Supporting Information for:

Lanthanide Nano-drums: A New Class of Molecular Nanoparticles for Potential Biomedical Applications

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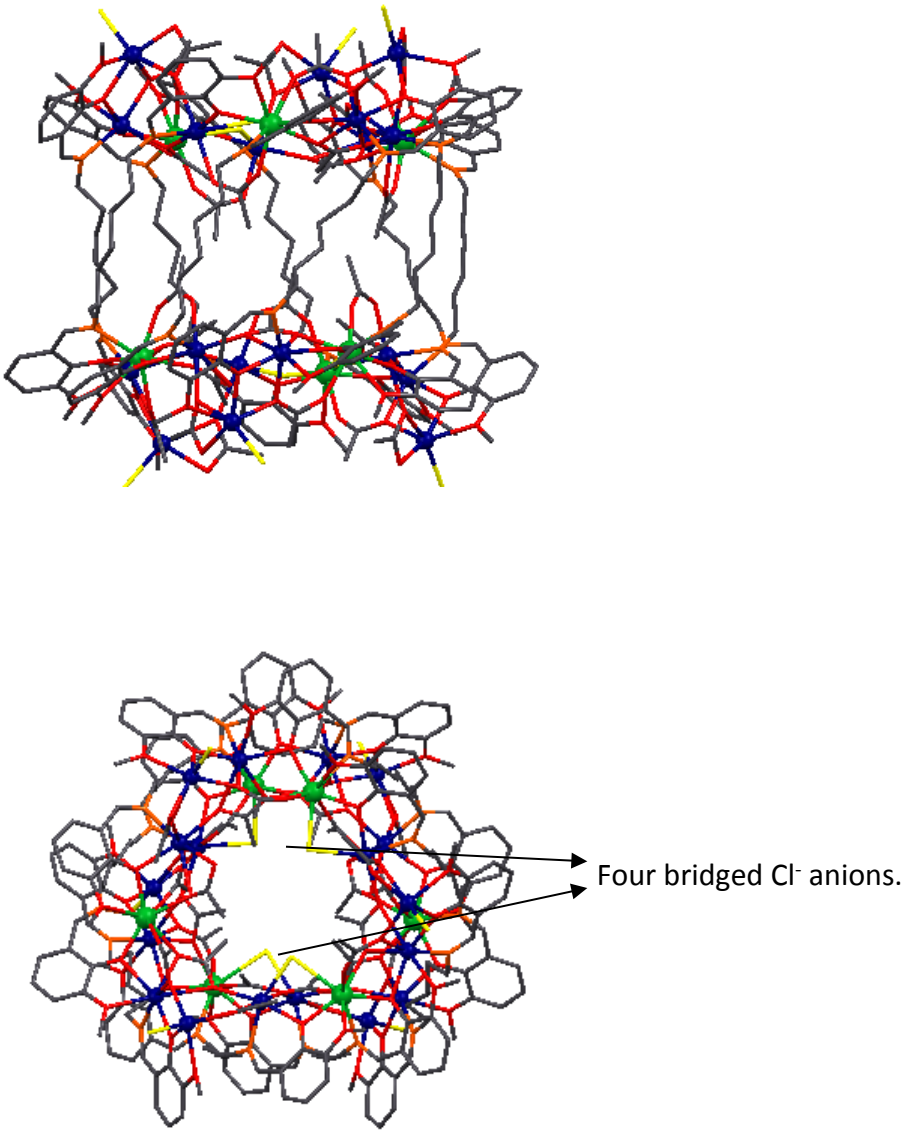
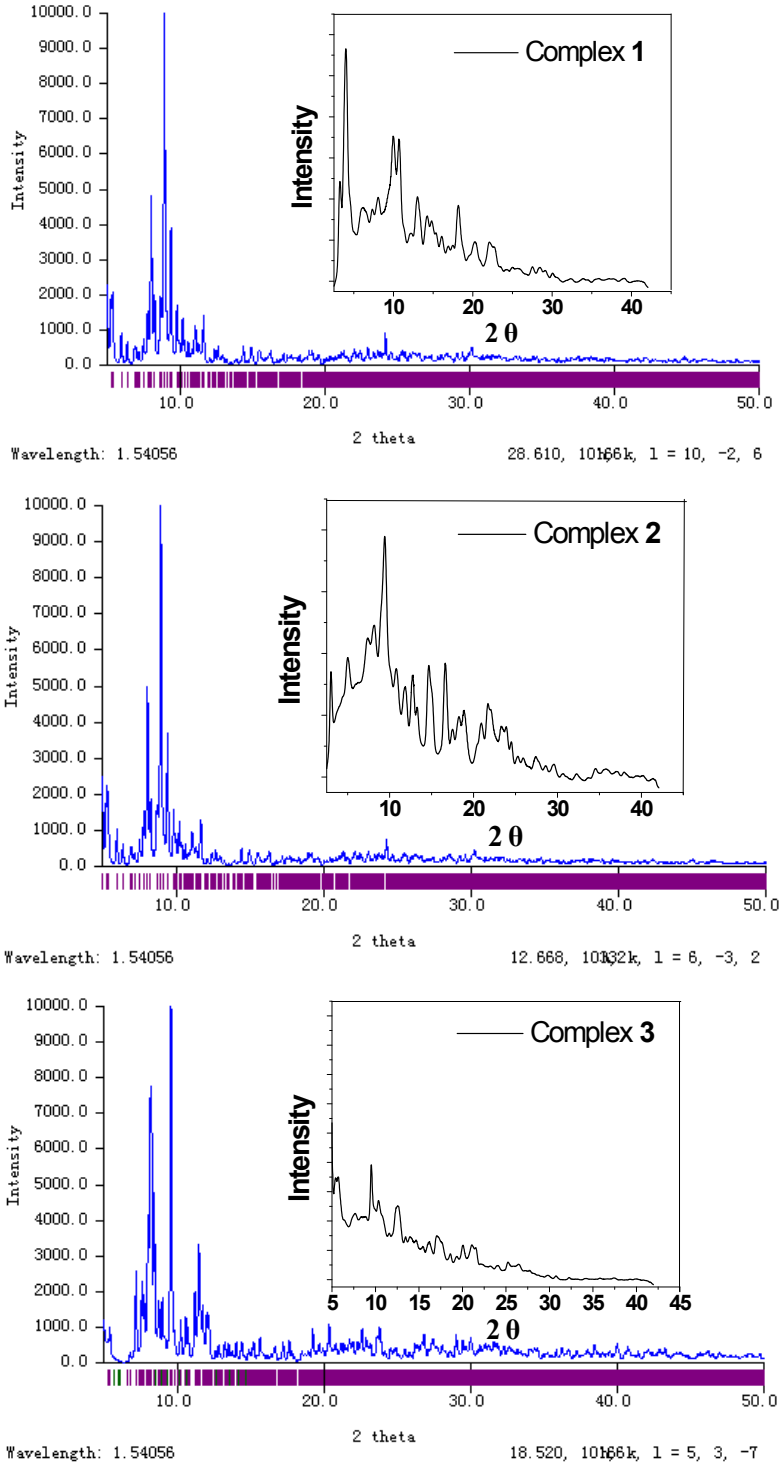
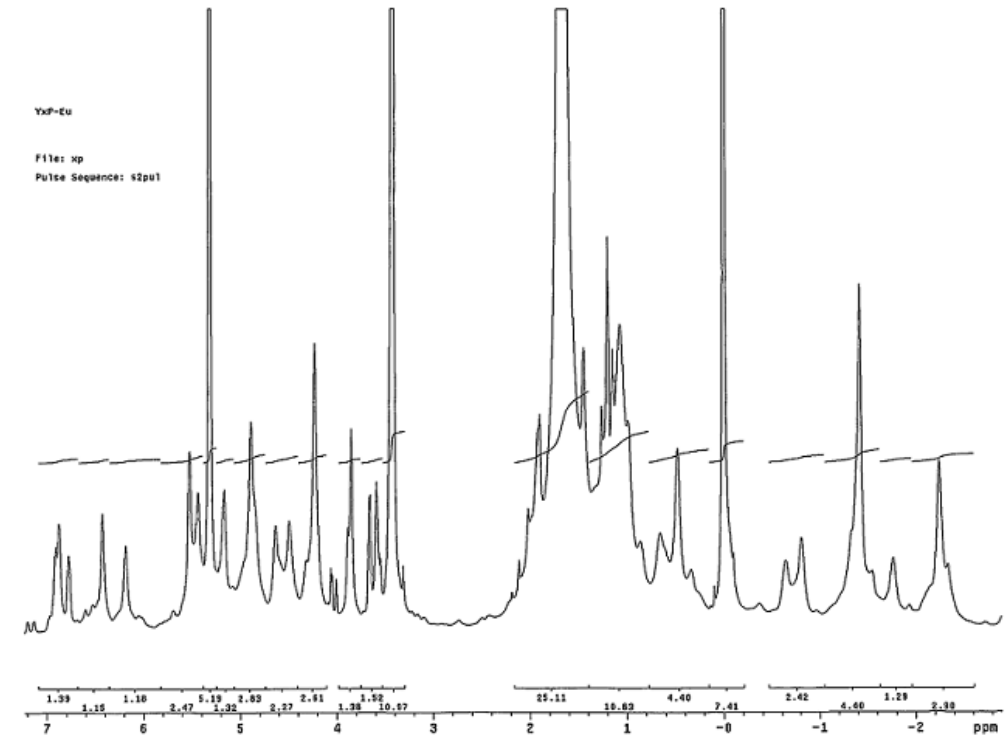


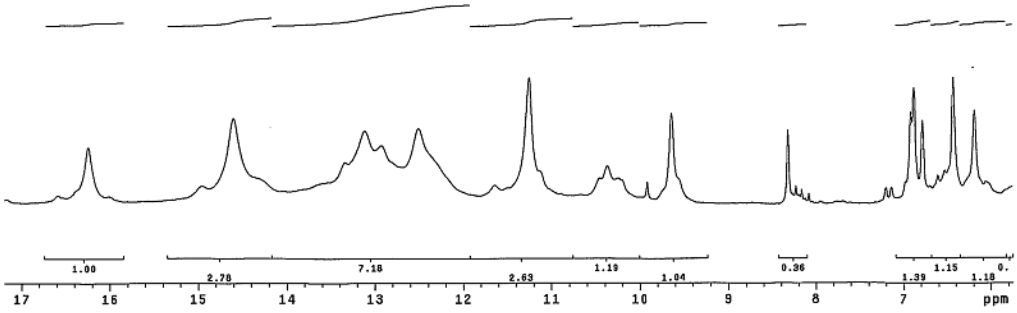
Figure S1. A view of the crystal structure of **3**. Viewed along the *b*-axis (up) and *a*-axis (down). (Eu^{3+}: green; Cd^{3+}: blue; Cl^{-}: yellow)



2. Figure S2. Powder XRD patterns of **1**-**3**

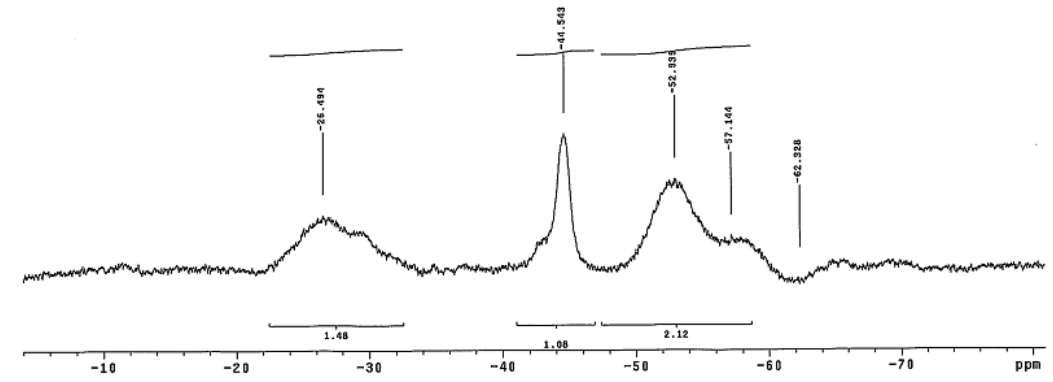


(a)

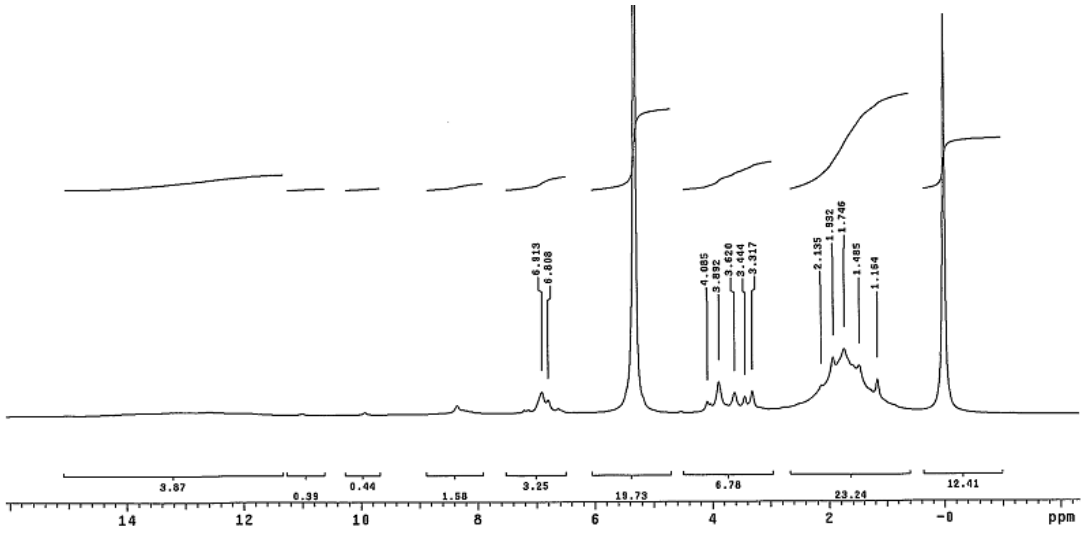


(b)

Figure S3: ^{1}H NMR spectrum of **1** in CD_2Cl_2.



(a)



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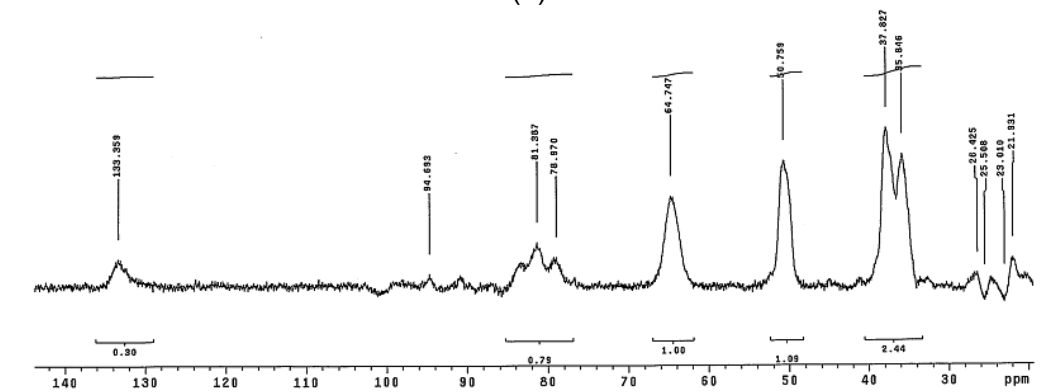


(c)

Figure S4: ^{1}H NMR spectrum of **2** in CD_2Cl_2.

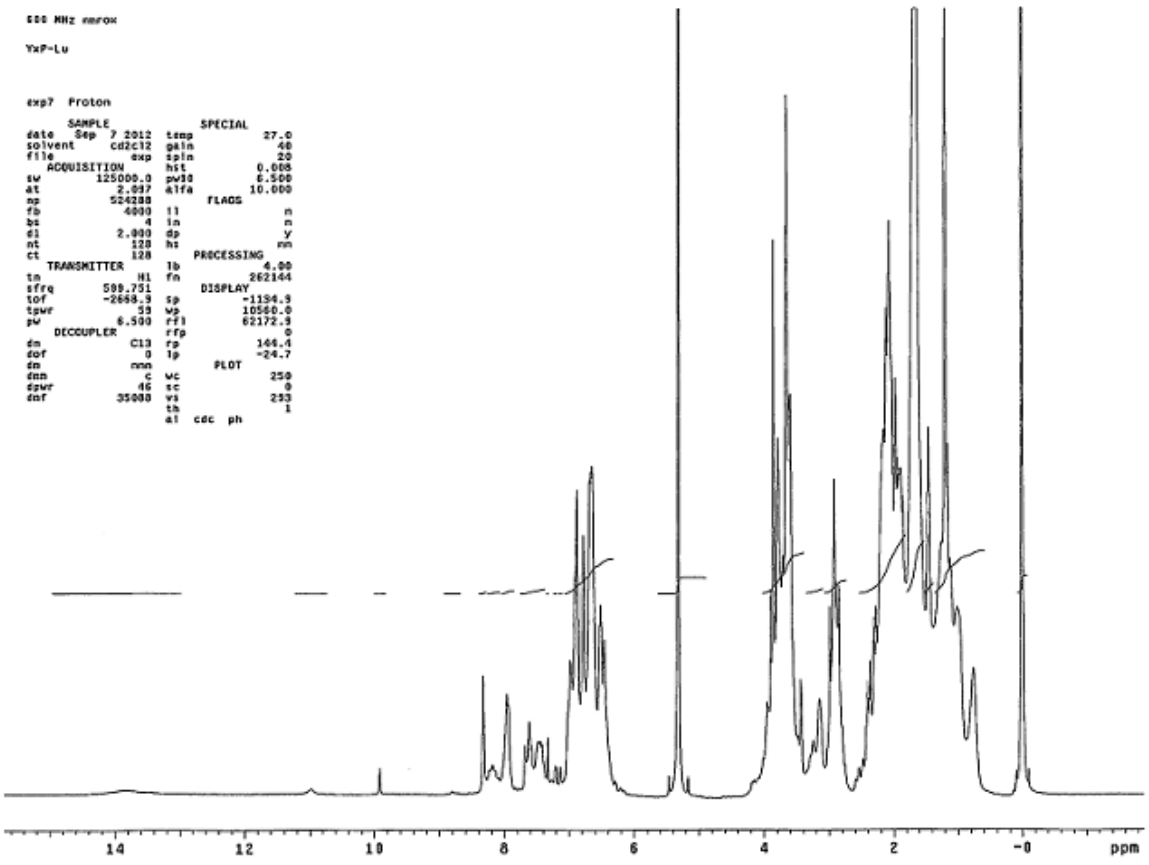


Figure S5: ^{1}H NMR spectrum of **3** in CD_2Cl_2.

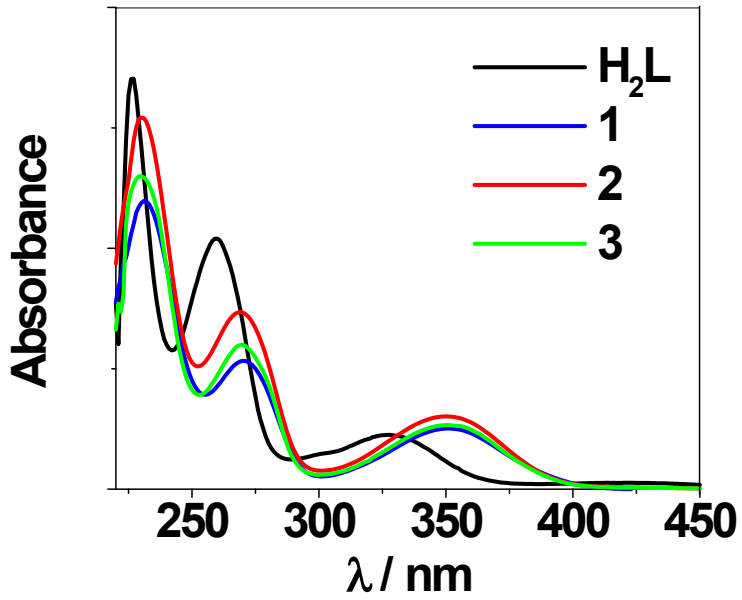


Figure S6. UV-Vis spectra of H_2L and complexes **1**-**3** in CH_2Cl_2 (C = 10^{-6} – 10^{-5} M).

Table S1. Crystal data and structure refinement for complexes **1**-**3**.

	1	**2**	**3**
Formula	$C_{274}H_{385}Cd_{18}Cl_8Eu_6N_{18}O_{110}$	$C_{271}H_{371}Cd_{18}Cl_8Tb_6N_{18}O_{106}$	$C_{269}H_{370}Cd_{18}Cl_8Lu_6N_{18}O_{102}$
Fw	8900.72	8832.84	8900.84
Crystal system	Hexagonal	Hexagonal	Monoclinic
Space group	P-3	P-3	C2/c
a [Å]	51.304(7)	51.114(7)	41.871(8)
b [Å]	51.304(7)	51.114(7)	22.803(5)
c [Å]	24.418(5)	24.362(5)	47.322(10)
α [deg]	90.00	90.00	90.00
β [deg]	90.00	90.00	112.91(3)
γ [deg]	120.00	120.00	90.00
V / [Å^3]	55660(16)	55123(16)	41618(14)
d / [g/cm^3]	1.593	1.597	1.421
Z	6	6	4
T [K]	153(1)	153(1)	153(1)
F(000)	26450	26153	17514
μ, mm^{-1}	2.138	2.288	2.435
θ rang, deg	3.00-25.00	2.97-25.00	1.53-25.00
reflns meads	449154	368767	99822
reflns used	59227	60771	35936
params	4036	4024	2099
R1[a], wR2[a] *I* > 2*σ*(*I*)	0.0754, 0.1806	0.0690, 0.1754	0.0727, 0.1800
R1,	0.1219, 0.2142	0.1155, 0.2225	0.0844, 0.1898

wR2 (all data)			
Quality of fit	1.021	1.062	1.108

[a] R1 = $\Sigma||F_o| - |F_c||/\Sigma|F_o|$. wR2 = $[\Sigma w[(F_o^2 - F_c^2)^2]/\Sigma|[w(F_o^2)^2]]^{1/2}$. $w=1/[\sigma^2(F_o^2)+(0.075P)^2]$, where $P = [\max(F_o^2,0)+2F_c^2]/3$.

Table S2. Selected Bond Lengths (Å) and Angles (°) for **1**.

Eu(1)-O(37)	2.223(8)	Eu(5)-O(7)	2.257(9)
Eu(1)-O(2)	2.249(8)	Eu(5)-O(3)	2.270(9)
Eu(1)-O(6)	2.264(8)	Eu(5)-O(81)	2.329(10)
Eu(1)-O(62)	2.322(8)	Eu(5)-O(74)	2.347(8)
Eu(1)-O(39)	2.346(10)	Eu(5)-O(78)	2.352(9)
Eu(1)-O(58)	2.351(9)	Eu(5)-N(4)	2.505(11)
Eu(1)-N(1)	2.486(9)	Eu(5)-O(4)	2.508(9)
Eu(1)-O(5)	2.555(8)	Eu(6)-O(19)	2.227(10)
Eu(2)-O(14)	2.228(9)	Eu(6)-O(69)	2.228(9)
Eu(2)-O(47)	2.230(8)	Eu(6)-O(15)	2.258(10)
Eu(2)-O(18)	2.264(9)	Eu(6)-O(71)	2.287(11)
Eu(2)-O(46)	2.312(9)	Eu(6)-O(68)	2.290(11)
Eu(2)-O(44)	2.358(8)	Eu(6)-O(79)	2.346(10)
Eu(2)-N(7)	2.484(10)	Eu(6)-N(10)	2.483(12)
Eu(2)-O(17)	2.549(8)	Eu(6)-O(16)	2.537(9)
Eu(2)-O(91)	2.622(12)	Cd(16)-O(11)	2.236(8)
Eu(3)-O(55)	2.209(9)	Cd(16)-O(77)	2.240(9)
Eu(3)-O(26)	2.228(9)	Cd(16)-N(6)	2.254(11)
Eu(3)-O(30)	2.251(9)	Cd(16)-O(74)	2.267(9)
Eu(3)-O(54)	2.322(10)	Cd(16)-O(7)	2.327(9)
Eu(3)-O(50)	2.345(9)	Cd(16)-O(8)	2.602(9)
Eu(3)-N(13)	2.487(12)	Cd(7)-O(10)	2.248(8)
Eu(3)-O(29)	2.556(10)	Cd(7)-O(45)	2.273(9)
Eu(3)-Cl(7)	2.787(11)	Cd(7)-N(5)	2.274(11)
Eu(4)-O(63)	2.201(9)	Cd(7)-O(44)	2.281(9)
Eu(4)-O(31)	2.245(10)	Cd(7)-O(14)	2.336(8)
Eu(4)-O(27)	2.245(10)	Cd(7)-O(13)	2.535(9)
Eu(4)-O(87)	2.279(10)	Cd(3)-O(34)	2.257(9)
Eu(4)-O(89)	2.335(9)	Cd(3)-N(17)	2.263(12)
Eu(4)-N(16)	2.490(12)	Cd(3)-O(61)	2.268(9)
Eu(4)-O(28)	2.560(10)	Cd(3)-O(58)	2.283(9)
Eu(4)-Cl(5)	2.844(7)	Cd(3)-O(2)	2.342(8)
Eu(5)-O(83)	2.241(8)	Cd(3)-O(1)	2.531(9)

Cd(2)-O(30)	2.293(9)	Cd(14)-O(32)	2.535(10)
Cd(2)-N(15)	2.307(11)	Cd(8)-O(92)	2.046(16)
Cd(2)-O(56)	2.323(9)	Cd(8)-N(9)	2.282(12)
Cd(2)-O(57)	2.342(9)	Cd(8)-O(18)	2.292(9)
Cd(2)-O(59)	2.404(11)	Cd(8)-O(48)	2.300(9)
Cd(2)-Cl(7)	2.593(8)	Cd(8)-O(49)	2.332(11)
Cd(6)-O(10)	2.269(9)	Cd(8)-O(51)	2.499(11)
Cd(6)-O(45)	2.275(8)	Cd(8)-O(91)	2.604(17)
Cd(6)-O(42)	2.318(10)	Cd(9)-O(22)	2.230(9)
Cd(6)-O(41)	2.353(10)	Cd(9)-O(53)	2.277(10)
Cd(6)-O(9)	2.434(10)	Cd(9)-O(52)	2.295(11)
Cd(6)-Cl(2)	2.454(4)	Cd(9)-O(21)	2.406(11)
Cd(5)-O(40)	2.277(13)	Cd(9)-O(51)	2.423(12)
Cd(5)-N(3)	2.284(11)	Cd(9)-Cl(4)	2.456(4)
Cd(5)-O(38)	2.302(8)	Cd(13)-N(14)	2.276(12)
Cd(5)-O(6)	2.316(8)	Cd(13)-O(80)	2.294(10)
Cd(5)-O(43)	2.392(9)	Cd(13)-O(27)	2.300(10)
Cd(5)-O(41)	2.496(10)	Cd(13)-O(64)	2.316(10)
Cd(5)-O(39)	2.598(9)	Cd(13)-O(65)	2.412(12)
Cd(15)-O(82)	2.222(13)	Cd(13)-Cl(5)	2.543(5)
Cd(15)-O(84)	2.281(9)	Cd(12)-O(23)	2.209(11)
Cd(15)-N(2)	2.284(10)	Cd(12)-N(12)	2.265(14)
Cd(15)-O(3)	2.309(9)	Cd(12)-O(67)	2.279(11)
Cd(15)-O(90)	2.386(10)	Cd(12)-O(79)	2.298(10)
Cd(15)-O(85)	2.576(12)	Cd(12)-O(19)	2.308(11)
Cd(4)-O(60)	2.236(10)	Cd(12)-O(20)	2.510(11)
Cd(4)-O(34)	2.237(9)	Cd(1)-O(22)	2.232(9)
Cd(4)-O(61)	2.303(9)	Cd(1)-N(11)	2.258(13)
Cd(4)-O(33)	2.397(11)	Cd(1)-O(53)	2.268(10)
Cd(4)-Cl(3)	2.441(4)	Cd(1)-O(50)	2.295(9)
Cd(4)-O(59)	2.552(11)	Cd(1)-O(26)	2.298(9)
Cd(18)-O(15)	2.316(9)	Cd(1)-O(25)	2.509(10)
Cd(18)-N(8)	2.329(11)	Cd(11)-O(35)	2.234(11)
Cd(18)-O(70)	2.339(9)	Cd(11)-O(86)	2.274(16)
Cd(18)-O(73)	2.356(9)	Cd(11)-O(88)	2.299(10)
Cd(18)-O(75)	2.390(9)	Cd(11)-O(85)	2.342(14)
Cd(18)-O(72)	2.438(11)	Cd(11)-Cl(6)	2.487(6)
Cd(18)-O(71)	2.475(11)	Cd(11)-O(36)	2.498(12)
Cd(17)-O(76)	2.246(11)	Cd(10)-O(66)	2.197(15)
Cd(17)-O(11)	2.268(9)	Cd(10)-O(23)	2.237(12)
Cd(17)-O(77)	2.312(9)	Cd(10)-O(67)	2.273(12)
Cd(17)-O(75)	2.416(9)	Cd(10)-Cl(8')	2.38(3)
Cd(17)-Cl(1)	2.446(4)	Cd(10)-O(24)	2.414(15)
Cd(17)-O(12)	2.474(10)	Cd(10)-Cl(8)	2.47(2)
Cd(17)-C(248)	2.707(16)	Cd(10)-O(65)	2.584(13)
Cd(14)-O(35)	2.227(10)	O(37)-Eu(1)-O(2)	114.6(3)
Cd(14)-N(18)	2.230(13)	O(37)-Eu(1)-O(6)	86.2(3)
Cd(14)-O(88)	2.254(11)	O(2)-Eu(1)-O(6)	137.0(3)
Cd(14)-O(89)	2.288(9)	O(37)-Eu(1)-O(62)	148.4(3)
Cd(14)-O(31)	2.329(10)	O(2)-Eu(1)-O(62)	80.6(3)

O(6)-Eu(1)-O(62)	101.4(3)	O(18)-Eu(2)-O(17)	64.2(3)
O(37)-Eu(1)-O(39)	77.2(3)	O(46)-Eu(2)-O(17)	69.6(3)
O(2)-Eu(1)-O(39)	144.6(3)	O(44)-Eu(2)-O(17)	136.6(3)
O(6)-Eu(1)-O(39)	74.0(3)	N(7)-Eu(2)-O(17)	73.0(3)
O(62)-Eu(1)-O(39)	75.5(3)	O(14)-Eu(2)-O(91)	145.3(4)
O(37)-Eu(1)-O(58)	78.3(3)	O(47)-Eu(2)-O(91)	78.2(4)
O(2)-Eu(1)-O(58)	69.6(3)	O(18)-Eu(2)-O(91)	75.0(4)
O(6)-Eu(1)-O(58)	153.3(3)	O(46)-Eu(2)-O(91)	73.6(4)
O(62)-Eu(1)-O(58)	82.0(3)	O(44)-Eu(2)-O(91)	81.2(4)
O(39)-Eu(1)-O(58)	81.4(3)	N(7)-Eu(2)-O(91)	139.9(4)
O(37)-Eu(1)-N(1)	74.5(3)	O(17)-Eu(2)-O(91)	115.5(4)
O(2)-Eu(1)-N(1)	74.2(3)	O(55)-Eu(3)-O(26)	114.5(3)
O(6)-Eu(1)-N(1)	76.3(3)	O(55)-Eu(3)-O(30)	86.9(3)
O(62)-Eu(1)-N(1)	137.1(3)	O(26)-Eu(3)-O(30)	134.8(3)
O(39)-Eu(1)-N(1)	139.9(3)	O(55)-Eu(3)-O(54)	145.1(4)
O(58)-Eu(1)-N(1)	119.2(3)	O(26)-Eu(3)-O(54)	82.7(4)
O(37)-Eu(1)-O(5)	140.0(3)	O(30)-Eu(3)-O(54)	102.2(4)
O(2)-Eu(1)-O(5)	77.7(3)	O(55)-Eu(3)-O(50)	78.7(3)
O(6)-Eu(1)-O(5)	64.1(3)	O(26)-Eu(3)-O(50)	70.8(3)
O(62)-Eu(1)-O(5)	68.2(3)	O(30)-Eu(3)-O(50)	154.3(3)
O(39)-Eu(1)-O(5)	115.8(3)	O(54)-Eu(3)-O(50)	79.2(4)
O(58)-Eu(1)-O(5)	138.8(3)	O(55)-Eu(3)-N(13)	74.0(4)
N(1)-Eu(1)-O(5)	72.8(3)	O(26)-Eu(3)-N(13)	73.5(4)
O(14)-Eu(2)-O(47)	114.2(3)	O(30)-Eu(3)-N(13)	75.6(4)
O(14)-Eu(2)-O(18)	134.7(3)	O(54)-Eu(3)-N(13)	140.9(4)
O(47)-Eu(2)-O(18)	88.2(3)	O(50)-Eu(3)-N(13)	119.5(4)
O(14)-Eu(2)-O(46)	81.1(3)	O(55)-Eu(3)-O(29)	142.6(3)
O(47)-Eu(2)-O(46)	145.9(3)	O(26)-Eu(3)-O(29)	76.4(3)
O(18)-Eu(2)-O(46)	102.5(3)	O(30)-Eu(3)-O(29)	64.6(3)
O(14)-Eu(2)-O(44)	70.7(3)	O(54)-Eu(3)-O(29)	68.7(4)
O(47)-Eu(2)-O(44)	78.3(3)	O(50)-Eu(3)-O(29)	136.4(3)
O(18)-Eu(2)-O(44)	154.6(3)	N(13)-Eu(3)-O(29)	75.7(4)
O(46)-Eu(2)-O(44)	78.7(3)	O(55)-Eu(3)-Cl(7)	77.9(3)
O(14)-Eu(2)-N(7)	74.0(3)	O(26)-Eu(3)-Cl(7)	146.3(3)
O(47)-Eu(2)-N(7)	75.0(3)	O(30)-Eu(3)-Cl(7)	74.1(3)
O(18)-Eu(2)-N(7)	74.9(3)	O(54)-Eu(3)-Cl(7)	72.6(3)
O(46)-Eu(2)-N(7)	139.0(3)	O(50)-Eu(3)-Cl(7)	82.1(3)
O(44)-Eu(2)-N(7)	121.0(3)	N(13)-Eu(3)-Cl(7)	139.3(3)
O(14)-Eu(2)-O(17)	75.6(3)	O(29)-Eu(3)-Cl(7)	113.6(3)
O(47)-Eu(2)-O(17)	142.0(3)		

Table S3. Selected Bond Lengths (Å) and Angles (°) for **2**.

Tb(1)-O(37)	2.224(8)	Tb(6)-O(16)	2.543(9)
Tb(1)-O(2)	2.250(8)	Cd(1)-O(22)	2.240(9)
Tb(1)-O(6)	2.258(8)	Cd(1)-N(11)	2.253(13)
Tb(1)-O(62)	2.315(8)	Cd(1)-O(53)	2.265(10)
Tb(1)-O(58)	2.344(8)	Cd(1)-O(50)	2.284(9)
Tb(1)-O(39)	2.344(10)	Cd(1)-O(26)	2.286(9)
Tb(1)-N(1)	2.460(9)	Cd(1)-O(25)	2.507(10)
Tb(1)-O(5)	2.539(8)	Cd(2)-O(30)	2.284(9)
Tb(2)-O(47)	2.225(8)	Cd(2)-N(15)	2.297(10)
Tb(2)-O(14)	2.228(8)	Cd(2)-O(56)	2.316(8)
Tb(2)-O(18)	2.251(8)	Cd(2)-O(57)	2.332(8)
Tb(2)-O(46)	2.307(8)	Cd(2)-O(59)	2.403(10)
Tb(2)-O(44)	2.347(7)	Cd(2)-Cl(7)	2.581(7)
Tb(2)-N(7)	2.489(9)	Cd(3)-O(34)	2.259(9)
Tb(2)-O(17)	2.540(8)	Cd(3)-O(61)	2.266(9)
Tb(2)-O(91)	2.610(10)	Cd(3)-N(17)	2.269(11)
Tb(3)-O(55)	2.210(8)	Cd(3)-O(58)	2.281(8)
Tb(3)-O(26)	2.226(9)	Cd(3)-O(2)	2.350(8)
Tb(3)-O(30)	2.249(9)	Cd(3)-O(1)	2.528(8)
Tb(3)-O(54)	2.302(10)	Cd(4)-O(60)	2.225(10)
Tb(3)-O(50)	2.335(9)	Cd(4)-O(34)	2.233(9)
Tb(3)-N(13)	2.478(11)	Cd(4)-O(61)	2.297(9)
Tb(3)-O(29)	2.554(9)	Cd(4)-O(33)	2.396(10)
Tb(3)-Cl(7)	2.764(10)	Cd(4)-Cl(3)	2.438(4)
Tb(4)-O(63)	2.207(8)	Cd(4)-O(59)	2.545(10)
Tb(4)-O(27)	2.229(9)	Cd(4)-C(222)	2.758(15)
Tb(4)-O(31)	2.235(10)	Cd(5)-N(3)	2.284(10)
Tb(4)-O(87)	2.284(10)	Cd(5)-O(40)	2.285(12)
Tb(4)-O(89)	2.329(9)	Cd(5)-O(38)	2.302(8)
Tb(4)-N(16)	2.485(11)	Cd(5)-O(6)	2.320(7)
Tb(4)-O(28)	2.548(9)	Cd(5)-O(43)	2.401(8)
Tb(4)-Cl(5)	2.825(7)	Cd(5)-O(41)	2.498(9)
Tb(5)-O(7)	2.250(8)	Cd(5)-O(39)	2.601(9)
Tb(5)-O(83)	2.251(8)	Cd(6)-O(10)	2.257(8)
Tb(5)-O(3)	2.271(8)	Cd(6)-O(45)	2.281(8)
Tb(5)-O(81)	2.302(10)	Cd(6)-O(42)	2.292(9)
Tb(5)-O(74)	2.347(8)	Cd(6)-O(41)	2.336(9)
Tb(5)-O(78)	2.349(9)	Cd(6)-Cl(2)	2.442(4)
Tb(5)-N(4)	2.493(11)	Cd(6)-O(9)	2.445(9)
Tb(5)-O(4)	2.500(8)	Cd(6)-C(204)	2.664(14)
Tb(6)-O(19)	2.221(10)	Cd(7)-O(10)	2.247(8)
Tb(6)-O(69)	2.223(9)	Cd(7)-O(45)	2.267(8)
Tb(6)-O(15)	2.241(9)	Cd(7)-N(5)	2.279(11)
Tb(6)-O(71)	2.284(11)	Cd(7)-O(44)	2.281(8)
Tb(6)-O(68)	2.294(10)	Cd(7)-O(14)	2.332(7)
Tb(6)-O(79)	2.340(10)	Cd(7)-O(13)	2.524(8)
Tb(6)-N(10)	2.472(12)	Cd(8)-O(92)	2.060(13)

Cd(8)-N(9)	2.283(12)	Cd(16)-O(11)	2.237(8)
Cd(8)-O(18)	2.288(8)	Cd(16)-N(6)	2.241(10)
Cd(8)-O(48)	2.291(8)	Cd(16)-O(77)	2.245(9)
Cd(8)-O(49)	2.326(11)	Cd(16)-O(74)	2.261(8)
Cd(8)-O(51)	2.494(11)	Cd(16)-O(7)	2.314(8)
Cd(8)-O(91)	2.574(13)	Cd(16)-O(8)	2.595(9)
Cd(9)-O(22)	2.222(10)	Cd(17)-O(76)	2.245(11)
Cd(9)-O(53)	2.272(9)	Cd(17)-O(11)	2.254(8)
Cd(9)-O(52)	2.305(11)	Cd(17)-O(77)	2.312(9)
Cd(9)-O(51)	2.412(12)	Cd(17)-O(75)	2.414(10)
Cd(9)-O(21)	2.417(11)	Cd(17)-Cl(1)	2.435(4)
Cd(9)-Cl(4)	2.445(4)	Cd(17)-O(12)	2.478(10)
Cd(9)-C(214)	2.733(17)	Cd(17)-C(248)	2.702(16)
Cd(10)-O(66)	2.182(16)	Cd(18)-O(15)	2.315(9)
Cd(10)-O(23)	2.231(12)	Cd(18)-N(8)	2.320(11)
Cd(10)-O(67)	2.269(12)	Cd(18)-O(70)	2.332(8)
Cd(10)-Cl(8')	2.32(3)	Cd(18)-O(73)	2.339(9)
Cd(10)-O(24)	2.405(15)	Cd(18)-O(75)	2.382(9)
Cd(10)-Cl(8)	2.50(3)	Cd(18)-O(72)	2.452(12)
Cd(10)-O(65)	2.571(13)	Cd(18)-O(71)	2.478(11)
Cd(11)-O(35)	2.227(10)	O(37)-Tb(1)-O(2)	114.5(3)
Cd(11)-O(86)	2.268(17)	O(37)-Tb(1)-O(6)	86.1(3)
Cd(11)-O(88)	2.287(10)	O(2)-Tb(1)-O(6)	136.4(3)
Cd(11)-O(85)	2.309(14)	O(37)-Tb(1)-O(62)	148.3(3)
Cd(11)-Cl(6)	2.479(7)	O(2)-Tb(1)-O(62)	81.0(3)
Cd(11)-O(36)	2.505(12)	O(6)-Tb(1)-O(62)	101.6(3)
Cd(12)-O(23)	2.209(12)	O(37)-Tb(1)-O(58)	78.4(3)
Cd(12)-N(12)	2.258(14)	O(2)-Tb(1)-O(58)	70.1(3)
Cd(12)-O(67)	2.269(11)	O(6)-Tb(1)-O(58)	153.4(3)
Cd(12)-O(79)	2.290(10)	O(62)-Tb(1)-O(58)	81.9(3)
Cd(12)-O(19)	2.298(11)	O(37)-Tb(1)-O(39)	77.5(3)
Cd(12)-O(20)	2.520(12)	O(2)-Tb(1)-O(39)	144.7(3)
Cd(13)-N(14)	2.282(12)	O(6)-Tb(1)-O(39)	74.7(3)
Cd(13)-O(80)	2.283(10)	O(62)-Tb(1)-O(39)	75.1(3)
Cd(13)-O(27)	2.299(10)	O(58)-Tb(1)-O(39)	81.0(3)
Cd(13)-O(64)	2.310(9)	O(37)-Tb(1)-N(1)	74.7(3)
Cd(13)-O(65)	2.414(12)	O(2)-Tb(1)-N(1)	73.8(3)
Cd(13)-Cl(5)	2.530(6)	O(6)-Tb(1)-N(1)	75.8(3)
Cd(14)-N(18)	2.225(13)	O(62)-Tb(1)-N(1)	136.9(3)
Cd(14)-O(35)	2.226(10)	O(58)-Tb(1)-N(1)	119.6(3)
Cd(14)-O(88)	2.246(10)	O(39)-Tb(1)-N(1)	140.4(3)
Cd(14)-O(89)	2.284(9)	O(37)-Tb(1)-O(5)	139.9(3)
Cd(14)-O(31)	2.317(10)	O(2)-Tb(1)-O(5)	77.5(3)
Cd(14)-O(32)	2.527(10)	O(6)-Tb(1)-O(5)	63.9(3)
Cd(15)-O(82)	2.224(12)	O(62)-Tb(1)-O(5)	68.3(3)
Cd(15)-N(2)	2.254(10)	O(58)-Tb(1)-O(5)	138.9(3)
Cd(15)-O(84)	2.274(8)	O(39)-Tb(1)-O(5)	115.7(3)
Cd(15)-O(3)	2.292(8)	N(1)-Tb(1)-O(5)	72.5(3)
Cd(15)-O(90)	2.379(9)	O(47)-Tb(2)-O(14)	114.1(3)
Cd(15)-O(85)	2.573(12)	O(47)-Tb(2)-O(18)	88.4(3)

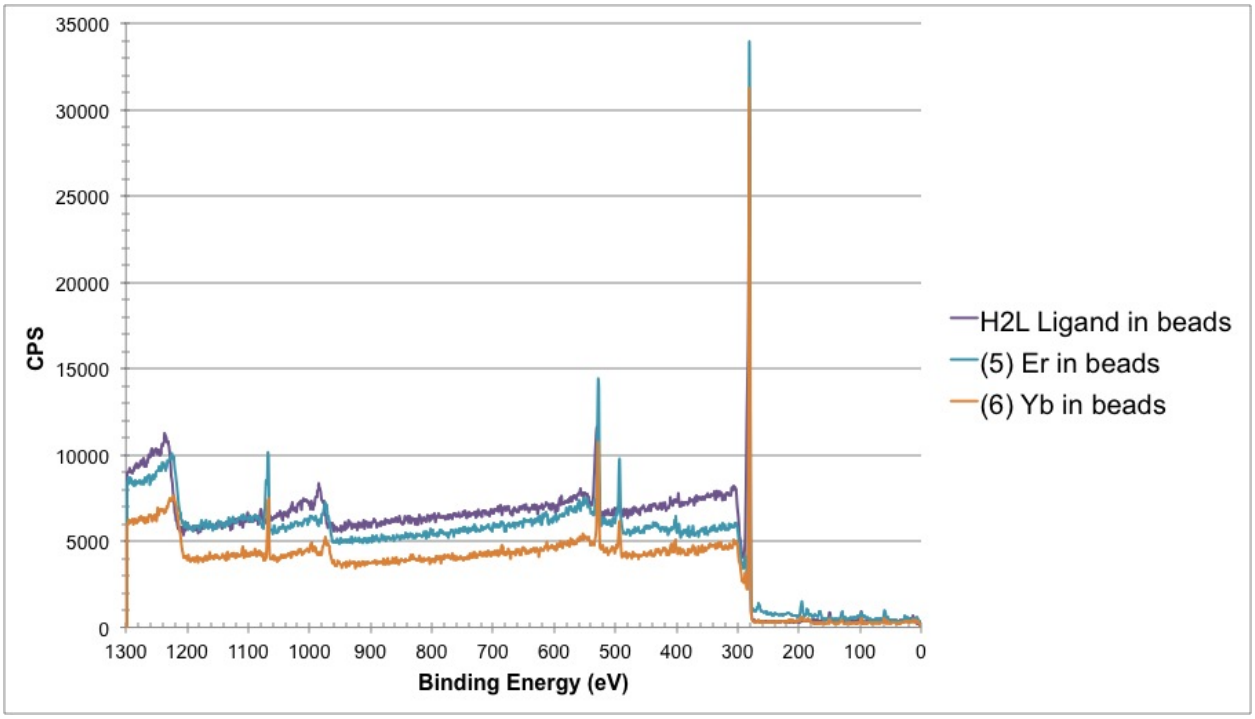
O(14)-Tb(2)-O(18)	134.6(3)	O(55)-Tb(3)-O(30)	87.3(3)
O(47)-Tb(2)-O(46)	146.2(3)	O(26)-Tb(3)-O(30)	135.0(3)
O(14)-Tb(2)-O(46)	81.2(3)	O(55)-Tb(3)-O(54)	144.5(4)
O(18)-Tb(2)-O(46)	102.0(3)	O(26)-Tb(3)-O(54)	82.7(4)
O(47)-Tb(2)-O(44)	78.1(3)	O(30)-Tb(3)-O(54)	102.2(4)
O(14)-Tb(2)-O(44)	70.8(3)	O(55)-Tb(3)-O(50)	78.1(3)
O(18)-Tb(2)-O(44)	154.6(3)	O(26)-Tb(3)-O(50)	70.4(3)
O(46)-Tb(2)-O(44)	79.2(3)	O(30)-Tb(3)-O(50)	154.6(3)
O(47)-Tb(2)-N(7)	75.0(3)	O(54)-Tb(3)-O(50)	79.3(4)
O(14)-Tb(2)-N(7)	74.0(3)	O(55)-Tb(3)-N(13)	74.5(3)
O(18)-Tb(2)-N(7)	75.0(3)	O(26)-Tb(3)-N(13)	73.5(3)
O(46)-Tb(2)-N(7)	138.8(3)	O(30)-Tb(3)-N(13)	75.7(4)
O(44)-Tb(2)-N(7)	120.9(3)	O(54)-Tb(3)-N(13)	140.9(4)
O(47)-Tb(2)-O(17)	141.7(3)	O(50)-Tb(3)-N(13)	119.1(3)
O(14)-Tb(2)-O(17)	75.5(3)	O(55)-Tb(3)-O(29)	143.0(3)
O(18)-Tb(2)-O(17)	64.0(3)	O(26)-Tb(3)-O(29)	76.8(3)
O(46)-Tb(2)-O(17)	69.6(3)	O(30)-Tb(3)-O(29)	64.3(3)
O(44)-Tb(2)-O(17)	136.9(3)	O(54)-Tb(3)-O(29)	68.9(4)
N(7)-Tb(2)-O(17)	72.6(3)	O(50)-Tb(3)-O(29)	136.6(3)
O(47)-Tb(2)-O(91)	78.4(3)	N(13)-Tb(3)-O(29)	75.6(4)
O(14)-Tb(2)-O(91)	145.7(3)	O(55)-Tb(3)-Cl(7)	77.8(3)
O(18)-Tb(2)-O(91)	74.6(3)	O(26)-Tb(3)-Cl(7)	146.1(3)
O(46)-Tb(2)-O(91)	73.7(4)	O(30)-Tb(3)-Cl(7)	74.1(3)
O(44)-Tb(2)-O(91)	81.6(3)	O(54)-Tb(3)-Cl(7)	72.4(3)
N(7)-Tb(2)-O(91)	139.7(4)	O(50)-Tb(3)-Cl(7)	82.4(3)
O(17)-Tb(2)-O(91)	115.4(3)	N(13)-Tb(3)-Cl(7)	139.5(3)
O(55)-Tb(3)-O(26)	114.4(3)	O(29)-Tb(3)-Cl(7)	113.4(3)

Table S4. Selected Bond Lengths (Å) and Angles (°) for **3**.

Lu(1)-O(27)	2.211(6)	Lu(2)-N(1)	2.503(9)
Lu(1)-O(10)	2.239(6)	Lu(2)-O(13)	2.533(7)
Lu(1)-O(11)	2.249(6)	Lu(2)-Cl(1)	2.638(6)
Lu(1)-O(26)	2.282(7)	Lu(3)-O(35)	2.221(7)
Lu(1)-O(24)	2.348(6)	Lu(3)-O(15)	2.232(7)
Lu(1)-N(6)	2.486(8)	Lu(3)-O(3)	2.246(7)
Lu(1)-O(9)	2.550(6)	Lu(3)-O(34)	2.307(7)
Lu(1)-Cl(2)	2.877(5)	Lu(3)-O(37)	2.356(10)
Lu(2)-O(19)	2.205(6)	Lu(3)-O(32)	2.361(7)
Lu(2)-O(2)	2.239(7)	Lu(3)-N(8)	2.488(8)
Lu(2)-O(14)	2.258(6)	Lu(3)-O(4)	2.569(7)
Lu(2)-O(42)	2.296(7)	Cd(1)-O(6)	2.251(6)
Lu(2)-O(44)	2.347(6)	Cd(1)-O(22)	2.268(7)

Cd(1)-O(25)	2.294(6)	Cd(9)-O(24)	2.283(7)
Cd(1)-O(5)	2.420(7)	Cd(9)-O(11)	2.330(6)
Cd(1)-O(21)	2.440(8)	Cd(9)-O(12)	2.493(7)
Cd(1)-Cl(5)	2.451(3)	O(27)-Lu(1)-O(10)	86.4(2)
Cd(2)-N(7)	2.277(8)	O(27)-Lu(1)-O(11)	114.1(2)
Cd(2)-O(14)	2.304(6)	O(10)-Lu(1)-O(11)	135.7(2)
Cd(2)-O(20)	2.308(6)	O(27)-Lu(1)-O(26)	145.6(3)
Cd(2)-O(23)	2.382(7)	O(10)-Lu(1)-O(26)	101.5(2)
Cd(2)-O(21)	2.477(8)	O(11)-Lu(1)-O(26)	83.4(2)
Cd(2)-Cl(1)	2.607(4)	O(27)-Lu(1)-O(24)	79.1(2)
Cd(3)-O(18)	2.251(7)	O(10)-Lu(1)-O(24)	153.4(2)
Cd(3)-O(41)	2.268(7)	O(11)-Lu(1)-O(24)	70.9(2)
Cd(3)-N(9)	2.275(10)	O(26)-Lu(1)-O(24)	79.5(2)
Cd(3)-O(44)	2.295(6)	O(27)-Lu(1)-N(6)	76.0(2)
Cd(3)-O(2)	2.321(6)	O(10)-Lu(1)-N(6)	75.4(3)
Cd(3)-O(1)	2.506(7)	O(11)-Lu(1)-N(6)	72.8(2)
Cd(4)-O(18)	2.247(8)	O(26)-Lu(1)-N(6)	138.4(3)
Cd(4)-O(40)	2.269(8)	O(24)-Lu(1)-N(6)	121.4(2)
Cd(4)-O(41)	2.305(7)	O(27)-Lu(1)-O(9)	142.1(2)
Cd(4)-Cl(4)	2.443(3)	O(10)-Lu(1)-O(9)	64.3(2)
Cd(4)-O(17)	2.447(8)	O(11)-Lu(1)-O(9)	77.7(2)
Cd(4)-O(39)	2.456(8)	O(26)-Lu(1)-O(9)	68.2(2)
Cd(5)-N(2)	2.283(8)	O(24)-Lu(1)-O(9)	137.0(2)
Cd(5)-O(36)	2.318(6)	N(6)-Lu(1)-O(9)	73.7(2)
Cd(5)-O(3)	2.324(6)	O(27)-Lu(1)-Cl(2)	78.21(19)
Cd(5)-O(38)	2.361(10)	O(10)-Lu(1)-Cl(2)	73.04(18)
Cd(5)-O(43)	2.369(7)	O(11)-Lu(1)-Cl(2)	146.66(18)
Cd(5)-O(39)	2.465(8)	O(26)-Lu(1)-Cl(2)	72.4(2)
Cd(5)-O(37)	2.522(8)	O(24)-Lu(1)-Cl(2)	82.21(18)
Cd(6)-O(7)	2.231(6)	N(6)-Lu(1)-Cl(2)	140.0(2)
Cd(6)-N(4)	2.257(10)	O(9)-Lu(1)-Cl(2)	112.40(18)
Cd(6)-O(32)	2.281(7)	O(19)-Lu(2)-O(2)	112.7(2)
Cd(6)-O(33)	2.284(7)	O(19)-Lu(2)-O(14)	88.3(2)
Cd(6)-O(15)	2.315(7)	O(2)-Lu(2)-O(14)	134.7(2)
Cd(6)-O(16)	2.498(7)	O(19)-Lu(2)-O(42)	145.7(2)
Cd(7)-O(29)	2.238(8)	O(2)-Lu(2)-O(42)	82.9(3)
Cd(7)-O(7)	2.247(7)	O(14)-Lu(2)-O(42)	102.1(2)
Cd(7)-O(33)	2.272(7)	O(19)-Lu(2)-O(44)	77.9(2)
Cd(7)-O(8)	2.381(10)	O(2)-Lu(2)-O(44)	71.0(2)
Cd(7)-Cl(3)	2.470(3)	O(14)-Lu(2)-O(44)	154.3(2)
Cd(7)-O(30)	2.500(8)	O(42)-Lu(2)-O(44)	79.1(2)
Cd(8)-N(5)	2.290(8)	O(19)-Lu(2)-N(1)	74.1(3)
Cd(8)-O(10)	2.301(6)	O(2)-Lu(2)-N(1)	73.5(3)
Cd(8)-O(28)	2.328(7)	O(14)-Lu(2)-N(1)	74.8(3)
Cd(8)-O(31)	2.333(7)	O(42)-Lu(2)-N(1)	140.0(3)
Cd(8)-O(30)	2.458(8)	O(44)-Lu(2)-N(1)	120.7(3)
Cd(8)-Cl(2)	2.546(4)	O(19)-Lu(2)-O(13)	142.2(2)
Cd(9)-O(6)	2.245(6)	O(2)-Lu(2)-O(13)	76.1(2)
Cd(9)-N(3)	2.254(9)	O(14)-Lu(2)-O(13)	64.5(2)
Cd(9)-O(25)	2.265(7)	O(42)-Lu(2)-O(13)	69.5(2)

O(44)-Lu(2)-O(13)	136.7(2)	O(35)-Lu(3)-O(32)	77.6(2)
N(1)-Lu(2)-O(13)	73.7(3)	O(15)-Lu(3)-O(32)	70.6(2)
O(19)-Lu(2)-Cl(1)	77.4(2)	O(3)-Lu(3)-O(32)	150.6(2)
O(2)-Lu(2)-Cl(1)	146.84(19)	O(34)-Lu(3)-O(32)	81.6(3)
O(14)-Lu(2)-Cl(1)	74.61(19)	O(37)-Lu(3)-O(32)	79.0(3)
O(42)-Lu(2)-Cl(1)	74.2(2)	O(35)-Lu(3)-N(8)	75.1(3)
O(44)-Lu(2)-Cl(1)	81.19(19)	O(15)-Lu(3)-N(8)	73.1(3)
N(1)-Lu(2)-Cl(1)	138.3(2)	O(3)-Lu(3)-N(8)	78.0(3)
O(13)-Lu(2)-Cl(1)	116.2(2)	O(34)-Lu(3)-N(8)	135.8(3)
O(35)-Lu(3)-O(15)	112.5(3)	O(37)-Lu(3)-N(8)	141.9(3)
O(35)-Lu(3)-O(3)	87.0(2)	O(32)-Lu(3)-N(8)	120.7(3)
O(15)-Lu(3)-O(3)	138.7(2)	O(35)-Lu(3)-O(4)	139.3(3)
O(35)-Lu(3)-O(34)	149.0(3)	O(15)-Lu(3)-O(4)	79.4(2)
O(15)-Lu(3)-O(34)	81.3(3)	O(3)-Lu(3)-O(4)	63.8(2)
O(3)-Lu(3)-O(34)	100.6(3)	O(34)-Lu(3)-O(4)	68.6(3)
O(35)-Lu(3)-O(37)	78.8(3)	O(37)-Lu(3)-O(4)	115.3(3)
O(15)-Lu(3)-O(37)	143.7(3)	O(32)-Lu(3)-O(4)	140.5(2)
O(3)-Lu(3)-O(37)	73.5(3)	N(8)-Lu(3)-O(4)	71.7(3)
O(34)-Lu(3)-O(37)	74.8(3)		



XPS Surveys:

Figure S7. XPS survey scans of H_2L ligand, (**5**), and (**6**) in beads

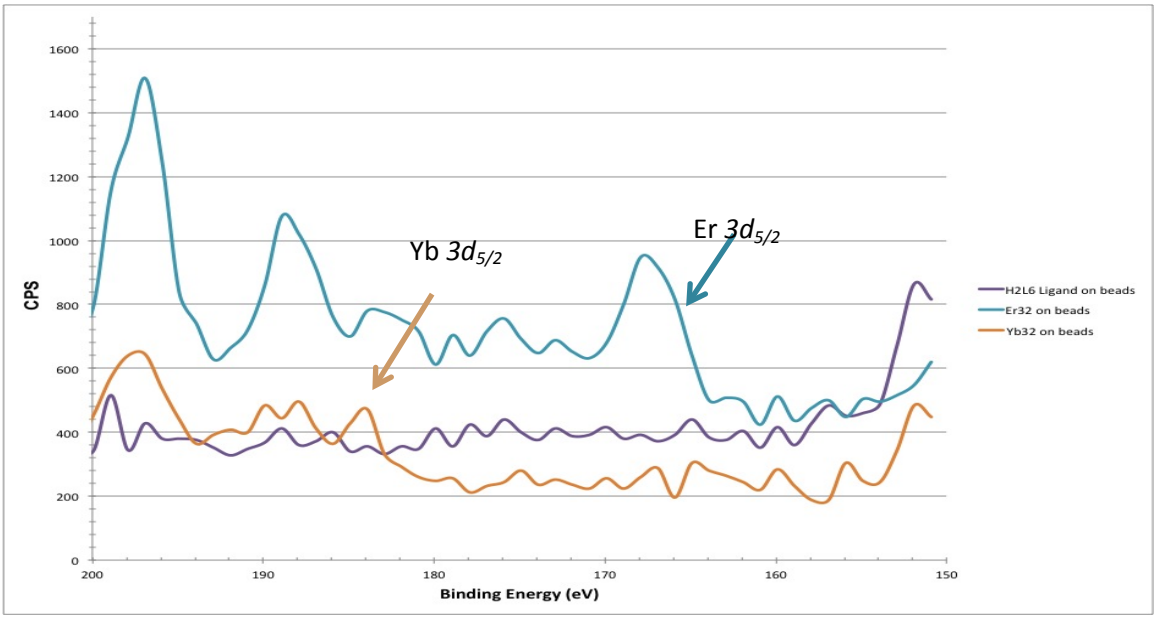


Figure S8. A closer look at the Er $4d_{5/2}$ and Yb $4d_{5/2}$ binding energies via XPS.

Table S5. Percent composition of Ln/Cd in beads

	Er $4d_{5/2}$	Yb $4d_{5/2}$	Cd $3d_{3/2}$
Binding Energy (eV)	168.1 eV	184.2 eV	405.6 eV
5 (Er) in beads	23.83 %		76.17 %
6 (Yb) in beads		26.78 %	73.22 %

Figure S8. A closer look at the Er $4d_{5/2}$ and Yb $4d_{5/2}$ binding energies via XPS.