $Eu^{3+}$-doped 2-Tb | 11.4 % | 4 |

**Table S3.** The quenching constants of **1-Eu** and reported MOFs for NB.

| Complex | Quenching Constants ($K_{SV}/M^{-1}$) | Ref. |
|---|---|---|
| [Cd(TPA)(DIB)](n) | $1.7 \times 10^4$ | 5 |
| $[Zn_2(4,4'\text{-nba})_2(1,4\text{-bib})_2]_n$ | $1.59 \times 10^4$ | 6 |
| $\{[Eu_2(L)_3 \cdot DMF \cdot H_2O] \cdot DMF \cdot H_2O\}_n$ | $1.5143 \times 10^4$ | **This work** |
| $\{MgL(H_2O)_2\}_n$ | $1.07 \times 10^4$ | 7 |
| $Ln_2(NSBPDC)_3(H_2O)_4] \cdot x(H_2O)$ | $6.5512 \times 10^3$ | 8 |
| $Zn_3(BTC)_2$: Eu(III) | $3.957 \times 10^3$ | 9 |
| $[Zn(H_2L^{2-})(H_2O)]_n$ | $3.26 \times 10^3$ | 10 |
| $\{[Zn(L)](DMF)_3\}_n$ | $2.875 \times 10^3$ | 11 |

**Table S4.** Results of ICP Analyses of $Eu^{3+}$.

| Samples | Concentration of $Eu^{3+}$ (ppb) |
|---|---|
| NB@$CH_3OH$ | 6.375 |
| Filter liquor of recycle **1-Eu** | 6.813 |

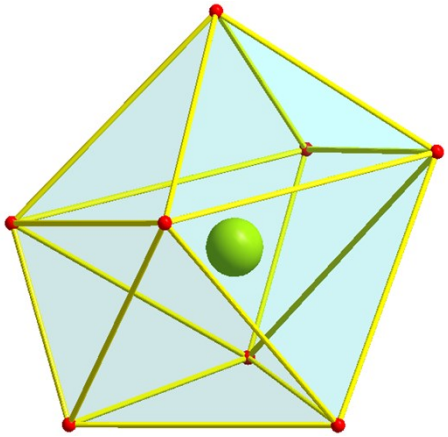


**Figure S1. (a)** A distorted trigondodecahedron geometry.

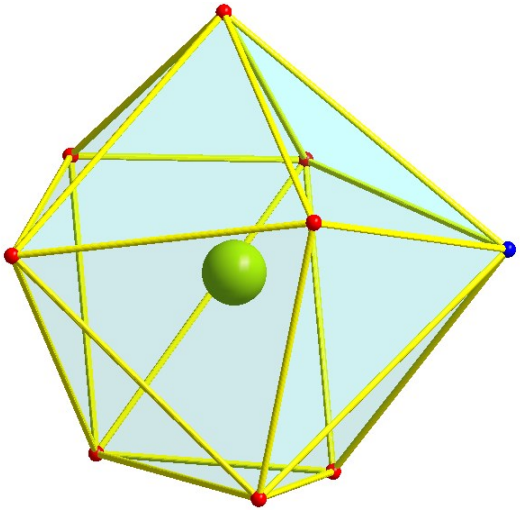


**Figure S1. (b)** A distorted tetrakaidecahedron geometry.

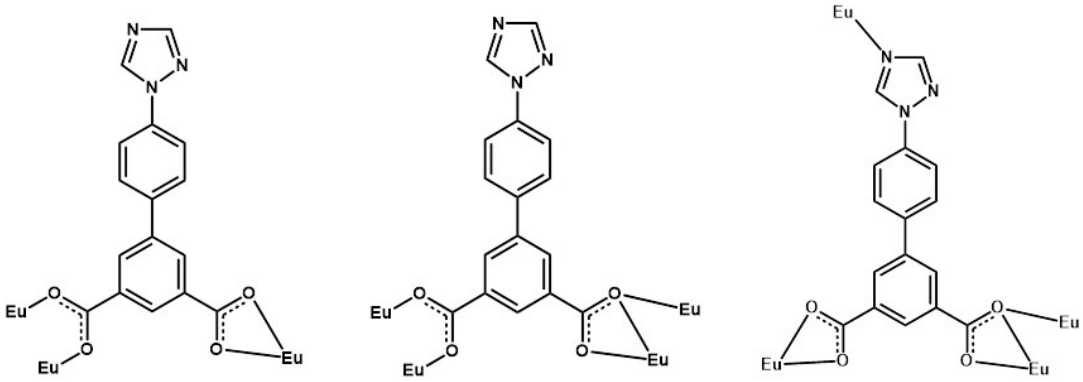



**Figure S2.** Three coordination modes of $L^{2-}$ in **1-Eu,** ($\eta^2\mu_2\chi^2$, $\eta^2\mu_1\chi^2$ and $\eta^2\mu_2\chi^3$).

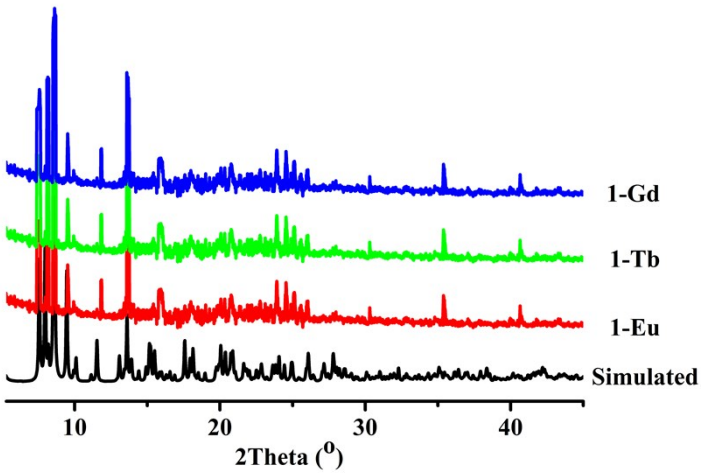



**Figure S3. PXRD** patterns of **1-Eu** simulated from the X-ray single-crystal structure and as-synthesized samples of **1-Eu**, **1-Tb** and **1-Gd**.

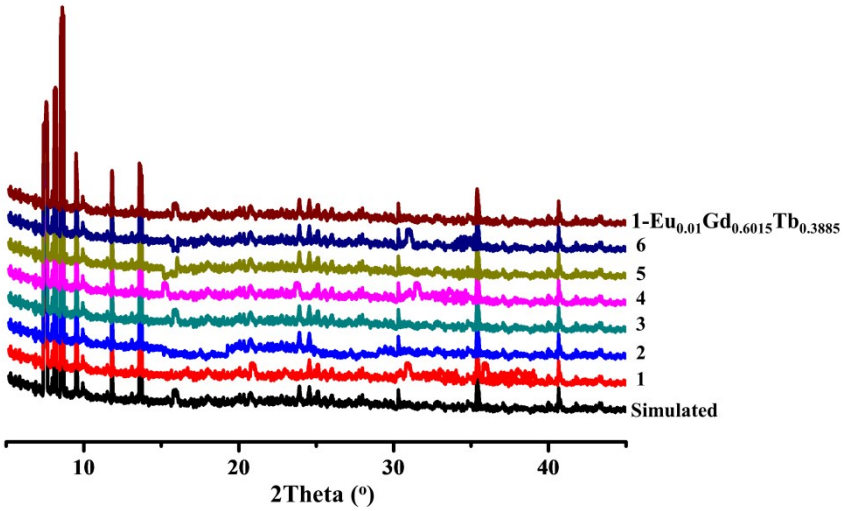



**Figure S4. PXRD** patterns of doped samples.

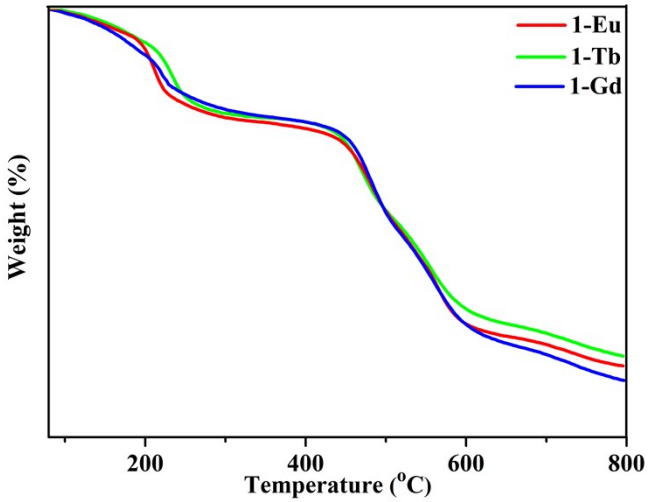



**Figure S5.** The **TGA** plots of **1-Eu**, **1-Tb** and **1-Gd** under $N_2$ environment.

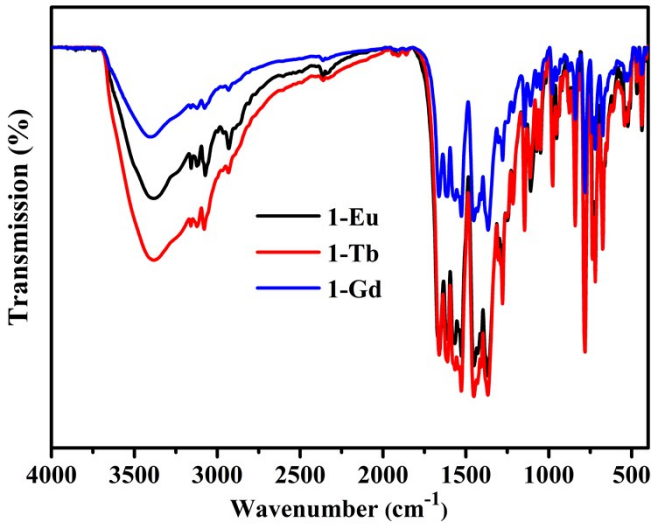



**Figure S6.** The **FT-IR** spectrometer of **1-Eu**, **1-Tb** and **1-Gd**.

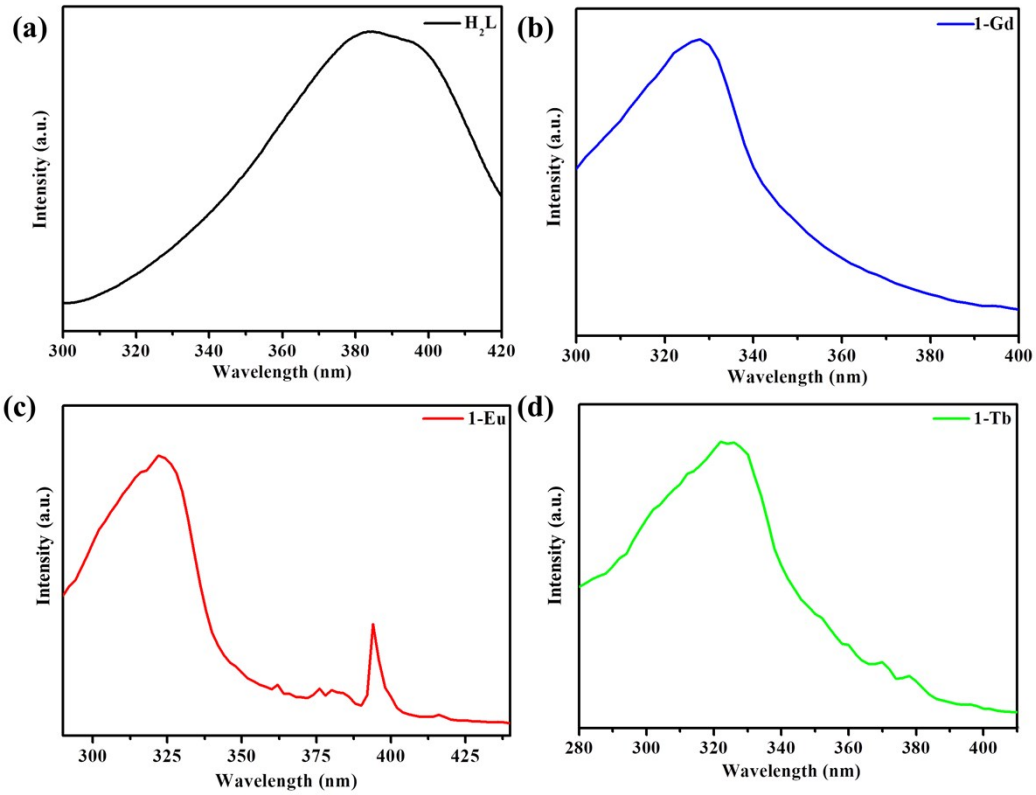



**Figure S7.** Solid state excitation spectra of $H_2L$ (a), **1-Gd**(b), **1-Eu**(c) and **1-Tb**(d).

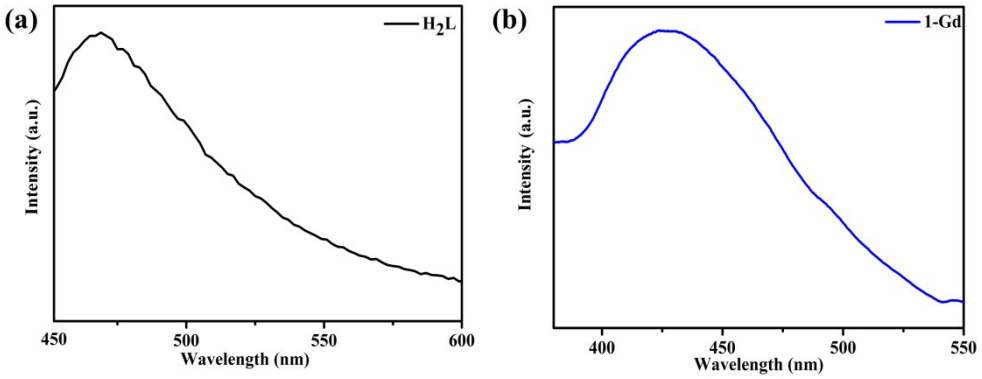
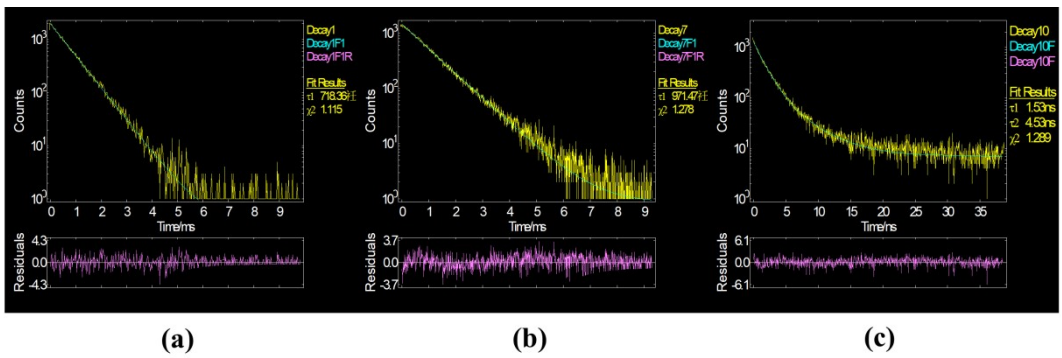



**Figure S8.** Solid-state emission spectra of $H_2L$(a), **1-Gd** (b).




**(a)** **(b)** **(c)**

**Figure S9.** Luminescence decay lifetimes of **1-Eu** (a), **1-Tb** (b) and**1-Gd** (c) measured at the excitation.

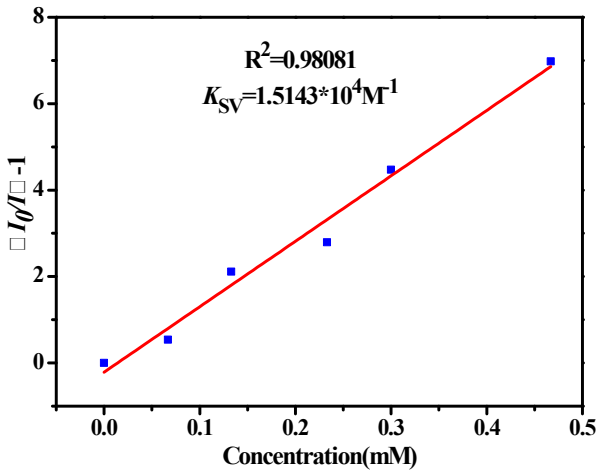



**Figure S10.** Linear correlation for the plot of ($I_0/I$)-1 vs concentration of nitrobenzene in low concentration range.

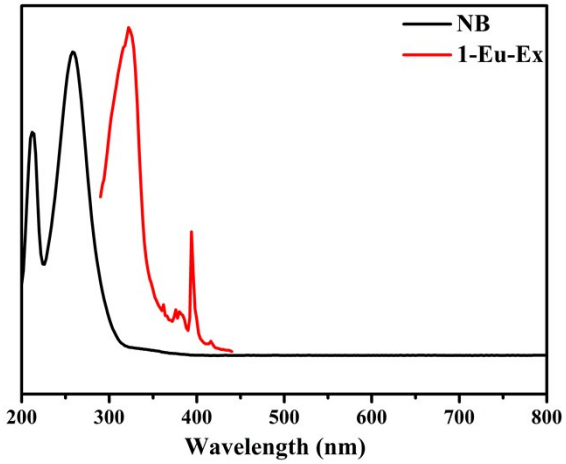



**Figure S11. UV-Vis** adsorption spectra of nitrobenzene in $CH_3OH$ solution and excitation spectrum of **1-Eu** in $CH_3OH$ solution**.**

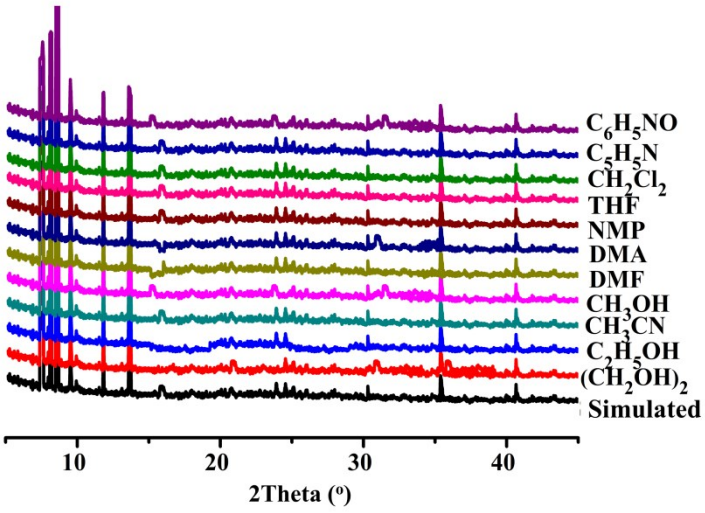



**Figure S12.** The **PXRD** patterns of **1-Eu** treated by small organic molecules solutions.

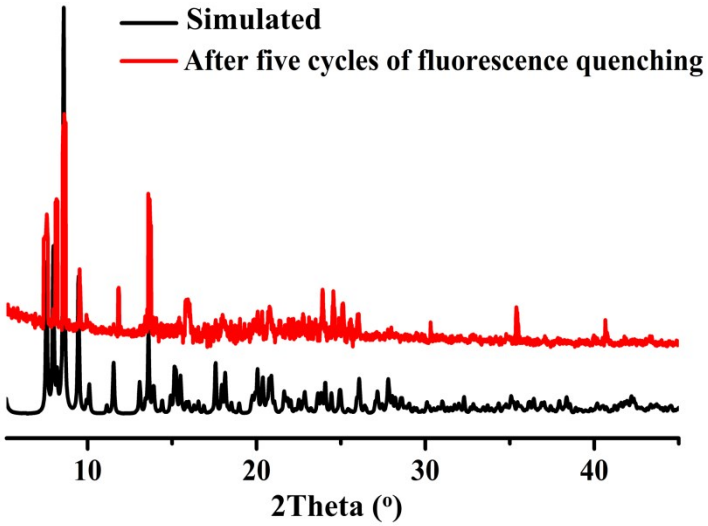



**Figure S13.** The **PXRD** patterns of **1-Eu** treated by multi-cycle fluorescence quenching.

## References:


1. Q. Tang, S. Liu, Y. Liu, D. He, J. Miao, X. Wang, Y. Ji and Z. Zheng, Color tuning and white light emission via in situ doping of luminescent lanthanide metal-organic frameworks, *Inorg. Chem*., 2014, **53**, 289-293.
2. X.-Y. Li, W.-J. Shi, X.-Q. Wang, L.-N. Ma, L. Hou and Y.-Y. Wang, Luminescence Modulation, White Light Emission, and Energy Transfer in a Family of Lanthanide Metal-Organic Frameworks Based on a Planar π-Conjugated Ligand, *Cryst. Growth Des.*, 2017, **17**, 4217-4224.
3. H. Liu, T. Chu, Z. Rao, S. Wang, Y. Yang and W.-T. Wong, The Tunable White-Light and Multicolor Emission in An Electrodeposited Thin Film of Mixed Lanthanide Coordination Polymers, *Adv. Opt. Mater.*, 2015, **3**, 1545-1550.
4. Z.-F. Liu, M.-F. Wu, S.-H. Wang, F.-K. Zheng, G.-E. Wang, J. Chen, Y. Xiao, A. Q. Wu, G.-C. Guo and J.-S. Huang, $Eu^{3+}$-doped $Tb^{3+}$ metal-organic frameworks emitting tunable three primary colors towards white light, *J. Mater. Chem. C*, 2013, **1**, 4634-4639.
5. X. Wang, Y. Han, X. X. Han, X. Hou, J.-J. Wang and F. Fu, Highly selective and sensitive detection of $Hg^{2+}$, $Cr_2O_7^{2-}$, and nitrobenzene/2,4-dinitrophenol in water via two fluorescent Cd-CPs, *New J. Chem.*, 2018, **42**, 19844-19852.
6. T.-Y. Xu, J.-M. Li, Y.-H. Han, A.-R. Wang, K.-H. He and Z.-F. Shi, A new 3D four-fold interpenetrated dia-like luminescent Zn(II)-based metal-organic framework: the sensitive detection of $Fe^{3+}$, $Cr_2O_7^{2-}$, and $CrO_4^{2-}$ in water, and nitrobenzene in ethanol, *New J. Chem.*, 2020, **44**, 4011-4022.
7. Y. S. Xue, W. Cheng, J. P. Cao and Y. Xu, 3D Enantiomorphic Mg-Based Metal-Organic Frameworks as Chemical Sensor of Nitrobenzene and Efficient Catalyst for $CO_2$ Cycloaddition, *Chem-Asian J.*, 2019, **14**, 1949-1957.
8. L.-L. Ren, Y.-Y. Cui, A.-L. Cheng and E.-Q. Gao, Water-stable lanthanide-based metal-organic frameworks for rapid and sensitive detection of nitrobenzene derivatives, *J. Solid State Chem.*, 2019, **270**, 463-469.
9. S. Xian, H.-L. Chen, W.-L. Feng, X.-Z. Yang, Y.-Q. Wang and B.-X. Li, Eu(III) doped zinc metal organic framework material and its sensing detection for nitrobenzene, *J. Solid State Chem.*, 2019, **280**, 120984.
10. Q. Zhao and C.-D. Si, A Novel Zinc Luminescent Coordination Polymer Based on a Tetracarboxylate Acid Ligand for the Detection of Nitrobenzene, *Cryst. Res. Technol.*, 2019, **54**, 1800155.
11. L. Wei, J. Lou, L. Liu, X.-Z. Ma, J. Li, R. Pan and Y.-X. Zhang, Zn(II)-Containing Metal-Organic Framework for Fluorescence Detection of Nitrobenzene and Prevention Effect on Hypertension via Down-Regulating the Expression of Vitamin D Receptor, *J. Clust. Sci.*, 2019, **31**, 479-486.