Supplementary information to be published electronically

1. The UV-Vis-NIR spectra of complex 3 and ligands

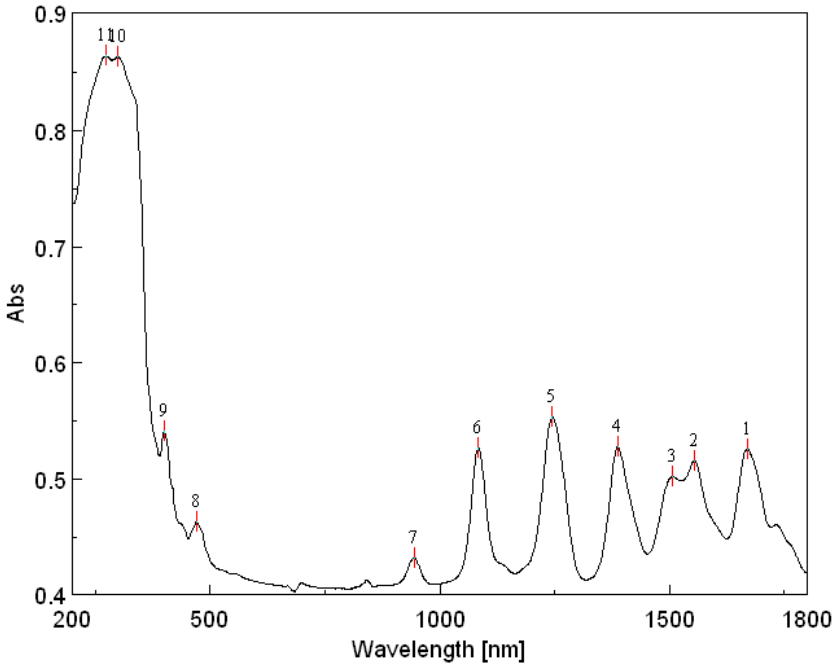

Fig. S1 The UV-Vis-NIR spectrum of complex **3**

The absorption spectrum of the complex **3** gives 9 absorption bands (peak 1-9) corresponding to $^6H_{5/2}\rightarrow{}^6F_{1/2}$, $^6H_{5/2}\rightarrow{}^6H_{15/2}$, $^6H_{5/2}\rightarrow{}^6F_{3/2}$, $^6H_{5/2}\rightarrow{}^6F_{5/2}$, $^6H_{5/2}\rightarrow{}^6F_{7/2}$, $^6H_{5/2}\rightarrow{}^6F_{9/2}$, $^6H_{5/2}\rightarrow{}^6F_{11/2}$, $^6H_{5/2}\rightarrow{}^4F_{5/2}$ and $^6H_{5/2}\rightarrow{}^4F_{7/2}$ transitions of the Sm(III) ion, respectively.

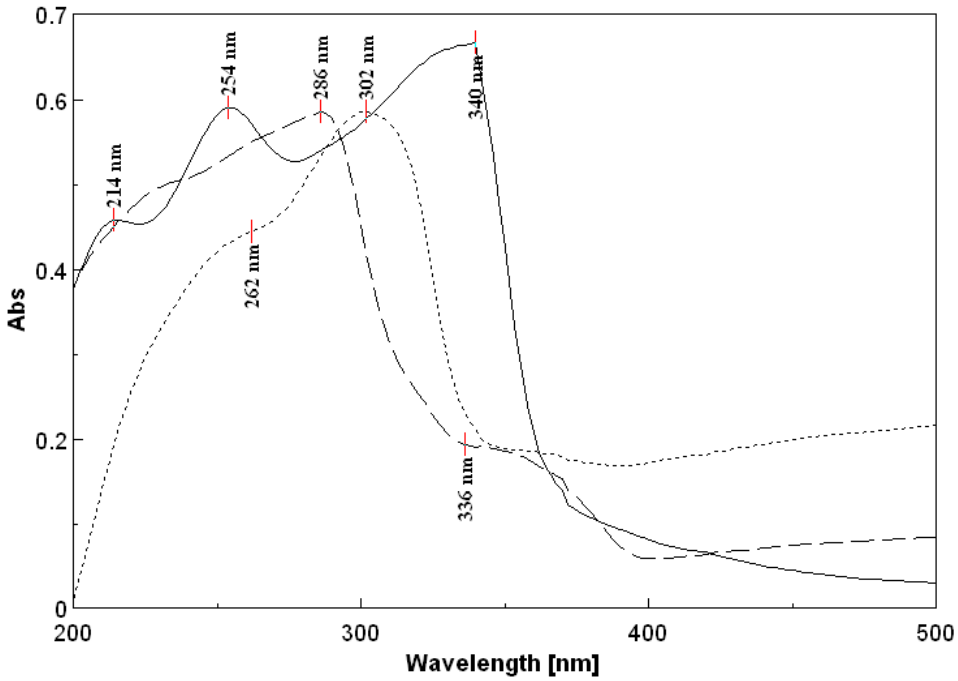

Fig. S2 The UV-Vis-NIR spectra of *p*-toluic acid (…), *p*-chloro-benzoic acid (- - -) and phen (—)

2. The emission spectra of ligands, complexes 1 and 4 in the UV-Vis region

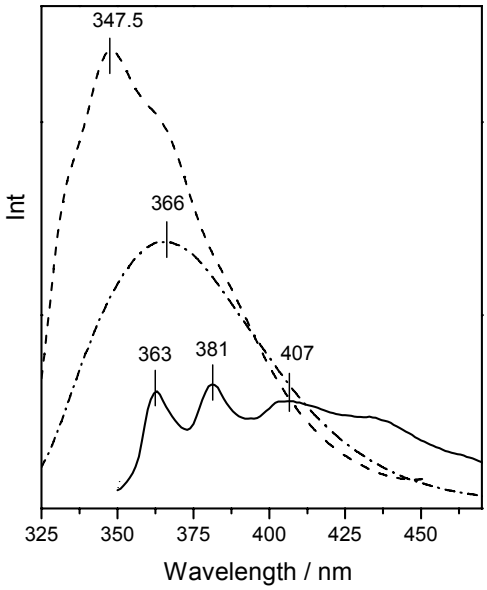

Fig. S3 The emission spectra of *p*-toluic acid (- · - · -) (λ_{Ex} = 314 nm), *p*-chloro-benzoic acid (- - -) (λ_{Ex} = 316 nm)and phen (—) (λ_{Ex} = 344 nm)

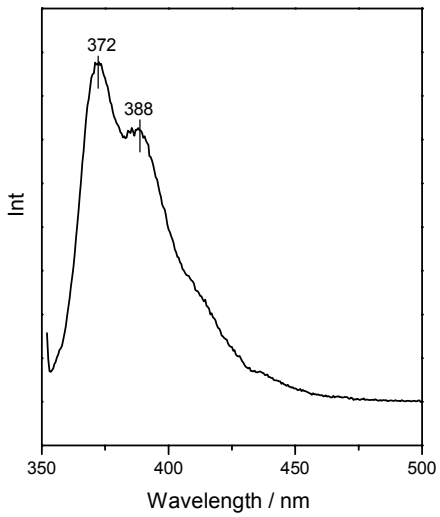

Fig. S4 The emission spectra of complex **1**

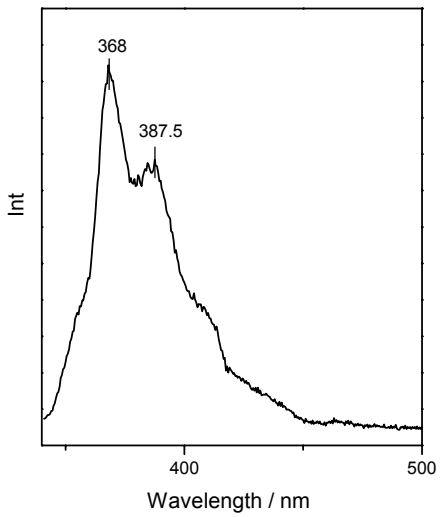

Fig. S5 The emission spectra of complex **4**

3. The packing diagram of complexes 1 and 4

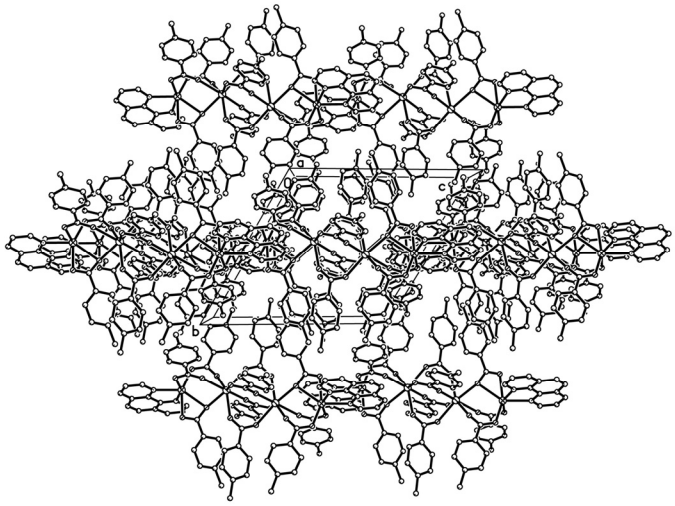

Fig. S6 The packing diagram of complex **1**.

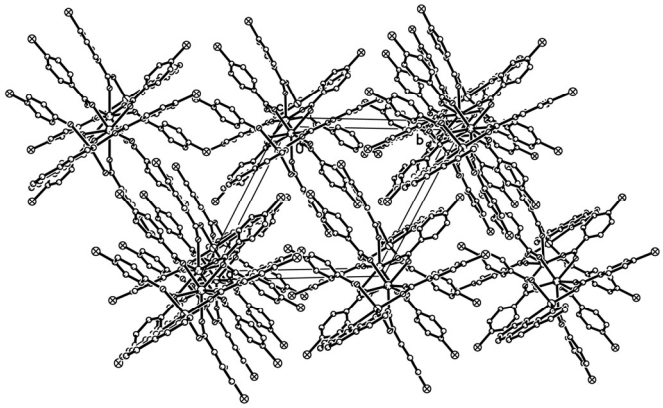

Fig. S7 The packing diagram of complex **4**.

4. The IR spectra of complexes

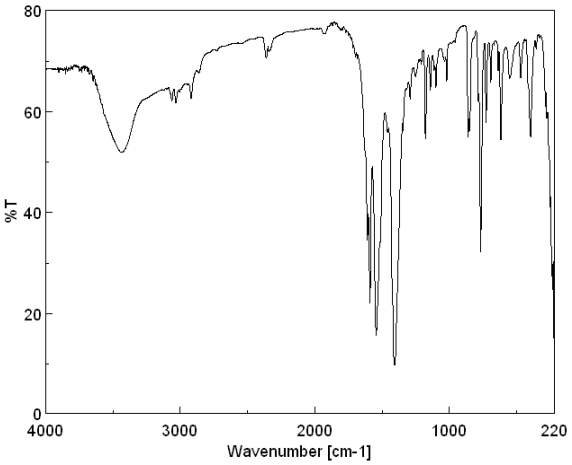

Fig. S8 The IR spectrum of complex **1**

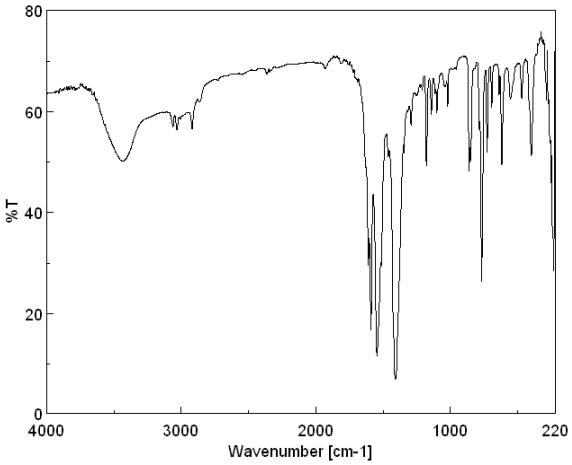

Fig. S9 The IR spectrum of complex **2**

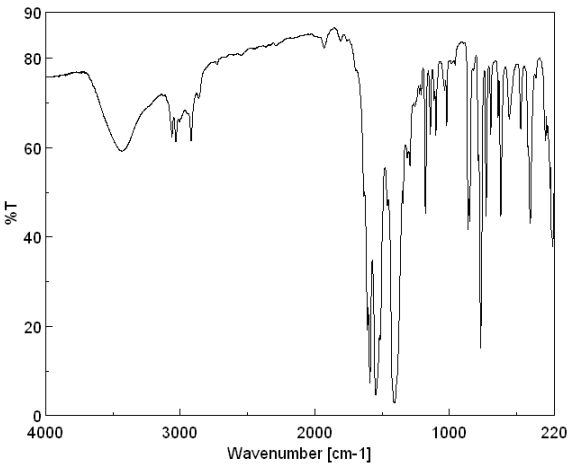

Fig. S10 The IR spectrum of complex **3**

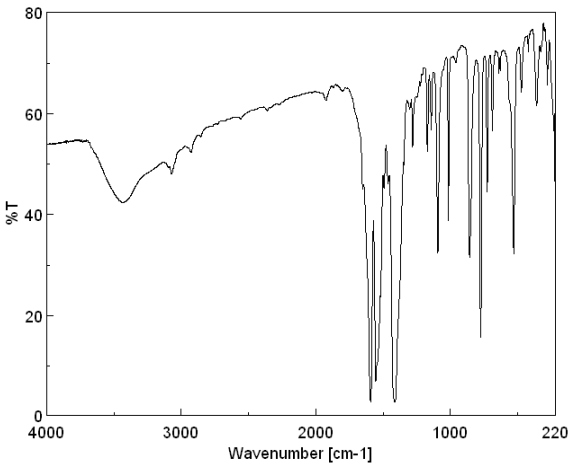

Fig. S11 The IR spectrum of complex **4**

4. Selected bond angles of complexes 1-4

Table S1 Selected bond angels [º] for complex **1**

O(3)-Nd(1)-O(8)	160.12(11)	O(3)-Nd(1)-O(2)	77.45(12)	O(8)-Nd(1)-O(2)	103.80(12)
O(3)-Nd(1)-O(5)	83.78(12)	O(8)-Nd(1)-O(5)	77.02(12)	O(2)-Nd(1)-O(5)	79.72(12)
O(3)-Nd(1)-O(1)	81.10(11)	O(8)-Nd(1)-O(1)	111.75(11)	O(2)-Nd(1)-O(1)	127.74(10)
O(5)-Nd(1)-O(1)	143.94(12)	O(3)-Nd(1)-O(4)	126.21(11)	O(8)-Nd(1)-O(4)	72.83(11)
O(2)-Nd(1)-O(4)	78.69(12)	O(5)-Nd(1)-O(4)	137.12(12)	O(1)-Nd(1)-O(4)	76.80(12)
O(3)-Nd(1)-O(9)	87.10(11)	O(8)-Nd(1)-O(9)	81.92(11)	O(2)-Nd(1)-O(9)	148.41(12)
O(5)-Nd(1)-O(9)	71.26(12)	O(1)-Nd(1)-O(9)	75.43(10)	O(4)-Nd(1)-O(9)	131.72(11)
O(7)-Cd(2)-O(6)	97.97(14)	O(7)-Cd(2)-N(1)	85.05(12)	O(6)-Cd(2)-N(1)	106.77(13)
O(7)-Cd(2)-O(10)	99.51(13)	O(6)-Cd(2)-O(10)	153.10(13)	N(1)-Cd(2)-O(10)	94.99(12)
O(7)-Cd(2)-N(2)	154.88(13)	O(6)-Cd(2)-N(2)	87.14(13)	N(1)-Cd(2)-N(2)	69.97(14)
O(10)-Cd(2)-N(2)	85.65(13)	O(7)-Cd(2)-O(9)	111.29(11)	O(6)-Cd(2)-O(9)	101.31(12)
N(1)-Cd(2)-O(9)	145.14(12)	O(10)-Cd(2)-O(9)	53.11(11)	N(2)-Cd(2)-O(9)	91.56(12)

Table S2 Selected bond lengths [Å] and angels [º] for complex **2**

O(10)-Pr(1)-O(1)	160.44(11)	O(10)-Pr(1)-O(7)	77.13(10)	O(1)-Pr(1)-O(7)	104.47(11)
O(10)-Pr(1)-O(4)	84.07(11)	O(1)-Pr(1)-O(4)	77.12(11)	O(7)-Pr(1)-O(4)	80.05(11)
O(10)-Pr(1)-O(8)	81.34(11)	O(1)-Pr(1)-O(8)	111.02(11)	O(7)-Pr(1)-O(8)	127.73(10)
O(4)-Pr(1)-O(8)	143.86(10)	O(10)-Pr(1)-O(9)	126.18(10)	O(1)-Pr(1)-O(9)	72.64(10)
O(7)-Pr(1)-O(9)	78.87(11)	O(4)-Pr(1)-O(9)	137.09(11)	O(8)-Pr(1)-O(9)	76.68(11)
O(10)-Pr(1)-O(6)	87.01(10)	O(1)-Pr(1)-O(6)	81.81(10)	O(7)-Pr(1)-O(6)	148.08(11)
O(4)-Pr(1)-O(6)	70.79(11)	O(8)-Pr(1)-O(6)	75.57(10)	O(9)-Pr(1)-O(6)	131.92(11)
O(2)-Cd(1)-O(3)	98.11(13)	O(2)-Cd(1)-N(1)	84.93(11)	O(3)-Cd(1)-N(1)	106.98(11)
O(2)-Cd(1)-O(5)	99.49(12)	O(3)-Cd(1)-O(5)	153.10(11)	O(5)-Cd(1)- N(1)	94.72(11)
O(2)-Cd(1)-N(2)	154.94(11)	O(3)-Cd(1)-N(2)	87.23(13)	N(1)-Cd(1)-N(2)	70.13(12)
O(5)-Cd(1)-N(2)	85.39(12)	O(2)-Cd(1)-O(6)	111.26(10)	O(3)-Cd(1)-O(6)	101.26(11)
N(1)-Cd(1)-O(6)	145.04(10)	O(5)-Cd(1)-O(6)	53.20(10)	N(2)-Cd(1)-O(6)	91.43(11)

Table S3 Selected bond lengths [Å] and angels [º] for complex **3**

O(7)-Sm(1)-O(5)	159.78(12)	O(7)-Sm(1)-O(10)	77.80(12)	O(5)-Sm(1)-O(10)	103.48(12)
O(7)-Sm(1)-O(1)	82.73(12)	O(5)-Sm(1)-O(1)	77.72(12)	O(10)-Sm(1)-O(1)	79.82(12)
O(7)-Sm(1)-O(9)	81.31(11)	O(5)-Sm(1)-O(9)	112.04(12)	O(10)-Sm(1)-O(9)	126.98(10)
O(1)-Sm(1)-O(9)	144.27(12)	O(7)-Sm(1)-O(8)	126.15(11)	O(5)-Sm(1)-O(8)	73.20(11)
O(10)-Sm(1)-O(8)	78.36(12)	O(1)-Sm(1)-O(8)	138.06(12)	O(9)-Sm(1)-O(8)	75.94(11)
O(7)-Sm(1)-O(3)	86.90(11)	O(5)-Sm(1)-O(3)	82.19(11)	O(10)-Sm(1)-O(3)	149.27(11)
O(1)-Sm(1)-O(3)	71.84(11)	O(9)-Sm(1)-O(3)	75.55(10)	O(8)-Sm(1)-O(3)	131.35(11)
O(2)-Cd(1)-O(6)	98.09(14)	O(2)-Cd(1)-O(4)	152.76(12)	O(6)-Cd(1)-O(4)	99.24(13)
O(2)-Cd(1)-N(1)	107.25(12)	O(6)-Cd(1)-N(1)	85.05(12)	O(4)-Cd(1)-N(1)	95.07(12)
O(2)-Cd(1)-N(2)	87.54(13)	O(6)-Cd(1)-N(2)	155.34(12)	O(4)-Cd(1)-N(2)	85.42(13)
N(1)-Cd(1)-N(2)	70.38(13)	O(2)-Cd(1)-O(3)	100.85(12)	O(6)-Cd(1)-O(3)	110.35(11)
O(4)-Cd(1)-O(3)	53.24(11)	N(1)-Cd(1)-O(3)	145.69(11)	N(2)-Cd(1)-O(3)	91.92(12)

Table S4 Selected bond lengths [Å] and angels [º] for complex **4**

O(10)-Ho(1)-O(3)	159.97(13)	O(10)-Ho(1)-O(6)	78.50(12)	O(3)-Ho(1)-O(6)	102.67(13)
O(10)-Ho(1)-O(2)	81.64(13)	O(3)-Ho(1)-O(2)	79.04(13)	O(6)-Ho(1)-O(2)	78.68(13)
O(10)-Ho(1)-O(5)	81.25(12)	O(3)-Ho(1)-O(5)	112.54(12)	O(6)-Ho(1)-O(5)	125.63(11)
O(2)-Ho(1)-O(5)	146.15(13)	O(10)-Ho(1)-O(9)	125.50(11)	O(3)-Ho(1)-O(9)	73.51(12)
O(6)-Ho(1)-O(9)	76.72(12)	O(2)-Ho(1)-O(9)	137.68(13)	O(5)-Ho(1)-O(9)	75.36(12)
O(10)-Ho(1)-O(8)	85.96(12)	O(3)-Ho(1)-O(8)	83.68(12)	O(6)-Ho(1)-O(8)	150.20(13)
O(2)-Ho(1)-O(8)	73.97(13)	O(5)-Ho(1)-O(8)	75.87(11)	O(9)-Ho(1)-O(8)	132.38(12)
O(1)-Cd(1)-O(4)	99.80(16)	O(1)-Cd(1)-N(1)	109.30(13)	O(4)-Cd(1)-N(1)	86.59(14)
O(1)-Cd(1)-O(7)	149.61(14)	O(4)-Cd(1)-O(7)	98.36(15)	N(1)-Cd(1)-O(7)	95.89(13)
O(1)-Cd(1)-N(2)	87.95(15)	O(4)-Cd(1)-N(2)	157.29(13)	N(1)-Cd(1)-N(2)	70.70(15)
O(7)-Cd(1)-N(2)	84.55(14)	O(1)-Cd(1)-O(8)	98.08(12)	O(4)-Cd(1)-O(8)	105.82(12)
N(1)-Cd(1)-O(8)	147.65(13)	O(7)-Cd(1)-O(8)	53.35(11)	N(2)-Cd(1)-O(8)	94.03(12)