General strategy for lanthanide coordination polymers constructed from 1, 1'-ferrocenedicarboxylic acid under hydrothermal conditions

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Synthesis of $[Ln_2(fcd)_3(phen)_2]\cdot(CH_3OH)_2$ (Ln = Eu (**2-Eu**), Gd (**2-Gd**), Tb (**2-Tb**)). Synthesis of red acicular crystals of **2-Eu/Gd/Tb** followed the same procedure as for **2-Sm**, except that $SmCl_3\cdot6H_2O$ was replaced by $EuCl_3\cdot6H_2O$ (0.6 mmol, 0.2199g; yield 51% based on Eu), $GdCl_3\cdot6H_2O$ (0.6 mmol, 0.2230g; yield 44% based on Gd), $TbCl_3\cdot6H_2O$ (0.6 mmol, 0.2241g; yield 51% based on Tb), respectively. Calcd. for **2-Eu**, $C_{62}H_{48}Fe_3Eu_2N_4O_{14}$: C, 48.2%; H, 3.1%; O, 14.5%; N, 3.6%; found: C, 48.3%; H, 3.2%; O, 14.6%; N, 3.6%. FTIR (KBr)/cm^{-1}: 3383 w, 3078 w, 1603 m, 1516 m, 1482 s, 1391 s, 1355 s, 1190 w, 1098 w, 1028 w, 847 m, 825 m, 731 m, 513 m. Calcd. for **2-Gd**, $C_{62}H_{48}Fe_3Gd_2N_4O_{14}$: C, 47.8%; H, 3.1%; O, 14.4%; N, 3.6%; found: C, 47.8%; H, 3.2%; O, 14.5%; N, 3.6%. FTIR (KBr)/cm^{-1}: 3392 w, 3078 w, 1606 s, 1516 m, 1482 s, 1392 s, 1354 s, 1191 m, 1029 w, 848 m, 795 m, 731 m, 504 s. Calcd. for **2-Tb**, $C_{62}H_{48}Fe_3Tb_2N_4O_{14}$: C, 47.7%; H, 3.1%; O, 14.4%; N, 3.6%; found: C, 47.8%; H, 3.2%; O, 14.5%; N, 3.6%. FTIR (KBr)/cm^{-1}: 3392 w, 1608 s, 1517 m, 1482 s, 1394 s, 1355 m, 1192 w, 1098 w, 1029 w, 849 m, 825 w, 795 m, 731 m, 505 m.

Synthesis of $Ln_2(fcd)_2(Hfcd)_2(phen)_2$ (Ln = La (**3-La**), Ce (**3-Ce**), Pr (**3-Pr**), Sm (**3-Sm**), Gd (**3-Gd**)). Synthesis of red acicular crystals of **3-La/Ce/Pr/Sm/Gd** followed the same procedure as for **3-Nd**, except that $NdCl_3\cdot7H_2O$ was replaced by $LaCl_3\cdot7H_2O$ (0.6 mmol, 0.2228 g; yield 32% based on La), $CeCl_3\cdot7H_2O$ (0.6 mmol, 0.2235g; yield 49% based on Ce), $PrCl_3\cdot7H_2O$ (0.6 mmol; 0.2240g, yield 35% based on Pr), $SmCl_3\cdot6H_2O$ (0.6 mmol; 0.2189 g, yield 42% based on Sm), $GdCl_3\cdot6H_2O$ (0.6 mmol, 0.2230g; yield 45% based on Gd), respectively. Calcd. for **3-La**, $C_{72}H_{50}Fe_4La_2N_4O_{16}$: C, 50.0%; H, 2.9%; O, 14.8%; N, 3.2%; found: C, %; H, %; O, %; N, %. FTIR (KBr)/cm^{-1}: 3428 w, 3123 w, 1645 m, 1574 s, 1475 s, 1389 s, 1351 m, 1188 w, 1100 w, 1022 w, 845 m, 802 m, 730 m, 562 w, 515 m. Calcd. for **3-Ce**, $C_{72}H_{50}Fe_4Ce_2N_4O_{16}$: C, 49.9%; H, 2.9%; O, 14.8%; N, 3.2%; found: C, %; H, %; O, %; N, %. FTIR (KBr)/cm^{-1}: 3426 w, 3121 w, 1645 m, 1574 s, 1475 s, 1389 s ,1350 s, 1187 m, 1022 w, 844 m, 801 m, 730 m, 516 m. Calcd. for **3-Pr**, $C_{72}H_{50}Fe_4Pr_2N_4O_{16}$: C, 49.9%; H, 2.9%; O, 14.8%; N, 3.2%; found: C, %; H, %; O, %; N, %. FTIR (KBr)/cm^{-1}: 3121 w, 1575 s, 1477 s, 1389 s, 1351 m, 844 m, 800 m, 730 w,

515 m. Calcd. for **3-Sm**, $C_{72}H_{50}Fe_4Sm_2N_4O_{16}$: C, 49.3%; H, 2.9%; O, 14.6%; N, 2.7%; found: C, 49.3%; H, 3.0%; O, 14.8%; N, 2.8%. FTIR (KBr)/cm^{-1}: 3327 s, 3078 w, 1648 w, 1579 m, 1482 m, 1393 s, 1352 s, 1188 m, 1025 w, 843 w, 794 m, 730 m, 598 w, 591 m. Calcd. for **3-Gd**, $C_{72}H_{50}Fe_4Gd_2N_4O_{16}$: C, 49.0%; H, 2.8%; O, 14.5%; N, 2.7%; found: C, 49.1%; H, 2.9%; O, 14.7%; N, 2.7%. FTIR (KBr)/cm^{-1}: 3318 w, 3079 vw, 1603 w, 1518 m, 1483 s, 1394 s, 1356 m, 1354 m, 1190 w, 1025 w, 845 w, 793 m, 731 w, 548 w, 504 m.

Synthesis of $[Ln_2(fcd)_3(CH_3CH_2OH)_2(H_2O)_2]\cdot H_2O$ (Ln = La (**4-La**), Ce (**4-Ce**), Pr (**4-Pr**), Sm (**4-Sm**), Eu (**4-Eu**), Gd (**4-Gd**), Tb (**4-Tb**), Dy (**4-Dy**), Er (**4-Er**), Tm (**4-Tm**), Yb (**4-Yb**)). Synthesis of red block-like crystals of **4-La/Ce/Pr/Sm/Eu/Gd/Tb/Dy/Er/Tm/Yb** followed the same procedure as for **4-Nd**, except that $NdCl_3\cdot 7H_2O$ was replaced by $LaCl_3\cdot 7H_2O$ (0.6 mmol, 0.2228 g; yield 20% based on La), $CeCl_3\cdot 7H_2O$ (0.6 mmol, 0.2235g; yield 35% based on Ce), $PrCl_3\cdot 7H_2O$ (0.6 mmol, 0.2240g; yield 23% based on Pr), $SmCl_3\cdot 6H_2O$ (0.6 mmol, 0.2189 g; yield 33% based on Sm), $EuCl_3\cdot 6H_2O$ (0.6 mmol, 0.2199g; yield 32% based on Eu), $GdCl_3\cdot 6H_2O$ (0.6 mmol, 0.2230g; yield 35% based on Gd), $TbCl_3\cdot 6H_2O$ (0.6 mmol, 0.2241g; yield 40% based on Tb), $DyCl_3\cdot 6H_2O$ (0.6 mmol, 0.2262g; yield 10% based on Dy), $ErCl_3\cdot 6H_2O$ (0.6 mmol, 0.2290g; yield 15% based on Er), $TmCl_3\cdot 7H_2O$ (0.6 mmol, 0.2409g; yield 10% based on Tm), and $YbCl_3\cdot 6H_2O$ (0.6 mmol, 0.2331g; yield 9% based on Yb), respectively. Calcd. for **4-La**, $C_{40}H_{42}Fe_3La_2O_{17}$: C, 38.7%; H, 3.4%; O, 21.9%; found: C, %; H, %; O, %. FTIR (KBr)/cm^{-1}: 3338 m, 1645 w, 1523 s, 1480 s, 1393 s, 1351 s, 1186 m, 1028 w, 794 m, 503 m. Calcd. for **4-Ce**, $C_{40}H_{42}Fe_3Ce_2O_{17}$: C, 38.6%; H, 3.4%; O, 21.9%; found: C, 38.8%; H,3.5 %; O, 22.0%. FTIR (KBr)/cm^{-1}: 3338 w, 3122 w, 1644 m, 1574 m, 1475 s, 1389 s, 1351 s, 1187 m, 1023 m, 801 m, 730 m, 515 m. Calcd. for **4-Pr**, $C_{40}H_{42}Fe_3Pr_2O_{17}$: C, 38.6%; H, 3.4%; O, 21.9%; found: C, 38.7%; H, 3.5%; O, 22.1%. FTIR (KBr)/cm^{-1}: 3323 w, 3122 w, 1645 m, 1575 s, 1477 s, 1389 s, 1351 m, 1187 m, 1022 w, 800 s, 730 m, 515 m. Calcd. for **4-Sm**, $C_{40}H_{42}Fe_3Sm_2O_{17}$: C, 38.0%; H, 3.3%; O, 21.5%; found: C, 38.1%; H, 3.4%; O, 21.6%. FTIR (KBr)/cm^{-1}: 3312 m, 3078 w, 1647 w, 1523 m, 1482 s, 1393 s, 1352 m, 1188 m, 1024 m, 793 m, 730 m, 553 w, 501 m. Calcd. for **4-Eu**, $C_{40}H_{42}Fe_3Eu_2O_{17}$: C, 37.9%; H, 3.3%; O, 21.4%; found: C, 38.0%; H, 3.4%; O, 21.4%. FTIR (KBr)/cm^{-1}: 3325 w, 3078 w, 1652 w, 1517 m, 1482 s, 1391 s, 1352 s, 1189 m, 1023 w, 793 m, 730 m, 554 w, 501 m. Calcd. for **4-Gd**, $C_{40}H_{42}Fe_3Gd_2O_{17}$: C, 37.6%; H, 3.3%; O, 21.3%; found: C, 37.7%; H, 3.4%; O, 21.54%. FTIR (KBr)/cm^{-1}: 3327 m, 1525 s, 1486 s, 1395 s, 1353 m, 1190 m, 1029 m, 792 m, 548 m, 503 m. Calcd. for **4-Tb**, $C_{40}H_{42}Fe_3Tb_2O_{17}$: C, 37.5%; H, 3.3%; O, 21.2%; found: C, 37.6%; H, 3.3%; O, 21.3%. FTIR (KBr)/cm^{-1}: 3335 m, 1608 m,

1519 s, 1482 s, 1394 s, 1355 m, 1192 m, 1029 m, 794 m, 732 m, 553 w, 504 s. Calcd. for **4-Dy**, $C_{40}H_{42}Fe_3Dy_2O_{17}$: C, 37.3%; H, 3.3%; O, 21.1%; found: C, 37.2%; H, 3.2%; O, 21.1%. FTIR (KBr)/cm^{-1}: 3328 m, 1524 m, 1476 s, 1395 s, 1354 m, 1192 m, 1095 w, 1029 m, 791 m, 731 w, 548 m, 504 s. Calcd. for **4-Er**, $C_{40}H_{42}Fe_3Er_2O_{17}$: C, 37.0%; H, 3.2%; O, 21.0%; found: C, 37.1%; H, 3.2%; O, 21.1%. FTIR (KBr)/cm^{-1}: 3326 w, 1573 m, 1525 m, 1477 s, 1396 m, 1356 m, 1193 w, 1044 m, 800 m, 549 w, 505 m. Calcd. for **4-Tm**, $C_{40}H_{42}Fe_3Tm_2O_{17}$: C, 36.9%; H, 3.2%; O, 20.9%; found: C, 36.8%; H, 3.1%; O, 21.0%. FTIR (KBr)/cm^{-1}: 3336 m, 3081 w, 1574 m, 1525 m, 1476 s, 1396 s, 1193 m, 1044 m, 799 m, 691 w, 549 m, 504 m. Calcd. for **4-Yb**, $C_{40}H_{42}Fe_3Yb_2O_{17}$: C, 37.0%; H, 3.2%; O, 20.8%; found: C, 37.1%; H, 3.3%; O, 20.9%. FTIR (KBr)/cm^{-1}: 3335 w, 3081 vs, 1575 m, 1526 m, 1477 s, 1396 m, 1356 m, 1193 w, 1094 vw, 1043 m, 789 m, 549 m, 504m.

Synthesis of $[Ln_4(fcd)_6(H_2O)_2]\cdot n CH_3CH_2OH$ (Ln = Eu (**5-Eu**) and Tb (**5-Tb**)). Synthesis of block-like crystals of **5-Eu** and **5-Tb** followed the same procedure as for **5-Sm**, except that $SmCl_3\cdot 6H_2O$ was replaced by $EuCl_3\cdot 6H_2O$ (0.6 mmol, 0.2199g; yield 3% based on Eu) and $TbCl_3\cdot 6H_2O$ (0.6 mmol, 0.2241g; yield 6% based on Tb), respectively. Calcd. for **5-Eu**, $C_{36.62}H_{27.86}Fe_3Eu_2O_{13.31}$: C, 38.1%; H, 2.4%; O, 18.5%; found: C, 37.8%; H, 2.6%; O, 18.9%. FTIR (KBr)/cm^{-1}: 3328 m, 1648 w, 1525 s, 1482 s, 1394 s, 1352 s, 1188 m, 1026 m, 843 w, 794 m, 730 m, 598 w, 501 m. Calcd. for **5-Tb**, $C_{36.6}H_{27.8}Fe_3Tb_2O_{13.3}$: C, 37.7%; H, 2.4%; O, 18.2%; found: C, 37.1%; H, 2.5%; O, 19.1%. FTIR (KBr)/cm^{-1}: 3447 w, 1608 s, 1517 m, 1482 s, 1392 s, 1355 m, 1192 m, 1029 m, 851 m, 795 m, 776 m, 606 w, 582 w, 504 s.

Table S1. Details of X-ray data collection and refinement for twenty-six CPs.

	1-Nd	**2-Sm**	**2-Eu**	**2-Gd**
Formula	$C_{48}H_{32}Fe_2Nd_2N_6O_{14}$	$C_{62}H_{48}Fe_3Sm_2N_4O_{14}$	$C_{62}H_{48}Fe_3Eu_2N_4O_{14}$	$C_{62}H_{48}Fe_3Gd_2N_4O_{14}$
M	1316.97	1541.29	1544.51	1555.09
Crystal system	Monoclinic	Monoclinic	Monoclinic	Monoclinic
Space group	$P2_1/n$	$P2_1/n$	$P2_1/n$	$P2_1/n$
a, (Å)	14.0408(13)	10.6942(9)	10.7129(9)	10.6759(9)
b, (Å)	11.8581(11)	17.7327(16)	17.7399(15)	17.6628(16)
c, (Å)	14.7027(14)	15.3367(14)	15.3398(13)	15.2933(13)
α, (°)	90	90	90	90
β, (°)	108.905(2)	108.478(2)	108.298(2)	108.152(2)
γ, (°)	90	90	90	90
V, (Å^3)	2315.9(4)	2758.5(4)	2767.9(4)	2740.3(4)
Z	2	2	2	2
μ (Mo, Kα) (mm^{-1})	2.895	2.940	3.074	3.237

Total Reflections	11612	13725	13753	12974
Unique	4070	4857	4849	4810
F (000)	1292	1524	1528	1532
Goodness-of-fit on F^2	1.003	1.039	1.068	1.081
R_{int}	0.1036	0.0331	0.0461	0.0282
R_1	0.0571	0.0308	0.0411	0.0297
wR_2	0.1418	0.0622	0.0865	0.0652
R_1 (all data)	0.0757	0.0517	0.0708	0.0475
wR_2 (all data)	0.1552	0.0708	0.0995	0.0742
Largest diff. Peak and hole (e/Å^3)	2.511, -1.853	1.182, -0.545	1.298, -0.973	1.415, -0.579

	2-Tb	**3-La**	**3-Ce**	**3-Pr**
Formula	$C_{62}H_{48}Fe_3Tb_2N_4O_{14}$	$C_{36}H_{25}Fe_2LaN_2O_8$	$C_{36}H_{25}Fe_2CeN_2O_8$	$C_{36}H_{25}Fe_2PrN_2O_8$
M	1558.43	864.19	865.40	866.19
Crystal system	Monoclinic	Triclinic	Triclinic	Triclinic
Space group	$P2_1/n$	Pī	Pī	Pī
a, (Å)	10.6759(8)	11.6901(9)	11.5732(9)	11.6323(8)
b, (Å)	17.6542(14)	12.0958(11)	12.0184(11)	12.0808(11)
c, (Å)	15.2541(13)	13.7122(12)	13.6433(12)	13.7012(12)
α, (°)	90	94.4270(10)	94.6670(10)	94.5560(10)
β, (°)	107.965(2)	109.263(2)	109.238(2)	109.291(2)
γ, (°)	90	117.662(3)	117.504(3)	117.462(2)
V, (Å^3)	2734.8(4)	1558.4(2)	1526.2(2)	1549.5(2)
Z	2	2	2	2
μ (Mo, Kα) (mm^{-1})	3.404	2.324	2.465	2.531
Total Reflections	13527	7864	7828	7955
Unique	4795	5343	5260	5382
F (000)	1536	856	858	860
Goodness-of-fit on F^2	1.088	1.052	0.996	1.051
R_{int}	0.0362	0.0490	0.0512	0.0260
R_1	0.0313	0.0767	0.0377	0.0330
wR_2	0.0653	0.2233	0.0871	0.0737
R_1 (all data)	0.0519	0.0920	0.0501	0.0416
wR_2 (all data)	0.0750	0.2352	0.0938	0.0771
Largest diff. Peak and hole (e/Å^3)	1.523, -0.690	4.563, -1.727	1.352, -0.953	0.896, -0.620

	3-Nd	**3-Sm**	**3-Gd**	**4-La**
Formula	$C_{36}H_{25}Fe_2NdN_2O_8$	$C_{36}H_{25}Fe_2SmN_2O_8$	$C_{36}H_{25}Fe_2GdN_2O_8$	$C_{40}H_{42}Fe_3La_2O_{17}$
M	869.52	875.63	882.53	1240.10
Crystal system	Triclinic	Triclinic	Triclinic	Monoclinic
Space group	Pī	Pī	Pī	$P2/n$
a, (Å)	11.6308(11)	11.6356(11)	11.4571(8)	11.2058(12)
b, (Å)	12.1047(12)	12.1243(12)	11.9664(9)	10.2498(9)
c, (Å)	13.7228(13)	13.7652(12)	13.6101(11)	17.3112(19)

α, (°)	94.5620(10)	94.7080(10)	94.9040(10)	90
β, (°)	109.2130(10)	109.147(2)	109.074(2)	90.7080(10)
γ, (°)	117.492(2)	117.358(3)	117.141(3)	90
V, (Å^3)	1555.4(3)	1565.3(3)	1507.0(2)	1988.2(4)
Z	2	2	2	2
μ (Mo, Kα) (mm^{-1})	2.624	2.825	3.186	3.250
Total Reflections	7988	7967	7741	9773
Unique	5402	5430	5218	3497
F (000)	862	866	870	1220
Goodness-of-fit on F^2	1.043	1.033	1.061	1.062
R_{int}	0.0274	0.0331	0.0387	0.0379
R_1	0.0315	0.0371	0.0425	0.0570
wR_2	0.0695	0.0568	0.1128	0.1658
R_1 (all data)	0.0394	0.0512	0.0539	0.0754
wR_2 (all data)	0.0725	0.0597	0.1190	0.1821
Largest diff. Peak and hole (e/Å^3)	1.004, -0.407	1.111, -0.520	2.175, -1.325	2.353, -2.017

	4-Ce	**4-Pr**	**4-Nd**	**4-Sm**
Formula	$C_{40}H_{42}Fe_3Ce_2O_{17}$	$C_{40}H_{42}Fe_3Pr_2O_{17}$	$C_{40}H_{42}Fe_3Nd_2O_{17}$	$C_{40}H_{42}Fe_3Sm_2O_{17}$
M	1242.52	1244.10	1250.76	1262.98
Crystal system	Monoclinic	Monoclinic	Monoclinic	Monoclinic
Space group	*P*2/*n*	*P*2/*n*	*P*2/*n*	*P*2/*n*
a, (Å)	11.3229(11)	11.3555(11)	11.2736(12)	11.2715(9)
b, (Å)	10.4130(9)	10.4486(9)	10.3725(11)	10.3556(8)
c, (Å)	17.3743(15)	17.4158(16)	17.2866(17)	17.3141(15)
α, (°)	90	90	90	90
β, (°)	90.4170(10)	90.5620(10)	90.495(2)	90.5900(10)
γ, (°)	90	90	90	90
V, (Å^3)	2048.5(3)	2066.3(3)	2021.3(4)	2020.8(3)
Z	2	2	2	2
μ (Mo, Kα) (mm^{-1})	3.291	3.418	3.652	3.989
Total Reflections	10056	10302	9743	9907
Unique	3607	3642	3568	3567
F (000)	1224	1228	1232	1240
Goodness-of-fit on F^2	1.020	1.042	1.080	1.039
R_{int}	0.0556	0.0676	0.0822	0.0446
R_1	0.0406	0.0440	0.0572	0.0383
wR_2	0.0904	0.0950	0.1319	0.0857
R_1 (all data)	0.0611	0.0646	0.1045	0.0600
wR_2 (all data)	0.1004	0.1001	0.1572	0.0958
Largest diff. Peak and hole (e/Å^3)	1.306, -1.019	1.379, -0.722	3.275, -1.084	1.314, -1.137

	4-Eu	**4-Gd**	**4-Tb**	**4-Dy**
Formula	$C_{40}H_{42}Fe_3Eu_2O_{17}$	$C_{40}H_{42}Fe_3Gd_2O_{17}$	$C_{40}H_{42}Fe_3Tb_2O_{17}$	$C_{40}H_{42}Fe_3Dy_2O_{17}$

M	1266.20	1276.78	1280.12	1287.28
Crystal system	Monoclinic	Monoclinic	Monoclinic	Monoclinic
Space group	*P*2/*n*	*P*2/*n*	*P*2/*n*	*P*2/*n*
a, (Å)	11.2587(8)	11.2515(11)	11.3463(11)	11.2407(9)
b, (Å)	10.3499(6)	10.3397(9)	10.4194(9)	10.3184(8)
c, (Å)	17.3086(12)	17.2510(15)	17.4356(15)	17.3146(15)
α, (°)	90	90	90	90
β, (°)	90.5200(10)	90.6120(10)	90.7090(10)	90.8090(10)
γ, (°)	90	90	90	90
V, (Å^3)	2016.8(2)	2006.8(3)	2061.1(3)	2008.1(3)
Z	2	2	2	2
μ (Mo, Kα) (mm^{-1})	31.018	4.396	4.494	4.809
Total Reflections	6714	9782	9595	9673
Unique	3522	3534	3646	3518
F (000)	1244	1248	1252	1224
Goodness-of-fit on F^2	1.034	1.029	1.044	1.072
R_{int}	0.0877	0.0945	0.0821	0.0943
R_1	0.0683	0.0466	0.0495	0.0513
wR_2	0.1613	0.1020	0.0992	0.1243
R_1 (all data)	0.0905	0.0758	0.0789	0.0862
wR_2 (all data)	0.1766	0.1156	0.1063	0.1453
Largest diff. Peak and hole (e/Å^3)	1.759, -1.468	1.562, -1.265	1.263, -1.559	1.799, -1.154

	4-Er	**4-Tm**	**4-Yb**	**5-Sm**
Formula	$C_{40}H_{42}Fe_3Er_2O_{17}$	$C_{40}H_{42}Fe_3Tm_2O_{17}$	$C_{40}H_{42}Fe_3Yb_2O_{17}$	$C_{36.67}H_{28}Fe_3Sm_2O_{13.34}$
M	1296.80	1300.14	1308.36	1150.21
Crystal system	Monoclinic	Monoclinic	Monoclinic	Monoclinic
Space group	*P*2/*n*	*P*2/*n*	*P*2/*c*	$P2_1/c$
a, (Å)	11.2291(8)	11.1973(9)	11.2469(11)	14.8077(12)
b, (Å)	10.2751(6)	10.2417(8)	10.2870(9)	10.8766(9)
c, (Å)	17.2975(13)	17.2793(14)	20.5641(18)	21.5334(18)
α, (°)	90	90	90	90
β, (°)	90.7840(10)	90.7970(10)	122.250(4)	90.5970(10)
γ, (°)	90	90	90	90
V, (Å^3)	1995.6(2)	1981.4(3)	2012.2(3)	3467.9(5)
Z	2	2	2	4
μ (Mo, Kα) (mm^{-1})	5.303	5.580	5.736	4.630
Total Reflections	9805	9602	9776	17050
Unique	3502	3494	3544	6119
F (000)	1264	1236	1272	2212
Goodness-of-fit on F^2	1.083	1.090	0.994	1.018
R_{int}	0.0618	0.0471	0.0639	0.0670
R_1	0.0373	0.0382	0.0404	0.0469
wR_2	0.0916	0.0916	0.0980	0.1035

R_1 (all data)	0.0481	0.0589	0.0545	0.0771
wR_2 (all data)	0.1002	0.1030	0.1040	0.1195
Largest diff. Peak and hole (e/Å^3)	1.665, -1.564	1.908, -0.859	2.008, -1.103	1.763, -1.068

	5-Eu	**5-Tb**
Formula	$C_{36.62}H_{27.86}Fe_3Eu_2O_{13.31}$	$C_{36.60}H_{27.80}Fe_3Tb_2O_{13.30}$
M	1152.31	1165.78
Crystal system	Monoclinic	Monoclinic
Space group	$P2_1/c$	$P2_1/c$
a, (Å)	14.7692(12)	14.3873(12)
b, (Å)	10.8892(9)	10.9087(9)
c, (Å)	21.5846(16)	21.6106(17)
α, (°)	90	90
β, (°)	90.5010(10)	90.7520(10)
γ, (°)	90	90
V, (Å^3)	3471.2(5)	3391.4(5)
Z	4	4
μ (Mo, Kα) (mm^{-1})	4.856	5.444
Total Reflections	17083	16360
Unique	6113	5954
F (000)	2220	2256
Goodness-of-fit on F^2	1.054	1.053
R_{int}	0.0678	0.0885
R_1	0.0454	0.0599
wR_2	0.0759	0.1341
R_1 (all data)	0.0737	0.0956
wR_2 (all data)	0.0846	0.1521
Largest diff. Peak and hole (e/Å^3)	1.358, -1.399	2.457, -1.754

Table S2. Selected bond lengths (Å) and angles (°) for twenty-six CPs.

1-Nd					
Bond lengths (Å)					
Nd1-O1	2.411 (5)	Nd1-O1^i	2.685 (5)	Nd1-O2^i	2.474 (5)
Nd1-O3	2.381 (5)	Nd1-O4^i	2.408 (5)	Nd1-O5	2.500 (5)
Nd1-O6	2.626 (6)	Nd1-N1	2.673 (6)	Nd1-N2	2.602 (7)
O1-Nd1^i	2.685 (5)	O2-Nd1^i	2.474 (5)	O4-Nd1^i	2.408 (5)
Bond angles (°)					
O1-Nd1-O1^i	78.24 (17)		O1-Nd1-O2^i	128.24 (18)	
O1-Nd1-O5	89.91 (18)		O1-Nd1-O6	77.65 (18)	
O1-Nd1-N1	139.10 (18)		O1-Nd1-N2	148.41 (19)	
O2^i-Nd1-O1^i	50.25 (17)		O2^i-Nd1-O5	141.71 (19)	
O2^i-Nd1-O6	132.67 (19)		O2^i-Nd1-N1	76.25 (18)	
O2^i-Nd1-N2	71.7 (2)		O3-Nd1-O1^i	75.74 (16)	

O3-Nd1-O1	71.18 (17)	O3-Nd1-O2^{i}	97.13 (18)
O3-Nd1-O4^{i}	137.22 (19)	O3-Nd1-O5	92.1 (2)
O3-Nd1-O6	130.15 (19)	O3-Nd1-N1	73.79 (19)
O3-Nd1-N2	136.3 (2)	O4^{i}-Nd1-O1	79.06 (16)
O4^{i}-Nd1-O1^{i}	68.51 (16)	O4^{i}-Nd1-O2^{i}	77.74 (17)
O4^{i}-Nd1-O5	118.35 (19)	O4^{i}-Nd1-O6	68.98 (18)
O4^{i}-Nd1-N1	141.82 (19)	O4^{i}-Nd1-N2	83.0 (2)
O5-Nd1-O1^{i}	165.15 (18)	O5-Nd1-O6	49.5 (2)
O5-Nd1-N1	70.8 (2)	O5-Nd1-N2	76.1 (2)
O6-Nd1-O1^{i}	134.15 (17)	O6-Nd1-N1	111.1 (2)
N1-Nd1-O1^{i}	112.69 (18)	N2-Nd1-O1^{i}	118.61 (18)
N2-Nd1-O6	71.7 (2)	N2-Nd1-N1	62.6 (2)

Symmetry transformations used to generate equivalent atoms: $-x+1, -y, -z$.

2-Sm

Bond lengths (Å)

Sm1-O1	2.405 (3)	Sm1-O2^{i}	2.321 (3)	Sm1-O3	2.376 (3)
Sm1-O4^{i}	2.363 (3)	Sm1-O5	2.473 (3)	Sm1-O6	2.447 (3)
Sm1-N1	2.622 (4)	Sm1-N2	2.639 (4)	O2-Sm1^{i}	2.321 (3)
O4-Sm1^{i}	2.363 (3)				

Bond angles (°)

O1-Sm1-O5	137.64 (12)	O1-Sm1-O6	84.59 (12)
O1-Sm1-N1	77.78 (12)	O1-Sm1-N2	133.70 (12)
O2^{i}-Sm1-O1	123.72 (12)	O2^{i}-Sm1-O3	78.76 (12)
O2^{i}-Sm1-O4^{i}	74.47 (12)	O2^{i}-Sm1-O5	90.20 (13)
O2^{i}-Sm1-O6	136.55 (12)	O2^{i}-Sm1-N1	136.84 (12)
O2^{i}-Sm1-N2	79.44 (13)	O3-Sm1-O1	74.22 (11)
O3-Sm1-O5	143.36 (12)	O3-Sm1-O6	144.45 (11)
O3-Sm1-N1	71.94 (12)	O3-Sm1-N2	72.32 (12)
O4^{i}-Sm1-O1	82.49 (12)	O4^{i}-Sm1-O3	125.32 (12)
O4^{i}-Sm1-O5	83.64 (12)	O4^{i}-Sm1-O6	78.23 (12)
O4^{i}-Sm1-N1	148.69 (12)	O4^{i}-Sm1-N2	143.55 (12)
O5-Sm1-N1	94.78 (12)	O5-Sm1-N2	71.33 (12)
O6-Sm1-O5	53.39 (12)	O6-Sm1-N1	75.93 (12)
O6-Sm1-N2	105.37 (13)	N1-Sm1-N2	62.00 (12)

Symmetry transformations used to generate equivalent atoms: (i) −x+1, −y+1, −z+1; (ii) −x+1, −y+1, −z.

2-Eu

Bond lengths (Å)

Eu1-O1	2.402 (4)	Eu1-O2^{i}	2.322 (4)	Eu1-O3	2.373 (4)
Eu1-O4^{i}	2.356 (4)	Eu1-O5	2.446 (4)	Eu1-O6	2.470 (4)
Eu1-N1	2.614 (5)	Eu1-N2	2.639 (5)	O2-Eu1^{i}	2.322 (4)
O4-Eu1^{i}	2.356 (4)				

Bond angles (°)

O1-Eu1-O5	84.19 (14)	O1-Eu1-O6	137.28 (15)
O1-Eu1-N1	78.17 (14)	O1-Eu1-N2	134.32 (14)

$O2^{i}$-Eu1-O1	123.98 (15)	$O2^{i}$-Eu1-O3	78.76 (14)
$O2^{i}$-Eu1-$O4^{i}$	74.77 (15)	$O2^{i}$-Eu1-O5	136.54 (14)
$O2^{i}$-Eu1-O6	90.07 (15)	$O2^{i}$-Eu1-N1	136.67 (15)
$O2^{i}$-Eu1-N2	78.95 (15)	O3-Eu1-O1	74.63 (13)
O3-Eu1-O5	144.46 (13)	O3-Eu1-O6	143.38 (15)
O3-Eu1-N1	72.09 (14)	O3-Eu1-N2	72.37 (14)
$O4^{i}$-Eu1-O1	81.97 (14)	$O4^{i}$-Eu1-O3	125.29 (14)
$O4^{i}$-Eu1-O5	78.09 (14)	$O4^{i}$-Eu1-O6	83.71 (14)
$O4^{i}$-Eu1-N1	148.56 (15)	$O4^{i}$-Eu1-N2	143.46 (14)
O5-Eu1-O6	53.47 (14)	O5-Eu1-N1	75.88 (14)
O5-Eu1-N2	105.62 (15)	O6-Eu1-N1	94.60 (14)
O6-Eu1-N2	71.28 (15)	N1-Eu1-N2	62.20 (15)

Symmetry transformations used to generate equivalent atoms: (i) −x+2, −y+2, −z+1; (ii) −x+2, −y+2, −z+2.

2-Gd

Bond lengths (Å)

Gd1-O1	2.381 (3)	Gd1-$O2^{i}$	2.301 (3)	Gd1-O3	2.359 (3)
Gd1-$O4^{i}$	2.334 (3)	Gd1-O5	2.436 (3)	Gd1-O6	2.459 (3)
Gd1-N1	2.594 (4)	Gd1-N2	2.615 (4)	O2-$Gd1^{i}$	2.302 (3)
O4-$Gd1^{i}$	2.334 (3)				

Bond angles (°)

O1-Gd1-O5	84.20 (11)	O1-Gd1-O6	137.74 (11)
O1-Gd1-N1	78.12 (11)	O1-Gd1-N2	134.37 (11)
$O2^{i}$-Gd1-O1	123.62 (12)	$O2^{i}$-Gd1-O3	78.71 (11)
$O2^{i}$-Gd1-$O4^{i}$	74.65 (11)	$O2^{i}$-Gd1-O5	136.60 (11)
$O2^{i}$-Gd1-O6	89.95 (12)	$O2^{i}$-Gd1-N1	137.11 (11)
$O2^{i}$-Gd1-N2	78.89 (12)	O3-Gd1-O1	74.27 (10)
O3-Gd1-O5	144.52 (10)	O3-Gd1-O6	143.47 (11)
O3-Gd1-N1	72.52 (11)	O3-Gd1-N2	72.55 (11)
$O4^{i}$-Gd1-O1	81.82 (11)	$O4^{i}$-Gd1-O3	124.85 (12)
$O4^{i}$-Gd1-O5	78.01 (11)	$O4^{i}$-Gd1-O6	83.95 (11)
$O4^{i}$-Gd1-N1	148.24 (11)	$O4^{i}$-Gd1-N2	143.49 (11)
O5-Gd1-O6	53.91 (11)	O5-Gd1-N1	75.69 (11)
O5-Gd1-N2	106.08 (12)	O6-Gd1-N1	94.59 (11)
O6-Gd1-N2	71.21 (11)	N1-Gd1-N2	62.62 (11)

Symmetry transformations used to generate equivalent atoms: (i) −x+1, −y+1, −z+1; (ii) −x+1, −y+1, −z.

2-Tb

Bond lengths (Å)

Tb1-O1	2.373 (3)	Tb1-$O2^{i}$	2.290 (3)	Tb1-O3	2.334 (3)
Tb1-$O4^{i}$	2.322 (3)	Tb1-O5	2.437 (3)	Tb1-O6	2.415 (3)
Tb1-N1	2.583 (4)	Tb1-N2	2.606 (4)	O2-$Tb1^{i}$	2.290 (3)
O4-$Tb1^{i}$	2.322 (3)				

Bond angles (°)

O1-Tb1-O5	137.72 (12)	O1-Tb1-O6	84.05 (12)
O1-Tb1-N1	78.06 (12)	O1-Tb1-N2	134.57 (12)

O2^{i}-Tb1-O1	123.81 (12)	O2^{i}-Tb1-O3	78.94 (12)
O2^{i}-Tb1-O4^{i}	74.76 (12)	O2^{i}-Tb1-O5	89.57 (12)
O2^{i}-Tb1-O6	136.44 (12)	O2^{i}-Tb1-N1	137.29 (12)
O2^{i}-Tb1-N2	78.76 (12)	O3-Tb1-O1	74.29 (11)
O3-Tb1-O5	143.62 (12)	O3-Tb1-O6	144.46 (11)
O3-Tb1-N1	72.57 (12)	O3-Tb1-N2	72.67 (12)
O4^{i}-Tb1-O1	81.76 (12)	O4^{i}-Tb1-O3	125.02 (12)
O4^{i}-Tb1-O5	83.60 (12)	O4^{i}-Tb1-O6	77.75 (12)
O4^{i}-Tb1-N1	147.95 (12)	O4^{i}-Tb1-N2	143.37 (12)
O5-Tb1-N1	94.86 (12)	O5-Tb1-N2	71.26 (12)
O6-Tb1-O5	54.08 (12)	O6-Tb1-N1	75.63 (12)
O6-Tb1-N2	54.08 (12)	N1-Tb1-N2	62.87 (12)

Symmetry transformations used to generate equivalent atoms: (i) −x+1, −y+1, −z+1; (ii) −x+1, −y+1, −z.

3-La

Bond lengths (Å)

La1-O1	2.445 (6)	La1-O1^{i}	2.804 (7)	La1-O2^{i}	2.573 (7)
La1-O3	2.546 (7)	La1-O5	2.544 (7)	La1-O7^{ii}	2.476 (6)
La1-O8^{iii}	2.459 (7)	La1-N1	2.758 (8)	La1-N2	2.716 (8)
O1-La1^{i}	2.804 (6)	O2-La1^{i}	2.573 (7)	O7-La1^{iv}	2.476 (6)
O8-La1^{iii}	2.459 (7)				

Bond angles (°)

N2-La1-N1	60.0 (2)	O1-La1-O3	77.7 (2)
N2-La1-O1^{i}	111.9 (2)	O1-La1-O5	92.2 (2)
O1-La1-O1^{i}	75.2 (2)	O1-La1-O7^{ii}	76.3 (2)
O1-La1-O2^{i}	123.0 (2)	O1-La1-O8^{iii}	74.9 (2)
O1-La1-N1	147.8 (2)	O1-La1-N2	149.3 (3)
N1-La1-O1^{i}	110.6 (2)	O2^{i}-La1-O1^{i}	48.02 (19)
O2^{i}-La1-N1	67.7 (2)	O2^{i}-La1-N2	72.5 (2)
O3-La1-N2	75.0 (2)	O3-La1-O1^{i}	128.6 (2)
O3-La1-O2^{i}	138.7 (2)	O3-La1-N1	115.5 (2)
O5-La1-N2	92.8 (3)	O5-La1-N1	66.9 (2)
O5-La1-O1^{i}	150.4 (2)	O5-La1-O2^{i}	133.6 (2)
O5-La1-O3	72.2 (2)	O7^{ii}-La1-N2	80.3 (3)
O7^{ii}-La1-N1	135.5 (2)	O7^{ii}-La1-O5	139.5 (2)
O7^{ii}-La1-O1^{i}	64.2 (2)	O7^{ii}-La1-O2^{i}	82.5 (2)
O7^{ii}-La1-O3	67.4 (2)	O8^{iii}-La1-N2	135.7 (3)
O8^{iii}-La1-N1	77.1 (2)	O8^{iii}-La1-O7^{ii}	132.0 (2)
O8^{iii}-La1-O5	79.2 (3)	O8^{iii}-La1-O1^{i}	71.7 (2)
O8^{iii}-La1-O2^{i}	82.0 (2)	O8^{iii}-La1-O3	139.2 (2)

Symmetry transformations used to generate equivalent atoms: (i) -*x*, -*y*+1, -*z*+1; (ii) *x*-1, *y*, z; (iii) -*x*+1, -*y*+1, -*z*+1; (iv) *x*+1, *y*, z.

3-Ce

Bond lengths (Å)

Ce1-O1	2.408 (3)	Ce1-O1^{i}	2.799 (3)	Ce1-O2^{i}	2.546 (3)
Ce1-O3	2.521 (3)	Ce1-O5	2.507 (3)	Ce1-O7^{ii}	2.439 (3)

Ce1-O8^{iii}	2.425 (3)	Ce1-N1	2.672 (4)	Ce1-N2	2.725 (4)
O1-Ce1^{i}	2.799 (3)	O2-Ce1^{i}	2.546 (3)	O7-Ce1^{iv}	2.439 (3)
O8-Ce1^{iii}	2.425 (3)				
Bond angles (^{o})					
O1-Ce1-N2	146.92 (12)		O1-Ce1-N1	149.22 (12)	
O1-Ce1-O1^{i}	75.61 (11)		O1-Ce1-O2^{i}	123.59 (10)	
O1-Ce1-O3	77.36 (10)		O1-Ce1-O5	91.78 (11)	
O1-Ce1-O7^{ii}	76.63 (11)		O1-Ce1-O8^{iii}	75.08 (11)	
O2^{i}-Ce1-N1	72.14 (11)		O2^{i}-Ce1-N2	68.42 (11)	
O2^{i}-Ce1-O1^{i}	48.18 (10)		O3-Ce1-N2	115.29 (11)	
O3-Ce1-O2^{i}	138.50 (11)		O3-Ce1-N1	75.17 (12)	
O3-Ce1-O1^{i}	128.72 (10)		O5-Ce1-N2	66.21 (11)	
O5-Ce1-O3	71.92 (11)		O5-Ce1-N1	92.70 (12)	
O5-Ce1-O1^{i}	150.47 (10)		O5-Ce1-O2^{i}	133.78 (11)	
O7^{ii}-Ce1-N1	80.15 (11)		O7^{ii}-Ce1-N2	136.17 (12)	
O7^{ii}-Ce1-O3	67.28 (11)		O7^{ii}-Ce1-O2^{i}	82.41 (11)	
O7^{ii}-Ce1-O1^{i}	64.53 (10)		O7^{ii}-Ce1-O5	139.07 (11)	
O8^{iii}-Ce1-N1	135.63 (12)		O8^{iii}-Ce1-N2	76.70 (11)	
O8^{iii}-Ce1-O5	79.42 (12)		O8^{iii}-Ce1-O7^{ii}	132.25 (11)	
O8^{iii}-Ce1-O2^{i}	82.24 (12)		O8^{iii}-Ce1-O3	139.18 (12)	
O8^{iii}-Ce1-O1^{i}	71.61 (10)		N1-Ce1-O1^{i}	111.89 (11)	
N1-Ce1-N2	60.50 (12)		N2-Ce1-O1^{i}	111.14 (10)	

Symmetry transformations used to generate equivalent atoms: (i) -*x*+2, -*y*+1, -*z*+1; (ii) *x*+1, *y*, z; (iii) -*x*+1, -*y*+1, -z+1; (iv) *x*-1, *y*, z.

3-Pr

Bond lengths (Å)					
Pr1-O1	2.406 (3)	Pr1-O1^{i}	2.821 (3)	Pr1-O2^{i}	2.536 (3)
Pr1-O3	2.524 (3)	Pr1-O5	2.424 (3)	Pr1-O6^{i}	2.439 (2)
Pr1-O8^{ii}	2.509 (3)	Pr1-N1	2.668 (3)	Pr1-N2	2.726 (3)
O1-Pr1^{i}	2.821 (3)	O2-Pr1^{i}	2.536 (3)	O6-Pr1^{i}	2.439 (2)
O8-Pr1^{ii}	2.509 (3)				
Bond angles (^{o})					
O1-Pr1-N1	149.18 (10)		O1-Pr1-N2	146.49 (9)	
O1-Pr1-O1^{i}	75.55 (9)		O1-Pr1-O2^{i}	123.56 (9)	
O1-Pr1-O3	76.97 (9)		O1-Pr1-O5	74.96 (9)	
O1-Pr1-O6^{i}	77.05 (9)		O1-Pr1-O8^{ii}	91.62 (9)	
O2^{i}-Pr1-N1	72.12 (10)		O2^{i}-Pr1-O1^{i}	48.17 (8)	
O2^{i}-Pr1-N2	68.89 (9)		O3-Pr1-N2	115.88 (10)	
O3-Pr1-O2^{i}	138.17 (9)		O3-Pr1-N1	75.39 (10)	
O3-Pr1-O1^{i}	128.24 (8)		O5-Pr1-N1	135.78 (10)	
O5-Pr1-N2	76.48 (10)		O5-Pr1-O6^{i}	132.03 (9)	
O5-Pr1-O8^{ii}	79.56 (10)		O5-Pr1-O3	139.09 (10)	
O5-Pr1-O1^{i}	71.55 (9)		O5-Pr1-O2^{i}	82.61 (10)	
O6^{i}-Pr1-O1^{i}	64.16 (8)		O6^{i}-Pr1-O2^{i}	81.46 (9)	
O6^{i}-Pr1-O3	67.42 (9)		O6^{i}-Pr1-O8^{ii}	139.41 (10)	

O6^{i}-Pr1-N1	79.97 (9)	O6^{i}-Pr1-N2	136.13 (9)
O8^{ii}-Pr1-O2^{i}	134.28 (9)	O8^{ii}-Pr1-O3	72.08 (9)
O8^{ii}-Pr1-N1	92.64 (10)	O8^{ii}-Pr1-N2	66.13 (9)
O8^{ii}-Pr1-O1^{i}	150.51 (9)	N1-Pr1-O1^{i}	112.07 (9)
N1-Pr1-N2	60.88 (10)	N2-Pr1-O1^{i}	111.25 (9)

Symmetry transformations used to generate equivalent atoms: (i) -*x*+2, -*y*+1, -*z*+1; (ii) -*x*+1, -*y*+1, -*z*+1.

3-Nd

Bond lengths (Å)

Nd1-N1	2.656 (3)	Nd1-N2	2.720 (3)	Nd1-O1^{i}	2.827 (3)
Nd1-O1	2.389 (3)	Nd1-O2^{i}	2.518 (3)	Nd1-O3	2.518 (3)
Nd1-O5	2.428 (3)	Nd1-O6^{i}	2.408 (3)	Nd1-O7	2.497 (3)
O1-Nd1^{i}	2.827 (3)	O2-Nd1^{i}	2.518 (3)	O6-Nd1^{i}	2.408 (3)

Bond angles (°)

N1-Nd1-N2	61.10 (11)	N1-Nd1-O1^{i}	112.52 (9)
N2-Nd1-O1^{i}	111.34 (9)	O1-Nd1-N1	149.00 (10)
O1-Nd1-N2	146.43 (11)	O1-Nd1-O1^{i}	75.25 (9)
O1-Nd1-O2^{i}	123.52 (9)	O1-Nd1-O3	76.85 (9)
O1-Nd1-O5	77.30 (10)	O1-Nd1-O6^{i}	75.04 (9)
O1-Nd1-O7	91.63 (9)	O2^{i}-Nd1-N1	72.19 (10)
O2^{i}-Nd1-N2	69.06 (9)	O2^{i}-Nd1-O1^{i}	48.39 (8)
O3-Nd1-N1	75.28 (10)	O3-Nd1-N2	116.12 (10)
O3-Nd1-O1^{i}	128.08 (8)	O3-Nd1-O2^{i}	137.89 (10)
O5-Nd1-N1	79.70 (10)	O5-Nd1-N2	135.91 (10)
O5-Nd1-O1^{i}	64.19 (9)	O5-Nd1-O2^{i}	80.91 (9)
O5-Nd1-O3	67.47 (9)	O5-Nd1-O7	139.37 (9)
O6^{i}-Nd1-N1	135.88 (10)	O6^{i}-Nd1-N2	76.32 (10)
O6^{i}-Nd1-O1^{i}	71.32 (9)	O6^{i}-Nd1-O2^{i}	82.80 (10)
O6^{i}-Nd1-O3	139.15 (10)	O6^{i}-Nd1-O5	132.09 (9)
O6^{i}-Nd1-O7	79.81 (10)	O7-Nd1-N1	92.44 (10)
O7-Nd1-N2	66.25 (10)	O7-Nd1-O1^{i}	150.46 (9)
O7-Nd1-O2^{i}	134.66 (9)	O7-Nd1-O3	71.96 (10)

Symmetry transformations used to generate equivalent atoms: (i) -x+1, -y+1, -z+1; (ii) x-1, y, z; (iii) x+1, y, z.

3-Sm

Bond lengths (Å)

Sm1-O1	2.362(3)	Sm1-O1^{i}	2.869 (3)	Sm1-O2^{i}	2.489 (3)
Sm1-O3	2.512 (3)	Sm1-O5	2.394 (3)	Sm1-O6^{i}	2.408 (3)
Sm1-O7^{ii}	2.483 (3)	Sm1-N1	2.633 (4)	Sm1-N2	2.697 (4)
O1- Sm1^{i}	2.868 (3)	O2-Sm1^{i}	2.489 (3)	O6-Sm1^{i}	2.408 (3)

Bond angles (°)

O1-Sm1-O1^{i}	75.49 (11)	O1-Sm1-O2^{i}	123.56 (10)
O1-Sm1-O3	76.23 (11)	O1-Sm1-O5	75.12 (10)
O1-Sm1-O6^{i}	77.49 (10)	O1-Sm1-O7^{ii}	90.99 (10)
O1-Sm1-N1	148.39 (11)	O1-Sm1-N2	145.68 (10)
O2^{i}-Sm1-O1^{i}	48.22 (9)	O2^{i}-Sm1-O3	137.97 (10)

O2^{i}-Sm1-N1	73.04 (11)	O2^{i}-Sm1-N2	69.58 (10)
O3-Sm1-O1^{i}	127.34 (9)	O3-Sm1-N2	116.83 (11)
O5-Sm1-O1^{i}	70.86 (9)	O5-Sm1-O2^{i}	82.11 (11)
O5-Sm1-O3	139.63 (11)	O5-Sm1-O6^{i}	131.26 (10)
O5-Sm1-O7^{ii}	80.57 (10)	O5-Sm1-N1	136.39 (11)
O5-Sm1-N2	75.98 (11)	O6^{i}-Sm1-O1^{i}	63.63 (9)
O6^{i}-Sm1-O2^{i}	80.54 (11)	O6^{i}-Sm1-O3	67.42 (10)
O6^{i}-Sm1-O7^{ii}	139.43 (11)	O6^{i}-Sm1-N1	79.65 (10)
O6i-Sm1-N2	136.46 (11)	O7^{ii}-Sm1-O1^{i}	150.62 (9)
O7^{ii}-Sm1-O2^{i}	135.21 (10)	O7^{ii}-Sm1-O3	72.08 (10)
O7^{ii}-Sm1-N1	92.35 (11)	O7^{ii}-Sm1-N2	66.26 (11)
N1-Sm1-O1^{i}	112.91 (10)	N2-Sm1-O1^{i}	111.59 (10)
N1-Sm1-N2	62.05 (11)		

Symmetry transformations used to generate equivalent atoms: (i) −x+2, −y+1, −z+1; (ii) −x+1, −y+1, −z+1.

3-Gd

Bond lengths (Å)

Gd1-O1	2.309 (4)	Gd1-O1^{i}	2.858 (4)	Gd1-O2^{i}	2.436 (4)
Gd1-O3	2.493 (5)	Gd1-O5	2.341 (4)	Gd1-O6^{i}	2.364 (4)
Gd1-O7^{ii}	2.414 (4)	Gd1-N1	2.656 (5)	Gd1-N2	2.579 (5)
O1-Gd1^{i}	2.858 (4)	O2-Gd1^{i}	2.436 (4)	O6-Gd1^{i}	2.364 (4)
O7-Gd1^{ii}	2.414 (4)				

Bond angles (°)

O1-Gd1-O1^{i}	75.49 (15)	O1-Gd1-O2^{i}	123.36 (15)
O1-Gd1-O3	75.88 (15)	O1-Gd1-O5	75.03 (15)
O1-Gd1-O6^{i}	77.64 (15)	O1-Gd1-O7^{ii}	90.78 (15)
O1-Gd1-N1	145.04 (16)	O1-Gd1-N2	148.35 (17)
O2^{i}-Gd1-O1^{i}	48.02 (13)	O2^{i}-Gd1-O3	137.72 (14)
O2^{i}-Gd1-N1	69.90 (15)	O2^{i}-Gd1-N2	73.38 (15)
O3-Gd1-O1^{i}	126.56 (13)	O3-Gd1-N1	117.83 (16)
O3-Gd1-N2	75.07 (16)	O5-Gd1-O1^{i}	70.55 (13)
O5-Gd1-O2^{i}	81.79 (15)	O5-Gd1-O3	140.02 (15)
O5-Gd1-O6^{i}	130.87 (14)	O5-Gd1-O7^{ii}	81.31 (15)
O5-Gd1-N1	75.56 (15)	O5-Gd1-N2	136.52 (16)
O6^{i}-Gd1-O1^{i}	63.46 (13)	O6^{i}-Gd1-O2^{i}	80.27 (15)
O6^{i}-Gd1-O3	66.90 (14)	O6^{i}-Gd1-O7^{ii}	139.12 (16)
O6^{i}-Gd1-N1	136.89 (15)	O6^{i}-Gd1-N2	79.66 (15)
O7^{ii}-Gd1-O1^{i}	150.96 (14)	O7^{ii}-Gd1-O2^{i}	135.78 (15)
O7^{ii}-Gd1-O3	72.27 (15)	O7^{ii}-Gd1-N1	66.40 (15)
O7^{ii}-Gd1-N2	92.13 (15)	N1-Gd1-O1^{i}	111.51 (14)
N2-Gd1-O1^{i}	113.05 (14)	N2-Gd1-N1	62.67 (17)

Symmetry transformations used to generate equivalent atoms: (i) -*x*, -*y*+1, -*z*+1; (ii) -*x*-1, -*y*+1, -*z*+1.

4-La

Bond lengths (Å)

La1-O1^{i}	2.359 (8)	La1-O2^{i}	2.432 (9)	La1-O3	2.333 (8)

La1-O4	2.403 (9)	La1-O5	2.209 (9)	La1-O6^{ii}	2.333 (8)
La1-O7	2.403 (9)	La1-O8	2.318 (9)	O1-La1^{i}	2.359 (8)
O2-La1^{i}	2.432 (8)	O6-La1^{ii}	2.274 (8)		

Bond angles (°)			
O1^{i}-La1-O2^{i}	54.6 (3)	O1^{i}-La1-O4	129.0 (3)
O1^{i}-La1-O7	138.2 (3)	O3-La1-O1^{i}	83.7 (3)
O3-La1-O2^{i}	73.3 (3)	O3-La1-O4	54.8 (3)
O3-La1-O7	130.2 (3)	O4-La1-O2^{i}	123.6 (3)
O5-La1-O1^{i}	75.9 (3)	O5-La1-O2^{i}	123.6 (3)
O5-La1-O3	94.7 (3)	O5-La1-O4	79.3 (3)
O5-La1-O6^{ii}	112.9 (3)	O5-La1-O7	77.4 (3)
O5-La1-O8	151.9 (4)	O6^{ii}-La1-O1^{i}	86.1 (3)
O6^{ii}-La1-O2^{i}	75.3 (3)	O6^{ii}-La1-O3	147.1 (3)
O6^{ii}-La1-O4	144.9 (3)	O6^{ii}-La1-O7	75.5 (3)
O6^{ii}-La1-O8	80.1 (4)	O7-La1-O2^{i}	75.5 (3)
O7-La1-O4	80.1 (4)	O8-La1-O1^{i}	131.4 (3)
O8-La1-O2^{i}	76.9 (3)	O8-La1-O3	83.6 (3)
O8-La1-O4	76.9 (3)	O8-La1-O7	82.3 (3)

Symmetry transformations used to generate equivalent atoms: (i) −x+3/2, y, −z+3/2; (ii) −x+1, −y+1, −z+1; (iii) −x+1, −y, −z+1.

4-Ce

Bond lengths (Å)					
Ce1-O1^{i}	2.571 (4)	Ce1-O2^{i}	2.527 (4)	Ce1-O3	2.497 (4)
Ce1-O4	2.550 (4)	Ce1-O5^{ii}	2.889 (4)	Ce1-O5	2.455 (4)
Ce1-O6^{ii}	2.464 (4)	Ce1-O7	2.518 (4)	Ce1-O8	2.554 (4)
O1-Ce1^{i}	2.571 (4)	O5-Ce1^{ii}	2.889 (4)	O6-Ce1^{ii}	2.464 (4)

Bond angles (°)			
O1^{i}-Ce1-O5^{ii}	96.58 (12)	O2^{i}-Ce1-O1^{i}	51.19 (13)
O2^{i}-Ce1-O4	124.01 (13)	O2^{i}-Ce1-O5^{ii}	77.31 (12)
O2^{i}-Ce1-O8	144.19 (13)	O3-Ce1-O1^{i}	72.45 (14)
O3-Ce1-O2^{i}	81.55 (13)	O3-Ce1-O4	51.53 (13)
O3-Ce1-O5^{ii}	158.56 (13)	O3-Ce1-O7	78.82 (14)
O3-Ce1-O8	126.19 (14)	O4-Ce1-O1^{i}	121.20 (13)
O4-Ce1-O5^{ii}	142.18 (12)	O4-Ce1-O8	75.02 (14)
O5-Ce1-O1^{i}	126.70 (13)	O5-Ce1-O2^{i}	75.66 (13)
O5-Ce1-O3	98.86 (14)	O5-Ce1-O4	82.68 (13)
5-Ce1-O5^{ii}	72.52 (13)	O5-Ce1-O6^{ii}	119.73 (14)
O5-Ce1-O7	154.38 (15)	O5-Ce1-O8	77.68 (13)
O6^{ii}-Ce1-O1^{i}	73.96 (15)	O6^{ii}-Ce1-O2^{i}	94.90 (14)
O6^{ii}-Ce1-O3	139.23 (15)	O6^{ii}-Ce1-O4	139.93 (15)
O6^{ii}-Ce1-O5^{ii}	47.62 (12)	O6^{ii}-Ce1-O7	71.82 (14)
O6^{ii}-Ce1-O8	78.08 (16)	O7-Ce1-O1^{i}	77.35 (14)
O7-Ce1-O2^{i}	128.35 (14)	O7-Ce1-O4	75.96 (15)
O7-Ce1-O5^{ii}	117.50 (13)	O7-Ce1-O8	83.21 (14)
O8-Ce1-O1^{i}	149.75 (13)	O8-Ce1-O5^{ii}	72.14 (13)

Symmetry transformations used to generate equivalent atoms: (i) −x+1/2, y, −z+1/2; (ii) −x+1, −y+1, −z+1; (iii) −x+1, −y, −z+1.

4-Pr

Bond lengths (Å)

Pr1-O1^{i}	2.572 (5)	Pr1-O2^{i}	2.509 (4)	Pr1-O3	2.539 (5)
Pr1-O4	2.493 (5)	Pr1-O5	2.458 (4)	Pr1-O5^{ii}	2.893 (5)
Pr1-O6^{ii}	2.457 (5)	Pr1-O7	2.505 (5)	Pr1-O8	2.540 (5)
O1-Pr1^{i}	2.572 (5)	O2-Pr1^{i}	2.509 (4)	O5-Pr1^{ii}	2.893 (5)
O6-Pr1^{ii}	2.457 (5)				

Bond angles (°)

O1^{i}-Pr1-O5^{ii}	96.46 (14)	O2^{i}-Pr1-O1^{i}	51.48 (14)
O2^{i}-Pr1-O3	124.05 (15)	O2^{i}-Pr1-O5^{ii}	77.07 (13)
O2^{i}-Pr1-O8	144.05 (14)	O3-Pr1-O1^{i}	121.43 (15)
O3-Pr1-O5^{ii}	142.08 (14)	O3-Pr1-O8	75.35 (15)
O4-Pr1-O1^{i}	72.23 (16)	O4-Pr1-O2^{i}	81.33 (15)
O4-Pr1-O3	52.02 (15)	O4-Pr1-O5^{ii}	158.13 (15)
O4-Pr1-O7	78.73 (18)	O4-Pr1-O8	126.95 (16)
O5-Pr1-O1^{i}	78.73 (18)	O5-Pr1-O2^{i}	75.62 (15)
O5-Pr1-O3	82.60 (15)	O5-Pr1-O4	99.13 (16)
O5-Pr1-O5^{ii}	72.30 (16)	O5-Pr1-O7	153.9 (2)
O5-Pr1-O8	77.91 (15)	O6^{ii}-Pr1-O1^{i}	73.95 (17)
O6^{ii}-Pr1-O2^{i}	94.89 (17)	O6^{ii}-Pr1-O3	140.03 (17)
O6^{ii}-Pr1-O4	139.26 (17)	O6^{ii}-Pr1-O5	119.33 (15)
O6^{ii}-Pr1-O5^{ii}	47.48 (14)	O6^{ii}-Pr1-O7	72.38 (19)
O6^{ii}-Pr1-O8	77.41 (18)	O7-Pr1-O1^{i}	77.6 (2)
O7-Pr1-O2^{i}	128.86 (19)	O7-Pr1-O3	75.61 (19)
O7-Pr1-O5^{ii}	117.90 (17)	O7-Pr1-O8	82.73 (19)
O8-Pr1-O1^{i}	149.01 (15)	O8-Pr1-O5^{ii}	71.96 (15)

Symmetry transformations used to generate equivalent atoms: (i) −x+3/2, y, −z+3/2; (ii) −x+1, −y+1, −z+1; (iii) −x+1, −y+2, −z+1.

4-Nd

Bond lengths (Å)

Nd1-O1^{i}	2.551 (7)	Nd1-O2^{i}	2.495 (7)	Nd1-O3	2.505 (7)
Nd1-O4	2.470 (7)	Nd1-O5	2.406 (7)	Nd1-O5^{ii}	2.893 (7)
Nd1-O6^{ii}	2.413 (8)	Nd1-O7	2.482 (8)	Nd1-O8	2.515 (7)
O1-Nd1^{i}	2.551 (7)	O2-Nd1^{i}	2.495 (7)	O5-Nd1^{ii}	2.893 (7)
O6-Nd1^{ii}	2.413 (8)				

Bond angles (°)

O1^{i}-Nd1-O5^{ii}	97.1 (2)	O2^{i}-Nd1-O1^{i}	51.4 (2)
O2^{i}-Nd1-O3	124.6 (2)	O2^{i}-Nd1-O5^{ii}	77.2 (2)
O2i-Nd1-O8	144.1 (2)	O3-Nd1-O1^{i}	121.8 (2)
O3-Nd1-O5^{ii}	141.1 (2)	O3-Nd1-O8	74.7 (2)
O4-Nd1-O1^{i}	72.3 (2)	O4-Nd1-O2^{i}	81.2 (2)
O4-Nd1-O3	52.5 (2)	O4-Nd1-O5^{ii}	157.9 (2)
O4-Nd1-O7	79.3 (3)	O4-Nd1-O8	126.9 (2)
O5-Nd1-O1^{i}	126.8 (2)	O5-Nd1-O2^{i}	75.6 (2)

O5-Nd1-O3	82.4 (2)	O5-Nd1-O4	98.5 (3)
O5-Nd1-O5^{ii}	71.9 (3)	O5-Nd1-O6^{ii}	119.0 (2)
O5-Nd1-O7	153.9 (3)	O5-Nd1-O8	78.1 (2)
O6^{ii}-Nd1-O1^{i}	74.1 (3)	O6^{ii}-Nd1-O2^{i}	94.5 (3)
O6^{ii}-Nd1-O3	140.0 (3)	O6^{ii}-Nd1-O4	140.0 (3)
O6^{ii}-Nd1-O5^{ii}	47.5 (2)	O6^{ii}-Nd1-O7	72.8 (3)
O6^{ii}-Nd1-O8	77.5 (3)	O7-Nd1-O1^{i}	77.7 (3)
O7-Nd1-O2^{i}	129.0 (3)	O7-Nd1-O3	75.6 (3)
O7-Nd1-O5^{ii}	118.1 (3)	O7-Nd1-O8	82.6 (3)
O8-Nd1-O1^{i}	149.1 (2)	O8-Nd1-O5^{ii}	71.7 (2)

Symmetry transformations used to generate equivalent atoms: (i) −x+3/2, y, −z+3/2; (ii) −x+1, −y+1, −z+1; (iii) −x+1, −y+2, −z+1.

4-Sm

Bond lengths (Å)

Sm1-O1^{i}	2.542 (5)	Sm1-O2^{i}	2.463 (4)	Sm1-O3	2.433 (5)
Sm1-O4	2.491 (5)	Sm1-O5	2.375 (5)	Sm1-O6^{ii}	2.392 (5)
Sm1-O7	2.449 (5)	Sm1-O8	2.481 (5)	O1-Sm1^{i}	2.542 (5)
O2-Sm1^{i}	2.463 (4)	O6-Sm1^{ii}	2.392 (5)		

Bond angles (°)

O2^{i}-Sm1-O1^{i}	52.32 (15)	O2^{i}-Sm1-O4	125.33 (16)
O2^{i}-Sm1-O8	142.71 (16)	O3-Sm1-O1^{i}	72.19 (17)
O3-Sm1-O2^{i}	81.72 (16)	O3-Sm1-O4	52.79 (15)
O3-Sm1-O7	79.95 (19)	O3-Sm1-O8	128.05 (17)
O4-Sm1-O1^{i}	121.66 (16)	O5-Sm1-O1^{i}	127.55 (16)
O5-Sm1-O2^{i}	75.49 (15)	O5-Sm1-O3	98.02 (18)
O5-Sm1-O4	82.07 (17)	O5-Sm1-O6^{ii}	117.95 (18)
O5-Sm1-O7	153.54 (19)	O5-Sm1-O8	78.10 (17)
O6^{ii}-Sm1-O1^{i}	74.10 (18)	O6^{ii}-Sm1-O2^{i}	92.79 (18)
O6^{ii}-Sm1-O3	141.07 (18)	O6^{ii}-Sm1-O4	141.30 (19)
O6^{ii}-Sm1-O7	74.14 (19)	O6^{ii}-Sm1-O8	76.91 (19)
O7-Sm1-O1^{i}	77.29 (18)	O7-Sm1-O2^{i}	129.52 (17)
O7-Sm1-O4	75.74 (19)	O7-Sm1-O8	82.53 (17)
O8-Sm1-O1^{i}	148.21 (17)	O8-Sm1-O4	75.58 (17)

Symmetry transformations used to generate equivalent atoms: (i) −x+1/2, y, −z+1/2; (ii) −x+1, −y+1, −z+1; (iii) −x+1, −y+2, −z+1.

4-Eu

Bond lengths (Å)

Eu1-O1^{i}	2.511 (8)	Eu1-O2^{i}	2.456 (8)	Eu1-O3	2.491 (8)
Eu1-O4	2.436 (8)	Eu1-O5	2.353 (7)	Eu1-O5^{ii}	3.000 (8)
Eu1-O6^{ii}	2.379 (8)	Eu1-O7	2.430 (8)	Eu1-O8	2.475 (8)
O1-Eu1^{i}	2.511 (8)	O2-Eu1^{i}	2.456 (8)	O5-Eu1^{ii}	3.000 (8)
O6-Eu1^{ii}	2.379 (8)				

Bond angles (°)

O1^{i}-Eu1-O5^{ii}	97.9 (2)	O2^{i}-Eu1-O1^{i}	52.5 (2)
O2^{i}-Eu1-O3	125.7 (3)	O2^{i}-Eu1-O5^{ii}	75.5 (2)
O2^{i}-Eu1-O8	142.1 (2)	O3-Eu1-O1^{i}	121.6 (2)

O3-Eu1-O5^{ii}	140.5 (2)	O4-Eu1-O1^{i}	72.1 (3)
O4-Eu1-O2^{i}	81.6 (3)	O4-Eu1-O3	53.1 (3)
O4-Eu1-O5^{ii}	156.3 (3)	O4-Eu1-O8	128.5 (3)
O5-Eu1-O1^{i}	127.8 (3)	O5-Eu1-O2^{i}	75.6 (3)
O5-Eu1-O3	81.7 (3)	O5-Eu1-O4	97.3 (3)
O5-Eu1-O5^{ii}	71.5 (3)	O5-Eu1-O6^{ii}	117.5 (3)
O5-Eu1-O7	153.6 (3)	O5-Eu1-O8	77.8 (3)
O6^{ii}-Eu1-O1^{i}	73.7 (3)	O6^{ii}-Eu1-O2^{i}	91.3 (3)
O6^{ii}-Eu1-O3	142.5 (3)	O6^{ii}-Eu1-O4	141.6 (3)
O6^{ii}-Eu1-O5^{ii}	46.2 (2)	O6^{ii}-Eu1-O7	74.7 (3)
O6^{ii}-Eu1-O8	77.6 (3)	O7-Eu1-O1^{i}	77.0 (3)

Symmetry transformations used to generate equivalent atoms: (i) −x+3/2, y, −z+3/2; (ii) −x+1, −y+1, −z+1; (iii) −x+1, −y, −z+1.

4-Gd

Bond lengths (Å)

Gd1-O1^{i}	2.515 (6)	Gd1-O2^{i}	2.431 (6)	Gd1-O3	2.413 (6)
Gd1-O4	2.468 (6)	Gd1-O5	2.345 (6)	Gd1-O6^{ii}	2.363 (7)
Gd1-O7	2.422 (6)	Gd1-O8	2.458 (6)	O1-Gd1^{i}	2.515 (6)
O2-Gd1^{i}	2.431 (6)	O6-Gd1^{ii}	2.363 (7)		

Bond angles (°)

O2^{i}-Gd1-O1^{i}	53.00 (18)	O2^{i}-Gd1-O4	125.9 (2)
O2^{i}-Gd1-O8	141.93 (18)	O3-Gd1-O1^{i}	72.6 (2)
O3-Gd1-O2^{i}	81.9 (2)	O3-Gd1-O4	53.2 (2)
O3-Gd1-O7	80.8 (2)	O3-Gd1-O8	128.7 (2)
O4-Gd1-O1^{i}	122.22 (19)	O5-Gd1-O1^{i}	128.2 (2)
O5-Gd1-O2^{i}	75.5 (2)	O5-Gd1-O3	97.3 (2)
O5-Gd1-O4	81.4 (2)	O5-Gd1-O6^{ii}	117.6 (2)
O5-Gd1-O7	152.7 (3)	O5-Gd1-O8	117.6 (2)
O6^{ii}-Gd1-O1^{i}	74.0 (2)	O6^{ii}-Gd1-O2^{i}	92.2 (2)
O6^{ii}-Gd1-O3	142.1 (2)	O6^{ii}-Gd1-O4	141.5 (2)
O6^{ii}-Gd1-O7	74.8 (2)	O6^{ii}-Gd1-O8	76.2 (2)
O7-Gd1-O1^{i}	77.5 (2)	O7-Gd1-O2^{i}	130.4 (2)
O7-Gd1-O4	75.6 (2)	O7-Gd1-O8	82.0 (2)
O8-Gd1-O1^{i}	147.3 (2)	O8-Gd1-O4	75.7 (2)

Symmetry transformations used to generate equivalent atoms: (i) −x+1/2, y, −z+1/2; (ii) −x+1, −y+1, −z+1; (iii) −x+1, −y, −z+1.

4-Tb

Bond lengths (Å)

Tb01-O1^{i}	2.519 (6)	Tb01-O2^{i}	2.442 (6)	Tb01-O3	2.475 (7)
Tb01-O4	2.415 (7)	Tb01-O5	2.322 (7)	Tb01-O6^{ii}	2.347 (7)
Tb01-O7	2.410 (7)	Tb01-O8	2.472 (6)	Tb01-C1^{i}	2.848 (8)
O1-Tb01^{i}	2.519 (6)	O2-Tb01^{i}	2.442 (6)	O6-Tb01^{ii}	2.347 (7)

Bond angles (°)

O2^{i}-Tb01-O1^{i}	53.0 (2)	O2^{i}-Tb01-O3	127.2 (2)
O2^{i}-Tb01-O8	140.6 (2)	O3-Tb01-O1^{i}	122.7 (2)
O4-Tb01-O1^{i}	72.4 (2)	O4-Tb01-O2^{i}	82.4 (2)

O4-Tb01-O3	54.2 (2)	O4-Tb01-O8	129.7 (2)
O5-Tb01-O1^{i}	128.4 (2)	O5-Tb01-O2^{i}	75.8 (2)
O5-Tb01-O3	80.9 (2)	O5-Tb01-O4	96.8 (3)
O5-Tb01-O6^{ii}	115.9 (3)	O5-Tb01-O7	152.8 (3)
O5-Tb01-O8	77.8 (2)	O6^{ii}-Tb01-O1^{i}	74.2 (2)
O6^{ii}-Tb01-O2^{i}	89.6 (2)	O6^{ii}-Tb01-O3	143.1 (3)
O6^{ii}-Tb01-O4	143.2 (2)	O6^{ii}-Tb01-O7	76.5 (3)
O6^{ii}-Tb01-O8	76.3 (2)	O7-Tb01-O1^{i}	77.3 (2)
O7-Tb01-O2^{i}	130.3 (2)	O7-Tb01-O3	76.3 (3)
O7-Tb01-O4	81.6 (3)	O7-Tb01-O8	82.4 (2)
O8-Tb01-O1^{i}	147.2 (2)	O8-Tb01-O3	75.8 (2)

Symmetry transformations used to generate equivalent atoms: (i) −x+1/2, y, −z+1/2; (ii) −x+1, −y+1, −z+1; (iii) −x+1, −y, −z+1.

4-Er

Bond lengths (Å)

Er1-O1^{i}	2.476 (4)	Er1-O2^{i}	2.382 (4)	Er1-O3	2.354 (4)
Er1-O4	2.433 (4)	Er1-O5	2.245 (4)	Er1-O6^{ii}	2.293 (5)
Er1-O7	2.18 (4)	Er1-O7A	2.422 (15)	Er1-O8	2.411 (4)
O1-Er1^{i}	2.476 (4)	O2-Er1^{i}	2.382 (4)	O6-Er1^{ii}	2.293 (5)

Bond angles (º)

O2^{i}-Er1-O1^{i}	53.84 (13)	O2^{i}-Er1-O4	128.35 (15)
O2^{i}-Er1-O7A	131.3 (5)	O2^{i}-Er1-O8	139.17 (13)
O3-Er1-O1^{i}	73.63 (15)	O3-Er1-O2^{i}	83.21 (14)
O3-Er1-O4	54.49 (14)	O3-Er1-O7A	82.2 (3)
O3-Er1-O8	130.02 (15)	O4-Er1-O1^{i}	123.82 (14)
O5-Er1-O1^{i}	128.96 (14)	O5-Er1-O2^{i}	75.67 (15)
O5-Er1-O3	95.40 (17)	O5-Er1-O4	80.02 (16)
O5-Er1-O6^{ii}	114.33 (17)	O5-Er1-O7A	151.9 (6)
O5-Er1-O8	77.86 (16)	O6^{ii}-Er1-O1^{i}	73.90 (16)
O6^{ii}-Er1-O2^{i}	87.26 (16)	O6^{ii}-Er1-O3	145.39 (16)
O6^{ii}-Er1-O4	144.39 (16)	O6^{ii}-Er1-O7A	79.4 (5)
O6^{ii}-Er1-O8	76.02 (16)	O7-Er1-O1^{i}	76.5 (15)
O7-Er1-O2^{i}	130.3 (15)	O7-Er1-O3	84.3 (8)
O7-Er1-O4	78.3 (16)	O7-Er1-O5	153.5 (17)
O7-Er1-O6^{ii}	76.8 (12)	O7-Er1-O8	82.1 (11)
O7A-Er1-O1^{i}	77.5 (5)	O7A-Er1-O4	75.9 (6)
O8-Er1-O1^{i}	146.25 (15)	O8-Er1-O4	75.67 (15)
O8-Er1-O7A	82.3 (4)		

Symmetry transformations used to generate equivalent atoms: (i) −*x*+3/2, *y*, −*z*+3/2; (ii) −*x*+1, −*y*+1, −*z*+1; (iii) −*x*+1, −*y*, −*z*+1.

4-Yb

Bond lengths (Å)

Yb1-O1^{i}	2.361 (5)	Yb1-O2^{i}	2.464 (5)	Yb1-O3	2.422 (5)
Yb1-O4	2.335 (5)	Yb1-O5	2.217 (5)	Yb1-O6^{ii}	2.279 (5)
Yb1-O7	2.320 (5)	Yb1-O8	2.393 (5)	O1-Yb1^{i}	2.361 (5)
O2-Yb1^{i}	2.464 (5)	O6-Yb1^{ii}	2.279 (5)		

Bond angles (°)					
O1^{i}-Yb1-O2^{i}	54.26 (16)		O1^{i}-Yb1-O3	129.28 (19)	
O1^{i}-Yb1-O8	137.87 (17)		O3-Yb1-O2^{i}	124.00 (18)	
O4-Yb1-O1^{i}	83.63 (18)		O4-Yb1-O2^{i}	73.35 (18)	
O4-Yb1-O3	55.16 (17)		O4-Yb1-O8	130.65 (18)	
O5-Yb1-O1^{i}	75.59 (18)		O5-Yb1-O2^{i}	129.02 (18)	
O5-Yb1-O3	79.3 (2)		O5-Yb1-O4	94.41 (19)	
O5-Yb1-O6^{ii}	113.08 (19)		O5-Yb1-O7	151.7 (2)	
O5-Yb1-O8	77.75 (19)		O6^{ii}-Yb1-O1^{i}	85.39 (18)	
O6^{ii}-Yb1-O2^{i}	74.71 (18)		O6^{ii}-Yb1-O3	145.28 (19)	
O6^{ii}-Yb1-O4	146.69 (18)		O6^{ii}-Yb1-O7	80.7 (2)	
O6^{ii}-Yb1-O8	75.81 (19)		O7-Yb1-O1^{i}	131.82 (18)	
O7-Yb1-O2^{i}	77.56 (18)		O7-Yb1-O3	76.4 (2)	
O7-Yb1-O4	83.53 (19)		O7-Yb1-O8	82.25 (18)	
O8-Yb1-O2^{i}	146.47 (17)		O8-Yb1-O3	75.57 (18)	
Symmetry transformations used to generate equivalent atoms: (i) −x, y, −z+3/2; (ii) −x, −y+1, −z+1; (iii) −x, −y+2, −z+1.					
4-Dy					
Bond lengths (Å)					
Dy1-O1^{i}	2.501 (6)	Dy1-O2^{i}	2.398 (6)	Dy1-O3	2.375 (6)
Dy1-O6^{ii}	2.319 (7)	Dy1-O7	2.371(6)	Dy1-O8	2.435 (6)
O1-Dy1^{i}	2.501 (6)	O2-Dy1^{i}	2.398 (6)	O6-Dy1^{ii}	2.319 (7)
Dy1-O4	2.454 (7)				
Bond angles (°)					
O2^{i}-Dy1-O1^{i}	53.61 (18)		O2^{i}-Dy1-O4	127.7 (2)	
O3-Dy1-O1^{i}	73.1 (2)		O3-Dy1-O2^{i}	82.6 (2)	
O3-Dy1-O4	54.5 (2)		O3-Dy1-O8	130.1 (2)	
O4-Dy1-O1^{i}	123.5 (2)		O5-Dy1-O1^{i}	128.6 (2)	
O5-Dy1-O2^{i}	75.4 (2)		O5-Dy1-O3	95.9 (3)	
O5-Dy1-O4	80.5 (2)		O5-Dy1-O6^{ii}	115.5 (2)	
O5-Dy1-O7	153.0 (3)		O5-Dy1-O8	78.1 (2)	
O6^{ii}-Dy1-O1^{i}	73.8 (2)		O6^{ii}-Dy1-O2^{i}	88.7 (2)	
O6^{ii}-Dy1-O3	144.1 (2)		O6^{ii}-Dy1-O4	143.5 (2)	
O6^{ii}-Dy1-O7	77.2 (2)		O6^{ii}-Dy1-O8	76.0 (2)	
O7-Dy1-O1^{i}	76.8 (2)		O7-Dy1-O2^{i}	130.4 (2)	
O7-Dy1-O3	82.2 (2)		O7-Dy1-O4	76.6 (2)	
O7-Dy1-O8	82.6 (2)		O8-Dy1-O1^{i}	146.4 (2)	
O8-Dy1-O4	75.8 (2)				
Symmetry transformations used to generate equivalent atoms: (i) −*x*+1/2, *y*, −*z*+1/2; (ii) −*x*+1, −*y*+1, −*z*+1; (iii) −*x*+1, −*y*, −*z*+1.					
4-Tm					
Bond lengths (Å)					
Tm1-O3^{i}	2.479 (5)	Tm1-O4^{i}	2.362 (5)	Tm1-O5	2.422 (6)
Tm1-O6	2.327 (5)	Tm1-O7	2.216 (6)	Tm1-O8^{ii}	2.265 (5)
Tm1-O9	2.331 (6)	Tm1-O10	2.398 (5)	O3-Tm1^{i}	2.479 (5)
O4-Tm1^{i}	2.362 (5)	O8-Tm1^{ii}	2.265 (5)		

Bond angles (°)					
O4^{i}-Tm1-O3^{i}	53.74 (16)		O4^{i}-Tm1-O5	128.7 (2)	
O4^{i}-Tm1-O10	138.38 (17)		O5-Tm1-O3^{i}	124.05 (18)	
O6-Tm1-O3^{i}	73.78 (19)		O6-Tm1-O4^{i}	83.19 (18)	
O6-Tm1-O5	54.72 (18)		O6-Tm1-O9	83.3 (2)	
O6-Tm1-O10	130.73 (19)		O7-Tm1-O3^{i}	128.77 (19)	
O7-Tm1-O4^{i}	75.66 (19)		O7-Tm1-O5	79.8 (2)	
O7-Tm1-O6	94.7 (2)		O7-Tm1-O8^{ii}	113.5 (2)	
O7-Tm1-O9	152.3 (2)		O7-Tm1-O10	77.9 (2)	
O7-Tm1-O10	77.9 (2)		O8^{ii}-Tm1-O3^{i}	74.6 (2)	
O8^{ii}-Tm1-O4^{i}	86.7 (2)		O8^{ii}-Tm1-O5	144.5 (2)	
O8^{ii}-Tm1-O6	146.6 (2)		O8^{ii}-Tm1-O9	79.5 (2)	
O8^{ii}-Tm1-O10	75.1 (2)		O9-Tm1-O3^{i}	77.28 (19)	
O9-Tm1-O4^{i}	131.02 (19)		O9-Tm1-O5	76.6 (2)	
O9-Tm1-O10	82.61 (19)		O10-Tm1-O3^{i}	146.10 (18)	
O10-Tm1-O5	76.10 (19)				
Symmetry transformations used to generate equivalent atoms: (i) −x+3/2, y, −z+3/2; (ii) −x+1, −y+1, −z+1; (iii) −x+1, −y, −z+1.					
5-Sm					
Bond lengths (Å)					
Sm1-O1	2.310 (5)	Sm1-O2^{i}	2.384 (5)	Sm1-O3	2.529 (5)
Sm1-O5	2.308 (5)	Sm1-O5^{i}	2.777 (5)	Sm1-O6^{i}	2.405 (5)
Sm1-O8^{ii}	2.370 (5)	Sm1-O10	2.403 (5)	Sm2-O3	2.484 (5)
Sm2-O4	2.479 (6)	Sm2-O8^{ii}	2.672 (5)	Sm2-O7^{ii}	2.473 (5)
Sm2-O9	2.652 (5)	Sm2-O10	2.586 (6)	Sm2-O11	2.322 (6)
Sm2-O12^{iii}	2.313 (6)	Sm2-O13	2.457 (6)	O2-Sm1^{i}	2.384 (5)
O5-Sm1^{i}	2.777 (5)	O6-Sm1^{i}	2.405 (5)	O8-Sm1^{iv}	2.370 (5)
O8-Sm2^{iv}	2.672 (5)	O7-Sm2^{iv}	2.474 (5)	O12-Sm2^{iii}	2.313 (6)
Bond angles (°)					
O1-Sm1-O2^{i}	134.25 (17)		O1-Sm1-O3	76.49 (17)	
O1-Sm1-O5^{i}	66.52 (17)		O1-Sm1-O6^{i}	82.48 (18)	
O1-Sm1-O8^{ii}	87.2 (2)		O1-Sm1-O10	146.68 (19)	
O2^{i}-Sm1-O3	134.08 (17)		O2^{i}-Sm1-O5^{i}	70.34 (16)	
O2^{i}-Sm1-O6^{i}	81.22 (18)		O2^{i}-Sm1-O10	78.34 (18)	
O3-Sm1-O5^{i}	138.43 (16)		O5-Sm1-O1	79.21 (18)	
O5-Sm1-O2^{i}	78.46 (19)		O5-Sm1-O3	75.89 (17)	
O5-Sm1-O5^{i}	79.11 (17)		O5-Sm1-O6^{i}	128.72 (17)	
O5-Sm1-O8^{ii}	145.3 (2)		O5-Sm1-O10	106.38 (18)	
O6^{i}-Sm1-O3	143.71 (16)		O6^{i}-Sm1-O5^{i}	49.71 (15)	
O8^{ii}-Sm1-O2^{i}	130.8 (2)		O8^{ii}-Sm1-O3	69.94 (18)	
O8^{ii}-Sm1-O5^{i}	124.19 (16)		O8^{ii}-Sm1-O6^{i}	79.92 (17)	
O8^{ii}-Sm1-O10	69.43 (19)		O10-Sm1-O3	73.34 (18)	
O10-Sm1-O5^{i}	146.50 (18)		O10-Sm1-O6^{i}	114.78 (19)	
O3-Sm2-O8^{ii}	65.96 (16)		O3-Sm2-O9	83.45 (16)	
O3-Sm2-O10	71.06 (17)		O4-Sm2-O3	53.02 (17)	

O4-Sm2-O8^{ii}	73.6 (2)	O4-Sm2-O9	131.21 (17)
O4-Sm2-O10	119.08 (17)	O7^{ii}-Sm2-O3	111.56 (17)
O7^{ii}-Sm2-O4	85.3 (2)	O7^{ii}-Sm2-O8^{ii}	50.01 (16)
O7^{ii}-Sm2-O9	136.4 (2)	O7^{ii}-Sm2-O10	95.4 (2)
O9-Sm2-O8^{ii}	110.97 (17)	O10-Sm2-O8^{ii}	62.24 (17)
O10-Sm2-O9	49.37 (16)	O11-Sm2-O3	149.22 (19)
O11-Sm2-O4	156.80 (18)	O11-Sm2-O8^{ii}	106.9 (2)
O11-Sm2-O7^{ii}	78.3 (2)	O11-Sm2-O9	71.06 (18)
O11-Sm2-O10	79.18 (19)	O11-Sm2-O13	76.6 (2)
O12^{iii}-Sm2-O3	82.61 (18)	O12^{iii}-Sm2-O4	78.7 (2)
O12^{iii}-Sm2-O8^{ii}	146.6 (2)	O12^{iii}-Sm2-O7^{ii}	145.5 (2)
O12^{iii}-Sm2-O9	74.4 (2)	O12^{iii}-Sm2-O10	119.1 (2)
O12^{iii}-Sm2-O11	105.9 (2)	O12^{iii}-Sm2-O13	75.8 (2)
O13-Sm2-O3	133.9 (2)	O13-Sm2-O4	82.7 (2)
O13-Sm2-O8^{ii}	117.88 (18)	O13-Sm2-O7^{ii}	71.9 (2)
O13-Sm2-O9	127.17 (18)	O13-Sm2-O10	154.5 (2)

Symmetry transformations used to generate equivalent atoms: (i) -x+1, -y+1, -z+1; (ii) x, y-1, z; (iii) -x, -y+1, -z+1; (iv) x, y+1, z.

5-Eu

Bond lengths (Å)

Eu1-O1	2.301 (4)	Eu1-O2^{i}	2.369 (4)	Eu1-O3	2.534 (5)
Eu1-O5^{i}	2.786 (5)	Eu1-O5	2.307 (4)	Eu1-O6^{i}	2.401 (4)
Eu1-O8^{iii}	2.357 (5)	Eu1-O9	2.398 (4)	Eu2-O3^{ii}	2.469 (4)
Eu2-O4^{ii}	2.454 (4)	Eu2-O7^{iv}	2.454 (5)	Eu2-O8^{iv}	2.667 (5)
Eu2-O9^{ii}	2.557 (5)	Eu2-O10^{ii}	2.659 (5)	Eu2-O11	2.292 (5)
Eu2-O12^{ii}	2.325 (5)	Eu2-O13	2.420 (5)	O2-Eu1^{i}	2.369 (4)
O3-Eu2^{ii}	2.469 (4)	O4-Eu2^{ii}	2.454 (4)	O5-Eu1^{i}	2.786 (5)
O6-Eu1^{i}	2.401 (4)	O7-Eu2^{iv}	2.454 (5)	O8-Eu1^{v}	2.357 (5)
O8-Eu2^{iv}	2.667 (5)	O9-Eu2^{ii}	2.557 (5)	O10-Eu2^{ii}	2.659 (5)
O12-Eu2^{ii}	2.325 (5)				

Bond angles (°)

O1-Eu1-O2^{i}	134.37 (16)	O1-Eu1-O3	76.52 (15)
O1-Eu1-O5	79.36 (16)	O1-Eu1-O5^{i}	66.55 (14)
O1-Eu1-O6^{i}	82.62 (15)	O1-Eu1-O8^{iii}	86.74 (16)
O1-Eu1-O9	146.26 (16)	O2^{i}-Eu1-O3	134.21 (15)
O2^{i}-Eu1-O5^{i}	70.40 (14)	O2^{i}-Eu1-O6^{i}	80.89 (16)
O2^{i}-Eu1-O9	78.68 (16)	O3-Eu1-O5^{i}	138.57 (13)
O5-Eu1-O2^{i}	78.80 (16)	O5-Eu1-O3	75.65 (15)
O5-Eu1-O5^{i}	79.62 (16)	O5-Eu1-O6^{i}	129.04 (16)
O5-Eu1-O8^{iii}	144.88 (17)	O5-Eu1-O9	106.29 (16)
O6^{i}-Eu1-O3	143.85 (15)	O6^{i}-Eu1-O5^{i}	49.52 (14)
O8^{iii}-Eu1-O2^{i}	131.04 (16)	O8^{iii}-Eu1-O3	69.77 (15)
O8^{iii}-Eu1-O5^{i}	123.80 (15)	O8^{iii}-Eu1-O6^{i}	79.97 (16)
O8^{iii}-Eu1-O9	69.47 (16)	O9-Eu1-O3	73.00 (15)
O9-Eu1-O5^{i}	146.83 (15)	O9-Eu1-O6^{i}	114.73 (16)

O3^{ii}-Eu2-O8^{iv}	65.98 (14)	O3^{ii}-Eu2-O9^{ii}	71.47 (15)
O3^{ii}-Eu2-O10^{ii}	83.65 (14)	O4^{ii}-Eu2-O3^{ii}	53.18 (15)
O4^{ii}-Eu2-O8^{iv}	73.65 (16)	O4^{ii}-Eu2-O9^{ii}	119.62 (15)
O4^{ii}-Eu2-O10^{ii}	131.55 (15)	O7^{iv}-Eu2-O3^{ii}	112.08 (15)
O7^{iv}-Eu2-O4^{ii}	85.99 (17)	O7^{iv}-Eu2-O8^{iv}	50.23 (15)
O7^{iv}-Eu2-O9^{ii}	95.00 (17)	O7^{iv}-Eu2-O10^{ii}	135.63 (16)
O9^{ii}-Eu2-O8^{iv}	62.45 (15)	O9^{ii}-Eu2-O10^{ii}	49.29 (15)
O10^{ii}-Eu2-O8^{iv}	111.07 (15)	O11-Eu2-O3^{ii}	82.12 (16)
O11-Eu2-O4^{ii}	78.38 (18)	O11-Eu2-O7^{iv}	146.02 (19)
O11-Eu2-O8^{iv}	146.15 (16)	O11-Eu2-O9^{ii}	118.97 (18)
O11-Eu2-O10^{ii}	74.46 (17)	O11-Eu2-O12^{ii}	105.96 (18)
O11-Eu2-O13	76.31 (18)	O12^{ii}-Eu2-O3^{ii}	149.35 (17)
O12^{ii}-Eu2-O4^{ii}	156.66 (17)	O12^{ii}-Eu2-O7^{iv}	77.93 (17)
O12^{ii}-Eu2-O8^{iv}	107.30 (16)	O12^{ii}-Eu2-O9^{ii}	78.99 (16)
O12^{ii}-Eu2-O10^{ii}	70.73 (16)	O12^{ii}-Eu2-O13	76.14 (18)
O13-Eu2-O3^{ii}	134.19 (17)	O13-Eu2-O4^{ii}	82.87 (17)
O13-Eu2-O7^{iv}	71.90 (18)	O13-Eu2-O8^{iv}	117.89 (16)
O13-Eu2-O9^{ii}	153.80 (17)	O13-Eu2-O10^{ii}	126.88 (16)

Symmetry transformations used to generate equivalent atoms: (i) -*x*+2, -*y*+1, -*z*+1; (ii) -*x*+1, -*y*+1, -*z*+1; (iii) *x*, *y*-1, *z*; (iv) -*x*+1, -*y*+2, -*z*+1; (v) *x*, *y*+1, z.

5-Tb

Bond lengths (Å)

Tb1-O1	2.276 (6)	Tb1-O2^{i}	2.351 (7)	Tb1-O3	2.469 (7)
Tb1-O5	2.277 (7)	Tb1-O5^{i}	2.722 (7)	Tb1-O6^{i}	2.374 (7)
Tb1-O8^{iii}	2.347 (8)	Tb1-O9	2.362 (7)	Tb2-O3^{ii}	2.444 (7)
Tb2-O4^{ii}	2.409 (7)	Tb2-O7^{iv}	2.383 (8)	Tb2-O8^{iv}	2.608 (7)
Tb2-O9^{ii}	2.459 (8)	Tb2-O11^{ii}	2.270 (7)	Tb2-O12	2.230 (7)
Tb2-O13	2.401 (8)	O2-Tb1^{i}	2.351 (7)	O3-Tb2^{ii}	2.444 (7)
O4-Tb2^{ii}	2.409 (7)	O5-Tb1^{i}	2.722 (7)	O6-Tb1^{i}	2.374 (7)
O7-Tb2^{iv}	2.383 (8)	O8-Tb1^{v}	2.347 (8)	O8-Tb2^{iv}	2.608 (7)
O9-Tb2^{ii}	2.459 (8)	O11-Tb2^{ii}	2.270 (7)		

Bond angles (°)

O1-Tb1-O2^{i}	135.2 (2)	O1-Tb1-O3	75.8 (2)
O1-Tb1-O5^{i}	66.7 (2)	O1-Tb1-O5	80.2 (2)
O1-Tb1-O6^{i}	83.4 (2)	O1-Tb1-O8^{iii}	86.0 (3)
O1-Tb1-O9	144.5 (3)	O2^{i}-Tb1-O3	134.0 (2)
O2^{i}-Tb1-O5^{i}	71.1 (2)	O2^{i}-Tb1-O6^{i}	81.1 (2)
O2^{i}-Tb1-O9	79.7 (3)	O3-Tb1-O5^{i}	137.9 (2)
O5-Tb1-O2^{i}	77.5 (2)	O5-Tb1-O3	76.7 (2)
O5-Tb1-O5^{i}	78.7 (2)	O5-Tb1-O6^{i}	128.8 (2)
O5-Tb1-O8^{iii}	146.6 (2)	O5-Tb1-O9	106.9 (3)
O6^{i}-Tb1-O3	143.8 (2)	O6^{i}-Tb1-O5^{i}	50.3 (2)
O8^{iii}-Tb1-O2^{i}	131.0 (2)	O8^{iii}-Tb1-O3	70.5 (2)
O8^{iii}-Tb1-O5^{i}	122.9 (2)	O8^{iii}-Tb1-O6	78.8 (2)

O8^{iii}-Tb1-O9	69.0 (3)	O9-Tb1-O3	72.3 (2)
O9-Tb1-O5^{i}	148.4 (2)	O9-Tb1-O6^{i}	114.2 (3)
O3^{ii}-Tb2-O8^{iv}	66.7 (2)	O3^{ii}-Tb2-O9^{ii}	71.1 (2)
O4^{ii}-Tb2-O3^{ii}	53.9 (2)	O4^{ii}-Tb2-O8^{iv}	74.7 (2)
O4^{ii}-Tb2-O9^{ii}	120.5 (2)	O7^{iv}-Tb2-O3^{ii}	114.5 (2)
O7^{iv}-Tb2-O4^{ii}	88.4 (3)	O7^{iv}-Tb2-O8^{iv}	51.3 (2)
O7^{iv}-Tb2-O9^{ii}	95.8 (3)	O7^{iv}-Tb2-O13	75.1 (3)
O9^{ii}-Tb2-O8^{iv}	63.4 (3)	O11^{ii}-Tb2-O3^{ii}	149.4 (3)
O11^{ii}-Tb2-O4^{ii}	156.6 (3)	O11^{ii}-Tb2-O7^{iv}	78.4 (3)
O11^{ii}-Tb2-O8^{iv}	110.0 (3)	O11^{ii}-Tb2-O9^{ii}	80.3 (3)
O11^{ii}-Tb2-O13	78.7 (3)	O12-Tb2-O3^{ii}	80.8 (3)
O12-Tb2-O4^{ii}	82.7 (3)	O12-Tb2-O7^{iv}	152.4 (3)
O12-Tb2-O8^{iv}	147.3 (3)	O12-Tb2-O9^{ii}	111.2 (3)
O12-Tb2-O11^{ii}	100.1 (3)	O12-Tb2-O13	77.7 (3)
O13-Tb2-O3^{ii}	130.4 (3)	O13-Tb2-O4^{ii}	79.3 (3)
O13-Tb2-O8^{iv}	119.9 (3)	O13-Tb2-O9^{ii}	158.4 (3)

Symmetry transformations used to generate equivalent atoms: #1 –x + 2, -y + 1, -z + 1; #2 –x + 1, -y + 1, -z + 1; #3 –x + 1, -y + 2, -z + 1; #4 –x + 2, -y + 2, -z + 1.

Table S3. Defined Ring and Relative parameters of the π-π Interactions in twenty-six CPs.

2-Sm					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)->	Cg(1)^{i}	3.283(4)	0.0	3.281(3)	3.282(3)
2-Eu					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)->	Cg(1)^{i}	3.303(5)	2.1	3.303(3)	3.302(3)
2-Gd					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)->	Cg(1)^{i}	3.283(4)	0.0	3.282(3)	3.282(3)
2-Tb					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)->	Cg(1)^{i}	3.287(5)	0.0	3.286(3)	3.286(3)
4-La					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)->	Cg(1)^{i}	3.384(9)	0.0	3.229(6)	3.228(6)
4-Ce					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)

Cg(1)-> Cg(1)^{i}		3.527(4)	0.0	3.284(3)	3.284(3)
4-Pr					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)-> Cg(1)^{i}		3.534(4)	0.0	3.299(3)	3.299(3)
4-Nd					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)-> Cg(1)^{i}		3.501(7)	0.0	3.268(5)	3.268(5)
4-Sm					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)-> Cg(1)^{i}		3.476(5)	0.0	3.262(3)	3.261(3)
4-Eu					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)-> Cg(1)^{i}		3.440(7)	0.0	3.217(5)	3.217(5)
4-Gd					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)-> Cg(1)^{i}		3.298(5)	0.0	3.297(4)	3.297(4)
4-Tb					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)-> Cg(1)^{i}		3.466(6)	0.0	3.283(4)	3.283(4)
4-Er					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)-> Cg(1)^{i}		3.292(4)	0.0	3.291(3)	3.291(3)
4-Yb					
Cg(1): C(2)-->C(3)-->C(4)-->C(5)-->C(6)-->					
Cg(I)	Cg(J)	Dist. centroids (Å)	Dihedral angle (°)	Perp. dist. (IJ) (Å)	Perp. dist. (JI) (Å)
Cg(1)-> Cg(1)^{i}		3.290(6)	0.0	3.289(5)	3.289(5)