Supporting Information

Holmium, thulium and lutetium-octamolybdate $[Mo_8O_{28}]^{8-}$ 1D chains, luminescence investigation of europium doped lutetium-octamolybdate

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Table S1 Relative Ln^{3+} contents for the x%Eu: LuPOM samples during synthesis (calcd.) and as determined by XRF.

Sample	Molar amounts used in synthesis [mmol]		Lu^{3+} ion		Eu^{3+} ions	
	$Lu(NO_3)_3$	$Eu(NO_3)_3$	Calcd.	XRF	Calcd.	XRF
1%Eu: LuPOM	0.01	0.99	99%	98.82%	1%	1.18%
2.5%Eu: LuPOM	0.025	0.975	97.5%	96.68%	2.5%	3.32%
5%Eu: LuPOM	0.05	0.95	95%	93.3%	5%	6.70%
7.5%Eu: LuPOM	0.075	0.925	92.5%	92.33%	7.5%	7.67%

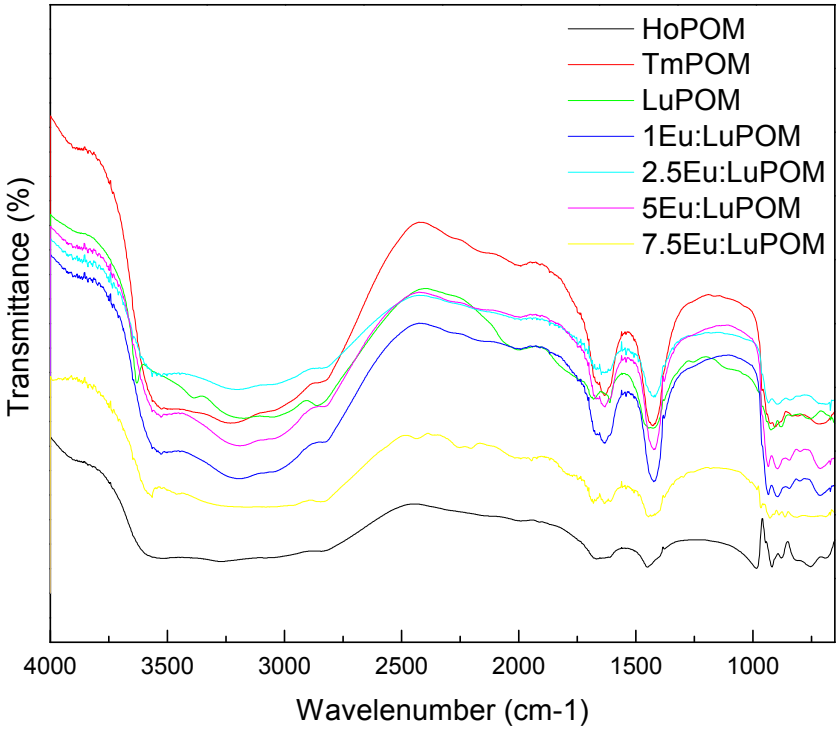

Figure S1 FT-IR spectra of HoPOM, TmPOM, LuPOM, 1%Eu: LuPOM, 2.5%Eu: LuPOM, 5%Eu: LuPOM, and 7.5%Eu: LuPOM.

Table S2 Data collection and refinement statistic

	HoPOM	**TmPOM**	**LuPOM**
Molecular formula	$(NH_4)_5Ho[Mo_8H_{12}O_{33}].8H_2O$	$(NH_4)Tm[Mo_8H_{12}O_{33}].7H_2O$	$(NH_4)Lu[Mo_8H_{12}O_{33}].7H_2O$
Formula weight ($gmol^{-1}$)	1694.79	1680.77	1663.64
T (K)	100	100	100
λ (Å)	1.54184	0.71073	0.71073
Crystal system	Triclinic	Triclinic	Triclinic
Space group	P-1	P-1	P-1
a (Å)	10.5227(4)	10.5985(2)	10.5090(4)
b (Å)	12.9748(5)	12.9686(3)	12.9322(3)
c (Å)	14.3537(4)	14.4308(3)	14.3629(4)
α (°)	76.253(3)	76.014(2)	76.258(2)
β (°)	84.980(3)	85.8180(10)	84.849(3)
γ (°)	84.373(3)	84.545(2)	84.370(3)
V ($Å^3$)	1890.22(12)	1913.40(7)	1882.60(10)
Z	2	2	2
ρ_{calc} (gcm^{-3})	2.978	2.917	2.935
$2\theta_{max}$ (°)	150.546	59.420	59.584
$F(000)$	1604	1588	1535.2
Measured reflections	35880	63922	41947
Unique reflections	7644	9916	9509
Observed reflections ($I > 2\sigma(I)$)	6472	8043	6977
Parameters refined	496	491	499
R_1	0.0682	0.0436	0.0500
wR_2	0.0791	0.1014	0.0937
R_1 (all data)	0.1807	0.0612	0.0816
wR_2 (all data)	0.1875	0.1120	0.1101
Goodness-of-fit (GOF)	1.057	1.034	1.039
μ (mm^{-1})	25.907	4.946	5.297
CSD-entry	CSD 1887985	CSD 1887986	CSD 1887987

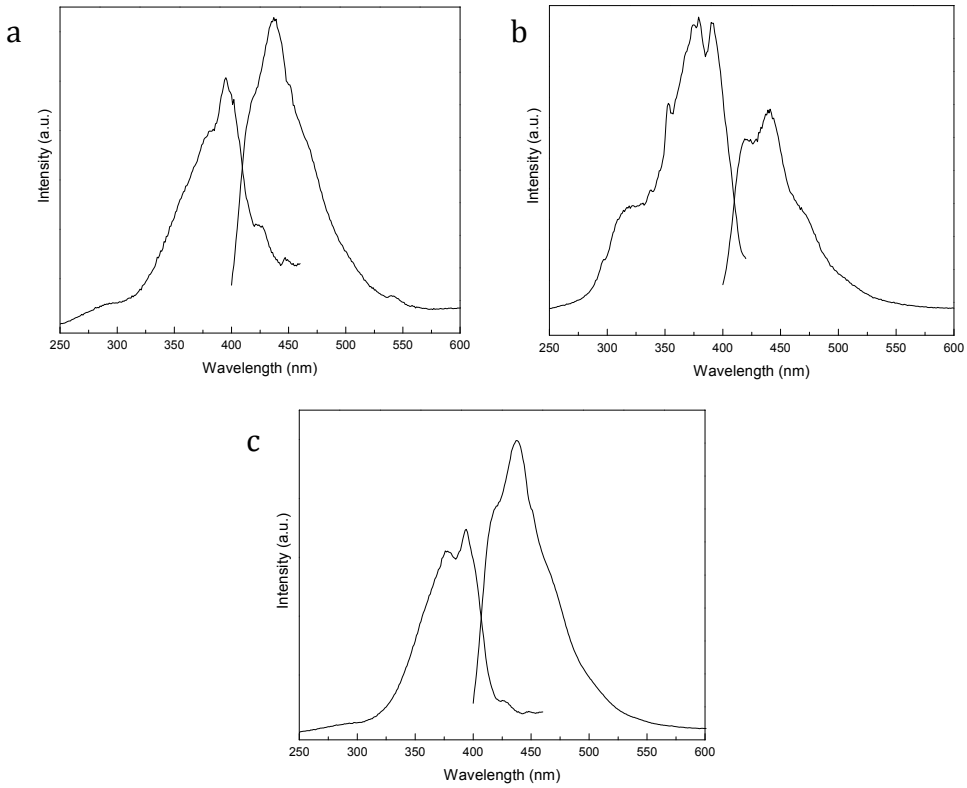

Figure S2 Combined excitation-emission spectra of a) HoPOM, b) TmPOM, and c) LuPOM

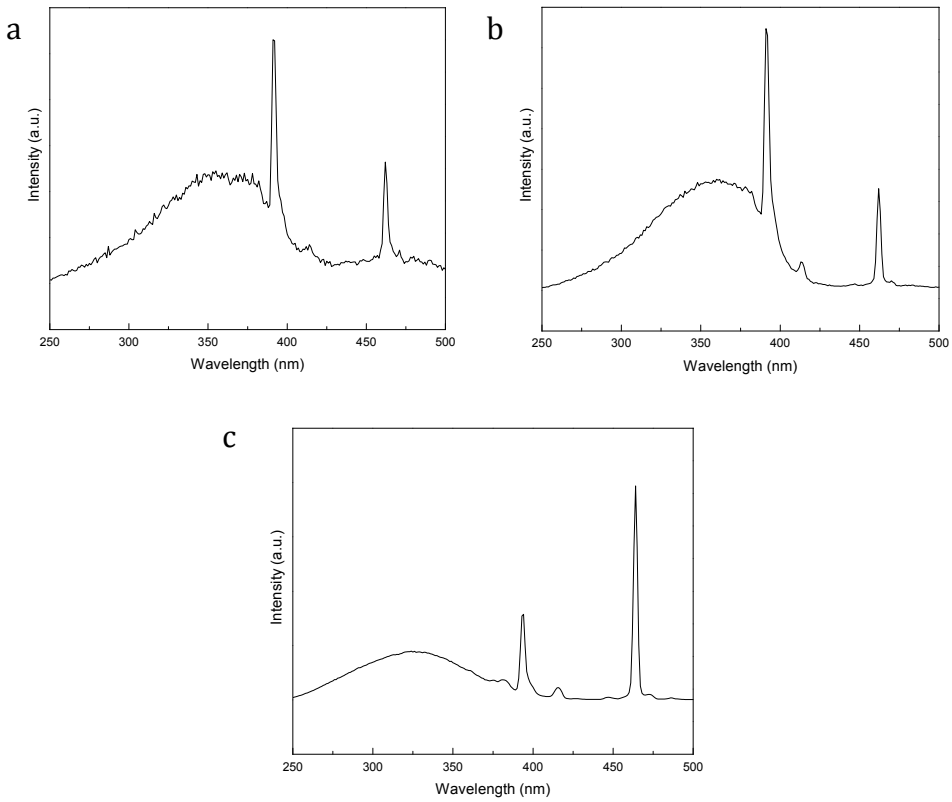

Figure S3 Excitation spectra of a) 1%Eu: LuPOM, b) 2.5%Eu: LuPOM, and c) 5%Eu: LuPOM (observed at the $^5D_0 \rightarrow {}^7F_2$ transition peak)

Table S3 Calculated x and y coordinates at different excitation wavelengths for 2.5%Eu: LuPOM

Wavelength [nm]	x coordinate	y coordinate
310	0.4159	0.2582
320	0.4410	0.2493
330	0.4117	0.2314
340	0.3744	0.2089
350	0.3346	0.1859
352	0.3262	0.1805
360	0.2951	0.1637
370	0.2522	0.1418
380	0.2221	0.1288

Table S4 Calculated x and y coordinates at different excitation wavelengths for 5%Eu: LuPOM

Wavelength [nm]	x coordinate	y coordinate
310	0.4305	0.2684
320	0.4220	0.2583
330	0.4004	0.2371
332	0.3848	0.2262
340	0.3568	0.2084
350	0.3123	0.1793
360	0.2796	0.1580
370	0.2504	0.1397
380	0.2327	0.1314

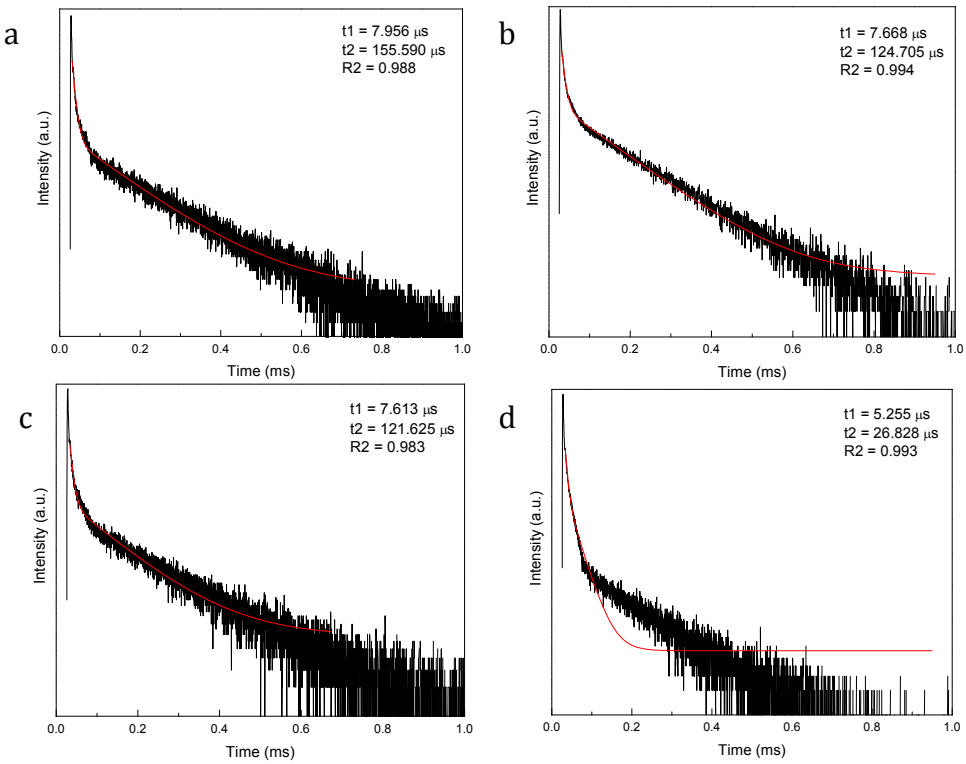

Figure S4 Decay profiles of a) 7.5%Eu: LuPOM, b) 5%Eu: LuPOM, c) 2.5%Eu: LuPOM, d) 1%Eu: LuPOM (excited into the maximum of the LMCT band and observed at the maximum of the $^5D_0 \rightarrow {}^7F_2$ transition peak)

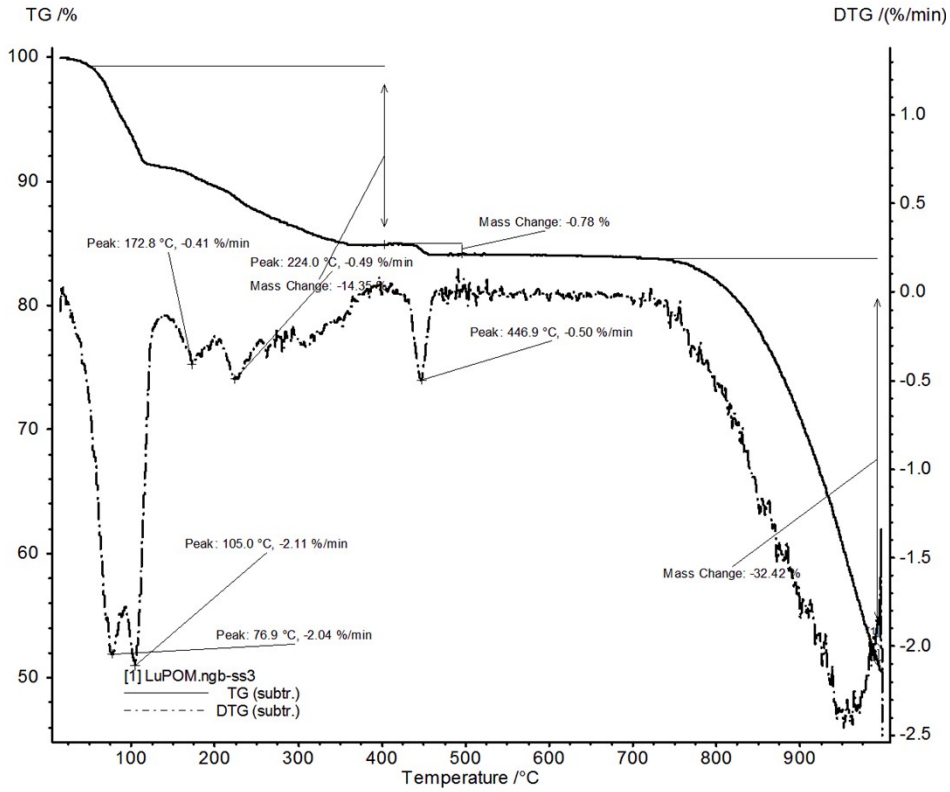

Figure S5 TGA and DTG of LuPOM compound.

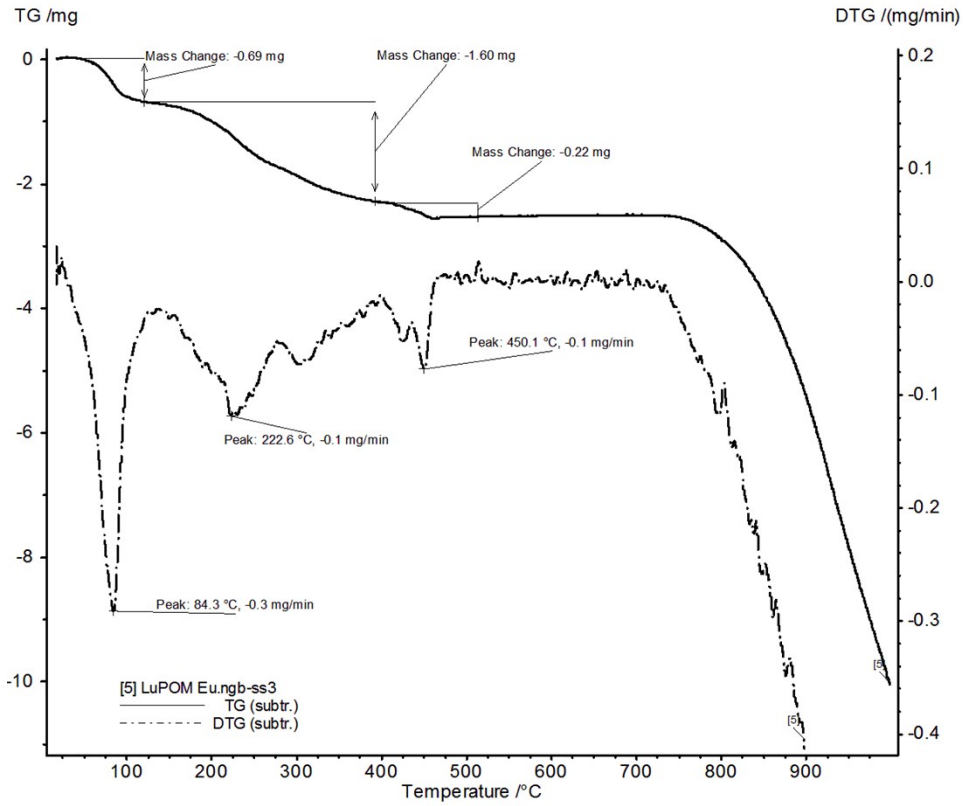

Figure S6 TGA and DTG of 7.5%Eu: LuPOM compound.