
Supporting Information

Conductivity of A Series of (4, 8)-connected Lanthanide Metal-Organic Frameworks with [Ln₄O₅] Clusters and High Selectivity for Visual Sensing of Nitrophenol Compounds

Wan-Li Liu, Yu-Wang, Yue-Qiao Hu,* Lei Lü* School of Chemistry and Chemical Engineering, Yan'an University, Yan'an s716000, P. R. China.

Table	S1.	Crysta	llographi	c par	ameter	rs of	Nd ₄ ,	Sm ₄ ,	Τb ₄ ,	and	Er ₄ .
Table	S2.	Selecte	ed Bond	ے leng ا	gths [Å] for	Nd₄	,, Sm ₄ ,	Τ b ₄ ,	and	Er ₄ .
Fig Nd	S1.	Exper	iment	and	simu	lation	of	PXRD	ра	ttern	for
Fig	S2.	Experim	nent ar	nd si	- mulatic .5	on of	PXF	RD pa	ttern	for	Sm₄.
Fig Tha	S3.	Exper	iment	and	simu	lation	of	PXRD	ра	ttern	for
Fig Fr.	S4.	Exper	iment	and	simu	lation	of	PXRD	ра	ttern	for
Fig.	S5	Cry	stal	structu	re	of	Nd ₄ ,	Sm₄	, Т	Ъ ₄ ,	and
Fig.	S6	1D cł	nain lik	e bu	iilding	unit	in	Nd₄,	Sm ₄ ,	Tb ₄ ,	and
Fig.	S7	TG	data	of	Nd ₄	unc 10	der	nitroge	en a	atmosp	here.
Fig.	S8	TG	data	of	Sm₄	unc 11	der	nitroge	en a	atmosp	here.
Fig.	S9	TG	data	of	Tb ₄	unc 	ler	nitroge	en a	atmosp	here.
Fig.	S10	TG	data	of	Er ₄	 un: 13	der	nitroge	en a	atmosp	here.

Fig.	S11	N_2	adsorption-o	orption-desorption		isotherms		Nd ₄ .
Fig.	S12	N ₂	adsorption-	desorpt	ion 5	isotherms		Tb ₄ .
Table	S3.	Inorganic	Nanomaterials	for	the	detection	of	4-
Table	S4.	Organic	materials	for	the	detection	of	4-

Table S1. Crystallographic parameters of Nd₄, Sm₄, Tb₄, and Er₄.

Complex	Nd ₄	Sm ₄	Tb ₄	Er ₄
Formula weight	$C_{23}H_{35}N_{17}O_{23}Nd_4$	$C_{23}H_{35}N_{17}O_{23}Sm_4$	$C_{26}H_{28}N_{18}O_{17}Tb_4$	$C_{26}H_{28}N_{18}O_{17}Er_4$
<i>Т/</i> К	296	296	296	296
Crystal system	Orthorhombic	Orthorhombic	Orthorhombic	Orthorhombic
Space group	Pmmn	Pmmn	Pmmn	Pmmn
a (Å)	12.9900(12)	12.9882(5)	13.2529(5)	13.3195(7)
b(Å)	19.6060(18)	19.5458(8)	19.3824(8)	19.3373(10)
c (Å)	8.3437(7)	8.3146(3)	8.2748(3)	8.2469(4)
α (°)	90	90	90	90
β (°)	90	90	90	90
γ (°)	90	90	90	90
<i>V</i> (ų)	2125.0(3)	2110.78(14)	2125.57(14)	2124.10(19)
Ζ	2	2	2	2
D (g·cm⁻³)	2.308	2.389	2.335	2.392
μ (mm⁻¹)	4.891	5.587	6.663	7.911
F[000]	1272	1446	1400	1428
ϑ (°)	2.441-25.046	2.909- 24.998	2.461-30.601	2.470-28.256
GOF	0.993	1.096	1.077	1.029
Ra [I>=20 (I)]	R1 = 0.0377	R1 = 0.0215	R1 = 0.0311	R1 = 0.0202
πα [i ² - 20 (i/]	wR2 = 0.0780	wR2 = 0.0498	wR2 = 0.0659	wR2 = 0.0654
Final R indexes	R1 = 0.0621	R1 = 0.0245	R1 = 0.0461	R1 = 0.0213
[all data]	wR2 = 0.0874	wR2 = 0.0513	wR2 = 0.0715	wR2 = 0.0662

N	d ₄	Sm ₄		
Nd(1)-N(2)	2.814(6)	Sm(2)-N(3)	2.772(3)	
Nd(2)-N(1)	2.562(6)	Sm(1)-N(4)	2.528(3)	
Nd(1)-O(2)	2.398(5)	Sm(1)-O(2)	2.398(3)	
Nd(1)-O(8)	2.470(4)	Sm(1)-O(3)	2.495(4)	
Nd(1)-O(4)	2.479(6)	Sm(1)-O(4)	2.867(5)	
Nd(1)-O(3)	2.514(8)	Sm(1)-O(5)	2.447(2)	
Nd(1)-O(5)	2.627(6)	Sm(1)-O(8)	2.399(3)	
Nd(2)-O(1)	2.419(5)	Sm(2)-O(5)	2.453(3)	
Nd(2)-O(8)	2.432(6)	Sm(2)-O(6)	2.506(5)	
Nd(2)-O(4)	2.485(4)	Sm(2)-O(7)	2.584(3)	
Nd(2)-O(6)	2.535(8)	Sm(2)-O(8)	2.437(2)	
Nd(2)-O(7)	2.786(8)	Sm(2)-O(1)	2.367(3)	
Т	b ₄	E	r ₄	
Tb(1)-N(1)	2.499(5)	Er(1)-N(3)	2.617(5)	
Tb(2)-N(2)	2.674(5)	Er(2)-N(4)	2.475(4)	
Tb(1)-O(1)	2.349(4)	Er(1)-O(3)	2.485(5)	
Tb(1)-O(5)	2.373(3)	Er(1)-O(4)	2.438(5)	
Tb(1)-O(6)	2.367(5)	Er(1)-O(5)	2.392(3)	
Tb(1)-O(7)	2.336(7)	Er(1)-O(1)	2.341(4)	
Tb(2)-O(6)	2.410(3)	Er(1)-O(2)	2.435(7)	
Tb(2)-O(5)	2.445(5)	Er(2)-O(4)	2.335(3)	
Tb(2)-O(4)	2.524(4)	Er(2)-O(5)	2.348(5)	
Tb(2)-O(3)	2.449(6)	Er(2)-O(6)	2.318(6)	
Tb(2)-O(2)	2.357(4)	Er(2)-O(7)	2.317(4)	

Table S2. Selected Band lengths [Å] for Nd₄, Sm₄, Tb₄, and Er₄.



Fig S1. Experiment and simulation of PXRD pattern for \mathbf{Nd}_4 .



Fig S2. Experiment and simulation of PXRD pattern for Sm₄.



Fig S3. Experiment and simulation of PXRD pattern for \mathbf{Tb}_4 .



Fig S4. Experiment and simulation of PXRD pattern for ${\sf Er}_4$.



Fig. S5 Crystal structure of Nd₄, Sm₄, Tb₄, and Er₄. H atoms and free solvents have been omitted for clarity.



Fig. S6 1D chain like building unit in Nd₄, Sm₄, Tb₄, and Er₄.



Fig. S7 TG data of Nd_4 under nitrogen atmosphere.



Fig. S8 TG data of Sm₄ under nitrogen atmosphere.



Fig. S9 TG data of Tb₄ under nitrogen atmosphere.



Fig. S10 TG data of Er₄ under nitrogen atmosphere.



Fig. S11 N₂ adsorption-desorption isotherms Nd₄.



Fig. S12 N₂ adsorption-desorption isotherms Tb₄.

Sensing probe	Detection method	Detection limit (nM)	Ref.
Amine-UiO-66/MIP	Luminescence	0.009	Anal. Chim. Acta,
			2022, 1202, 339638
CDs@ZIF-8	Luminescence	50	Biosens. Bioelectron.,
			2022, 198, 113848.
LZG-Eu y LZG-Tb	Luminescence	11.2	Dalton Trans., 2021,
			50 (5) <i>,</i> 1874.
Tb ₄	Luminescence	38.5	This work
Polyaniline/platinum	Surface plasmon resonance	0.00034	Sci. Rep., 2021, 11, 1.
rGO-HNT-AgNP	Electrochemical	48.6	Inorganic Chemistry
			Frontiers, 2020, 7,
			1981.
Chitosan-graphene	Electrochemical	57	Electrochim. Acta,
			2010, 55, 7102.
Mn-Fe₃O₄ and	Electrochemical	19	Food Chem., 2021,
graphene			348, 129126.
Ag₂O-ZnO	Electrochemical	23	J. of Hazard. Mater.,
			2021, 416, 125771.
Ni/Cu₂O	Electrochemical	16	Electrochim. Acta,
			2021, 367, 137453.
Au/CaCO3	Electrochemical	0.54	Appl. Surf. Sci., 2020,
			510, 145526.
Bauhinia vahlii and	Electrochemical	5	New J. Chem., 2021,
Co ₃ O ₄			45, 18358.

Table S3 Inorganic Nanomaterials for the detection of 4-NP

Sensing probe	Detection limit (nM)	Ref.
Citric acid and urea	2000	J. Hazard. Mater., 2020, 386, 121643.
Celery leaves and glutathione	26 and 100	New J. Chem., 2020, 44, 1500.
Ethylene glycol and $\boldsymbol{\beta}$ alanine	400	ACS Appl. Nano Mater., 2021, 4, 3444.
Sewage sludge	69	J. Hazard. Mater., 2020, 382, 121048.
Auricularia auricle	198	Anal. Methods, 2020, 12, 2237.
Ganoderma Lucidum Spore Powder	68	Food Chem., 2023, 406, No. 135029.
Hexamethylenetetramine	201	Spectrochimica Acta. Part A, Molecular and Biomolecular Spectroscopy, 2021, 259, 119897.
Triphenylamine	79	Journal of Photochemistry and Photobiology. A, Chemistry, 2023, 442, 114805.
Coumarin	0.5	J. Hazard. Mater., 2020, 398, 122854.
Fluorescent poly dopamine	24.2	Mikrochim. Acta, 2022, 189, DOI: 10.1007/s00604-021- 05106-3.
Coffee	10.9	Journal of Clean. Prod., 2023, 427, 139230.
Marine Rice	34	Diamond Relat. Mater., 2023, 135, 109849

Table S4 Organic materials for the detection of 4-NP.