

# Syntheses, crystal structures, and magnetic properties of cyclic dimer Ln<sub>2</sub>L<sub>2</sub> complexes constructed from (3-pyridinylmethoxy)phenyl-substituted nitronyl nitroxide ligands

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**Table S1** Selected bond lengths (Å) and angles (°) for complex **1**

Gd(1)-O(7)	2.320(5)	Gd(1)-O(1)	2.376(5)
Gd(1)-O(5)	2.356(4)	Gd(1)-O(6)	2.387(4)
Gd(1)-O(2)	2.357(5)	Gd(1)-N(1)	2.579(5)
Gd(1)-O(4)	2.362(4)	O(7)-N(2)	1.315(7)
Gd(1)-O(3)	2.364(4)		
N(2)-O(7)-Gd(1)	139.2(4)	O(4)-Gd(1)-N(1)	74.86(17)
O(7)-Gd(1)-N(1)	71.91(17)	O(3)-Gd(1)-N(1)	142.08(16)
O(5)-Gd(1)-N(1)	77.80(16)	O(1)-Gd(1)-N(1)	71.27(17)
O(2)-Gd(1)-N(1)	138.28(17)	O(6)-Gd(1)-N(1)	126.74(17)

**Table S2** Selected bond lengths (Å) and angles (°) for complex **2**

Tb(1)-O(7)	2.317(6)	Tb(1)-O(4)	2.368(6)
Tb(1)-O(5)	2.336(5)	Tb(1)-O(6)	2.376(5)
Tb(1)-O(2)	2.344(5)	Tb(1)-N(1)#1	2.585(6)
Tb(1)-O(3)	2.350(6)	O(7)-N(3)	1.323(8)
Tb(1)-O(1)	2.351(6)		
N(3)-O(7)-Tb(1)	139.8(5)	O(3)-Tb(1)-N(1)#1	72.0(2)
O(7)-Tb(1)-N(1)#1	72.0(2)	O(1)-Tb(1)-N(1)#1	74.7(2)
O(5)-Tb(1)-N(1)#1	77.73(19)	O(4)-Tb(1)-N(1)#1	138.9(2)
O(2)-Tb(1)-N(1)#1	142.4(2)	O(6)-Tb(1)-N(1)#1	126.7(2)

Symmetry transformations used to generate equivalent atoms: #1 -x+2,-y,-z+1

**Table S3** Selected bond lengths (Å) and angles (°) for complex **3**

Dy(1)-O(8)	2.294(5)	Dy(1)-O(4)	2.347(5)
Dy(1)-O(1)	2.323(4)	Dy(1)-O(2)	2.362(4)
Dy(1)-O(5)	2.332(5)	Dy(1)-N(3)	2.560(5)
Dy(1)-O(3)	2.336(5)	O(8)-N(2)	1.313(7)
Dy(1)-O(6)	2.340(4)		
O(8)-Dy(1)-N(3)	71.74(17)	O(6)-Dy(1)-N(3)	142.02(17)
O(1)-Dy(1)-N(3)	77.64(16)	O(4)-Dy(1)-N(3)	71.34(17)
O(5)-Dy(1)-N(3)	74.61(17)	O(2)-Dy(1)-N(3)	126.64(18)
O(3)-Dy(1)-N(3)	138.69(18)	N(2)-O(8)-Dy(1)	139.4(4)

**Table S4** Selected bond lengths (Å) and angles (°) for complex **4**

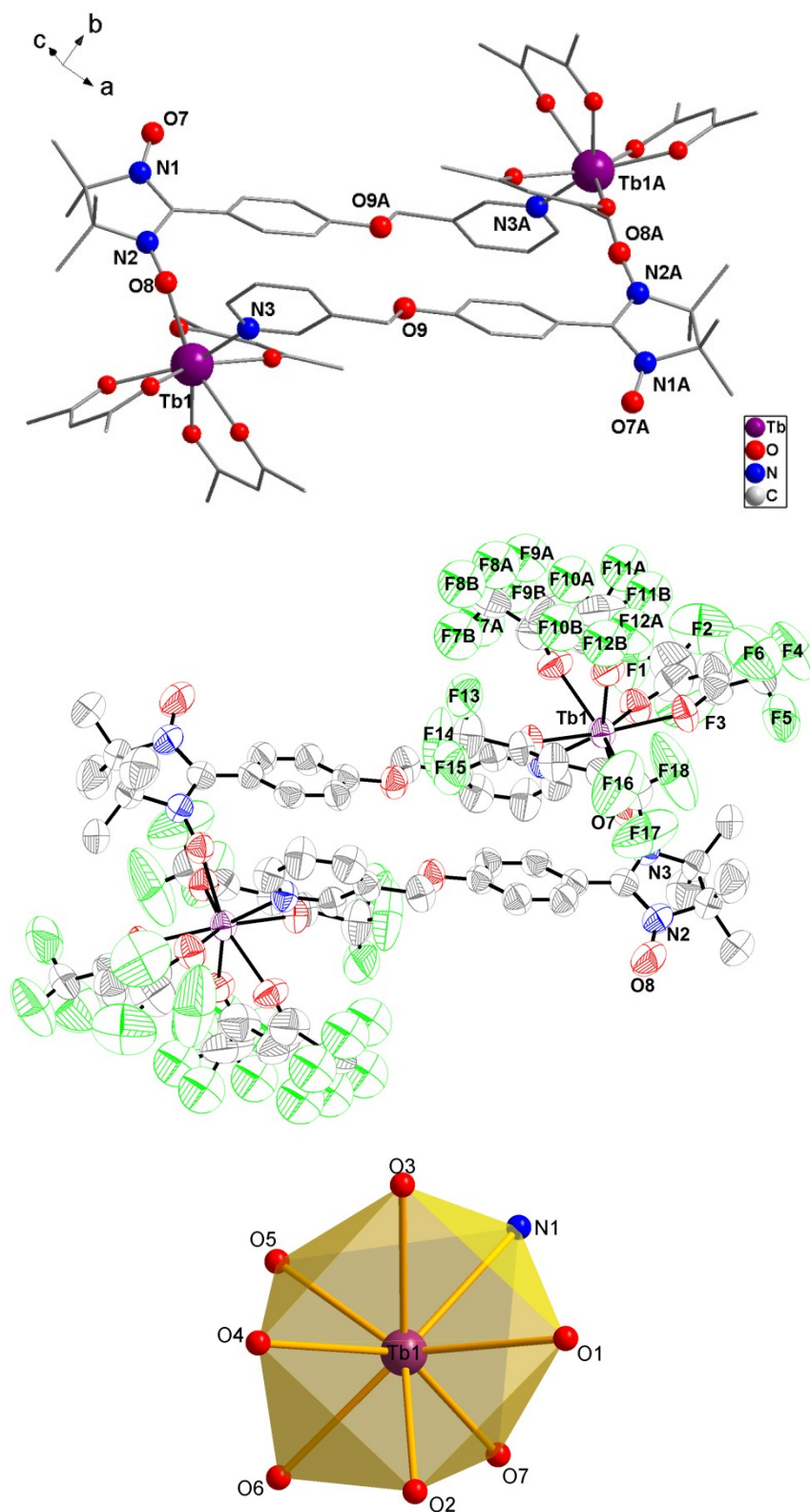
Ho(1)-O(8)#1	2.282(4)	Ho(1)-O(6)	2.338(4)
Ho(1)-O(1)	2.313(4)	Ho(1)-O(2)	2.349(4)
Ho(1)-O(4)	2.313(4)	Ho(1)-N(1)	2.547(5)
Ho(1)-O(3)	2.326(4)	O(8)-N(2)	1.314(7)
Ho(1)-O(5)	2.328(5)		
O(3)-Ho(1)-N(1)	142.23(16)	N(2)-O(8)-Ho(1)#1	139.3(4)
O(5)-Ho(1)-N(1)	138.68(17)	O(8)#1-Ho(1)-N(1)	71.74(16)
O(6)-Ho(1)-N(1)	71.26(16)	O(1)-Ho(1)-N(1)	77.43(15)
O(2)-Ho(1)-N(1)	126.72(16)	O(4)-Ho(1)-N(1)	74.48(16)

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

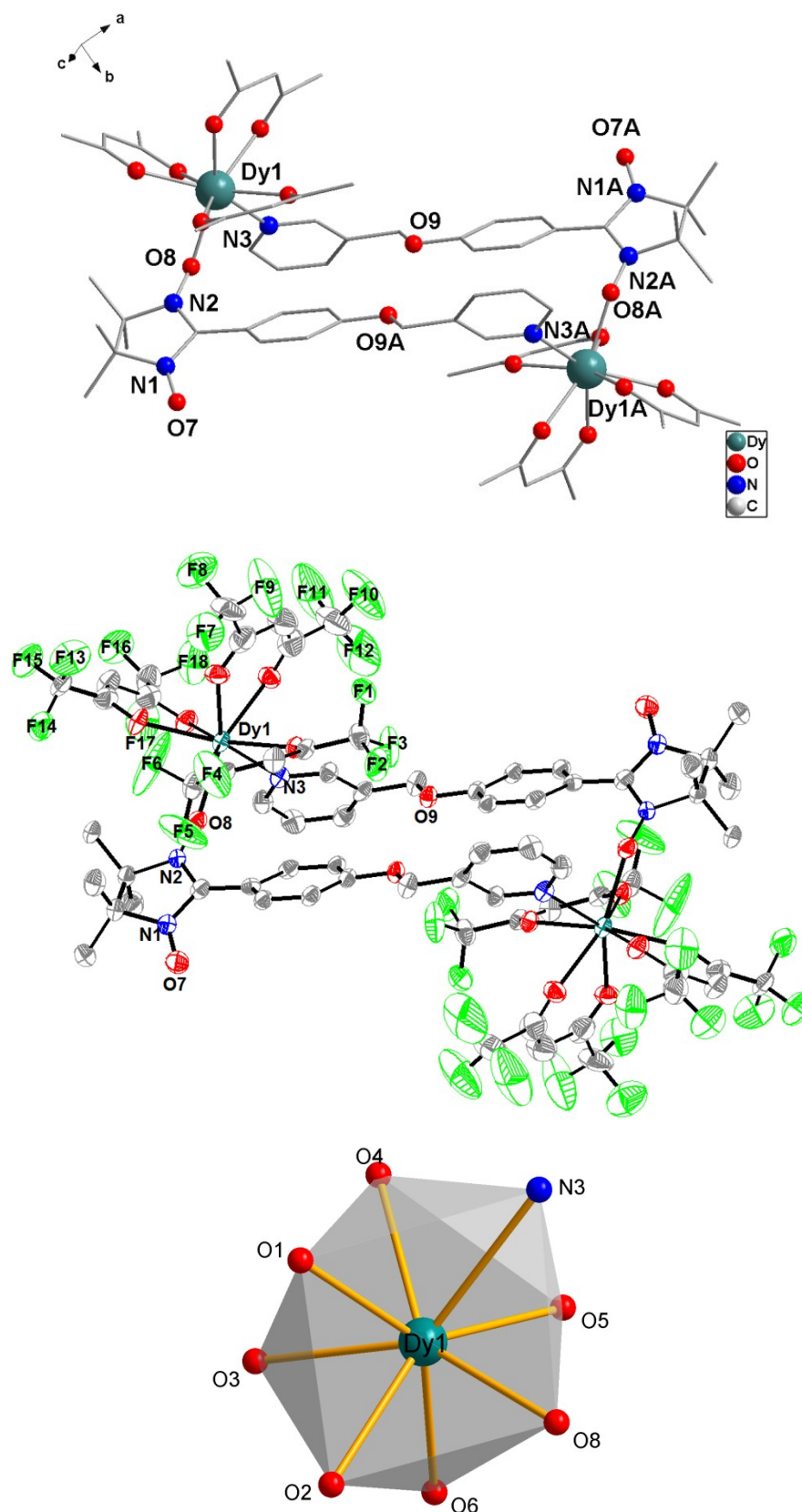
**Table S5** Selected bond lengths (Å) and angles (°) for complex **5**

Er(1)-O(7)	2.281(5)	Er(1)-O(2)	2.331(5)
Er(1)-O(5)	2.307(4)	Er(1)-O(6)	2.345(5)
Er(1)-O(3)	2.316(5)	Er(1)-N(3)#1	2.534(6)
Er(1)-O(1)	2.319(5)	O(7)-N(1)	1.311(7)
Er(1)-O(4)	2.320(5)		
O(7)-Er(1)-N(3)#1	71.75(18)	O(4)-Er(1)-N(3)#1	142.21(18)
O(5)-Er(1)-N(3)#1	77.47(17)	O(2)-Er(1)-N(3)#1	71.26(18)
O(3)-Er(1)-N(3)#1	74.37(18)	O(6)-Er(1)-N(3)#1	126.94(18)
O(1)-Er(1)-N(3)#1	138.92(19)	N(1)-O(7)-Er(1)	138.8(4)

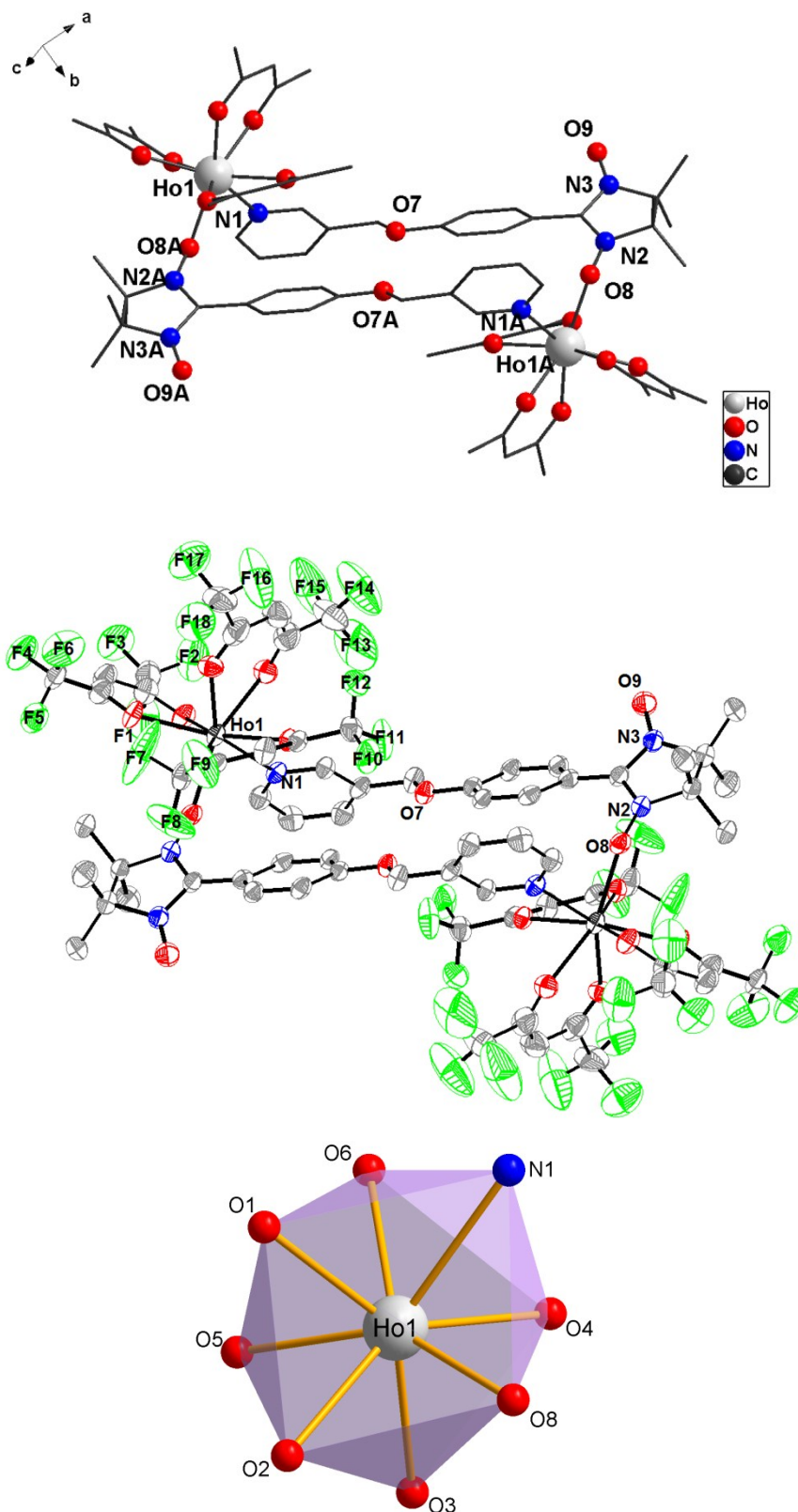
Symmetry transformations used to generate equivalent atoms: #1 -x+1,-y+1,-z



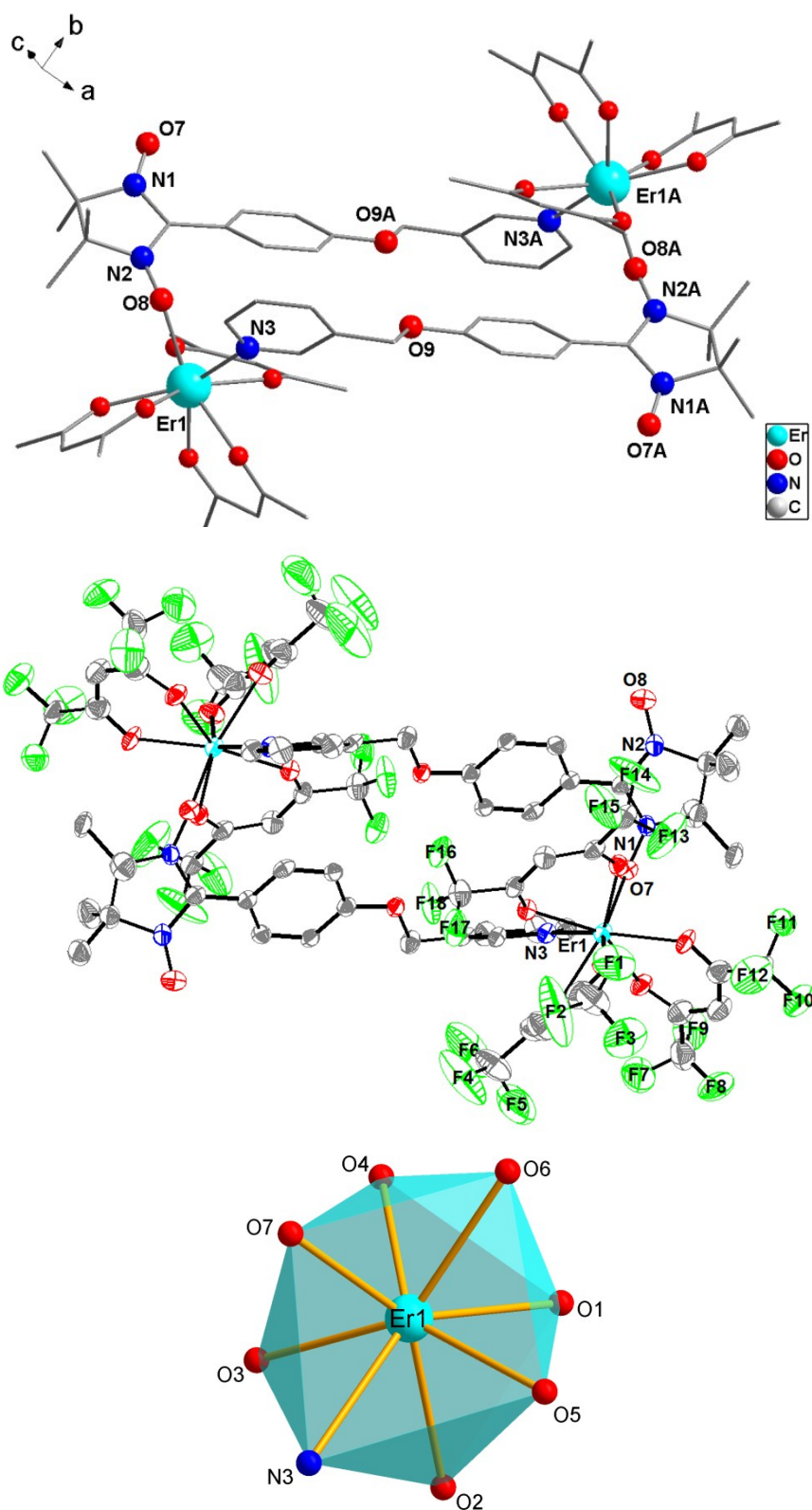
**Figure S1.** (top) Crystal structure of complex **2** (H atoms and F atoms are omitted for clarity and symmetry transformations used to generate equivalent atoms A:  $-x+2, -y, -z+1$ ); (middle) ORTEP view of complex **2** at the 50% probability level. (bottom) The coordination polyhedron of Tb(III) ion in **2**.



**Figure S2.**(top) Crystal structure of complex **3** (H atoms and F atoms are omitted for clarity and symmetry transformations used to generate equivalent atoms A:  $-x+1, -y+1, -z+1$ ); (middle) ORTEP view of complex **3** at the 50% probability level. (bottom) The coordination polyhedron of Dy(III) ion in **3**.

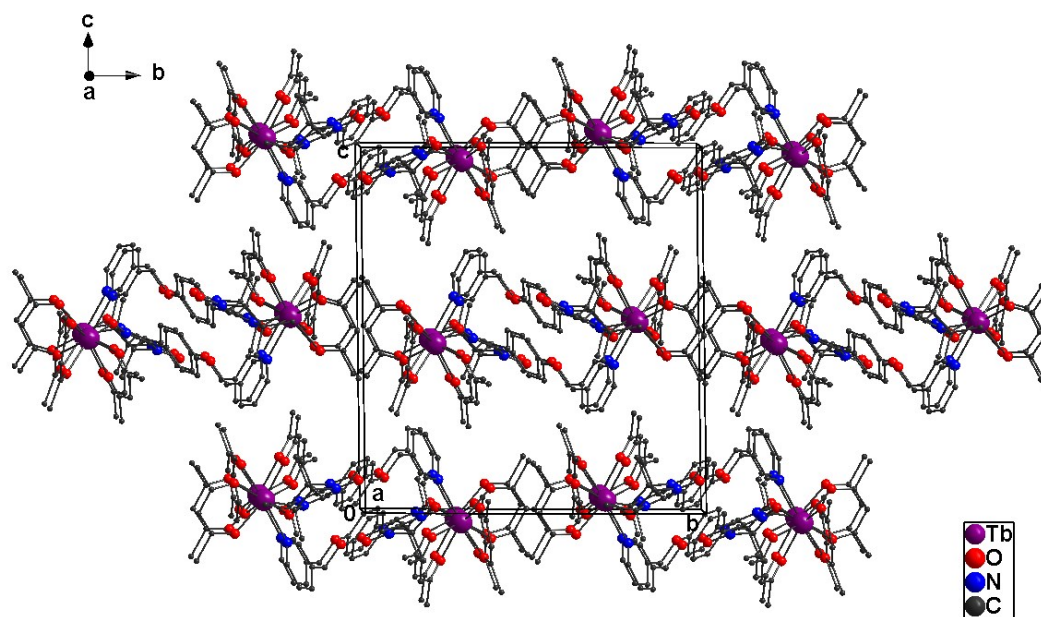


**Figure S3.** (top) Crystal structure of complex 4 (H atoms and F atoms are omitted for clarity and symmetry transformations used to generate equivalent atoms A:  $-x+1, -y+1, -z$ ); (middle) ORTEP view of complex 4 at the 50% probability level. (bottom) The coordination polyhedron of Ho(III) ion in 4.

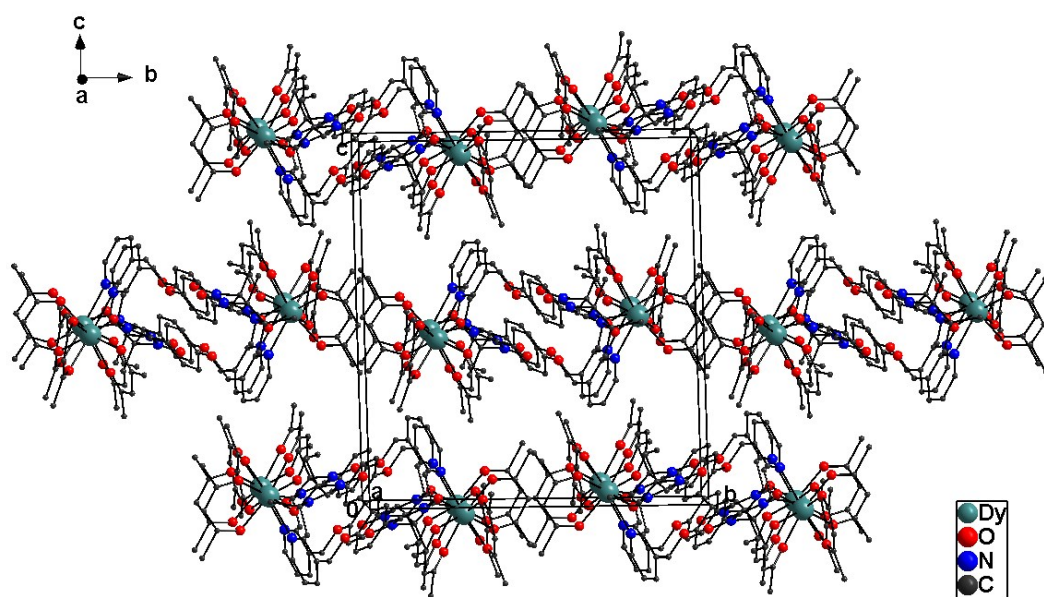


**Figure S4.** (top) Crystal structure of complex **5** (H atoms and F atoms are omitted for clarity and symmetry transformations used to generate equivalent atoms A:  $-x+1, -y+1, -z$ ); (middle) ORTEP view of complex **5** at the 50% probability level. (bottom) The coordination polyhedron of Er(III) ion in **5**.

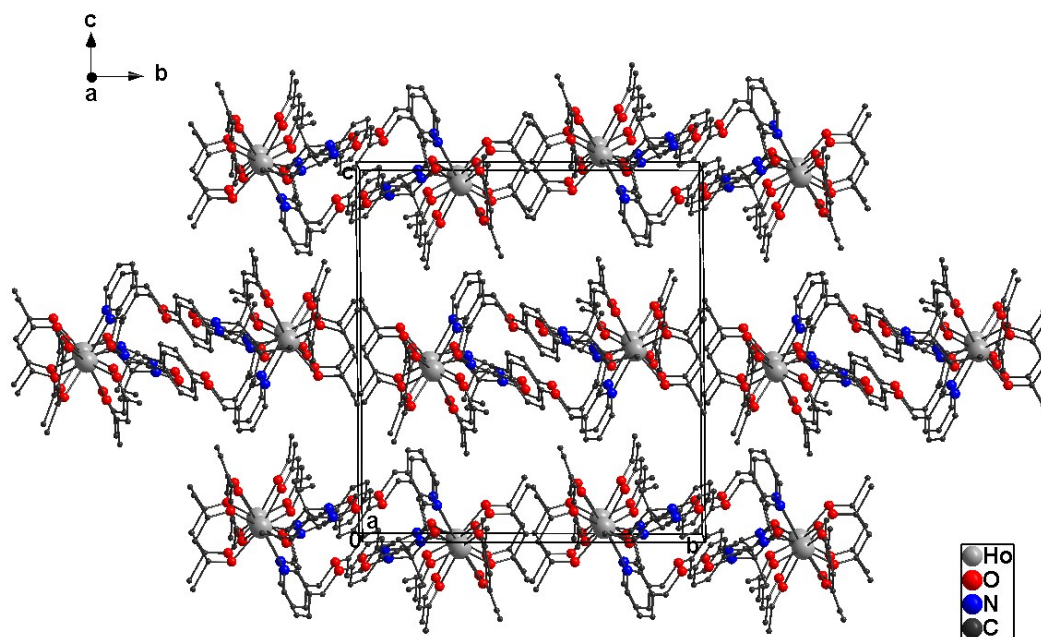




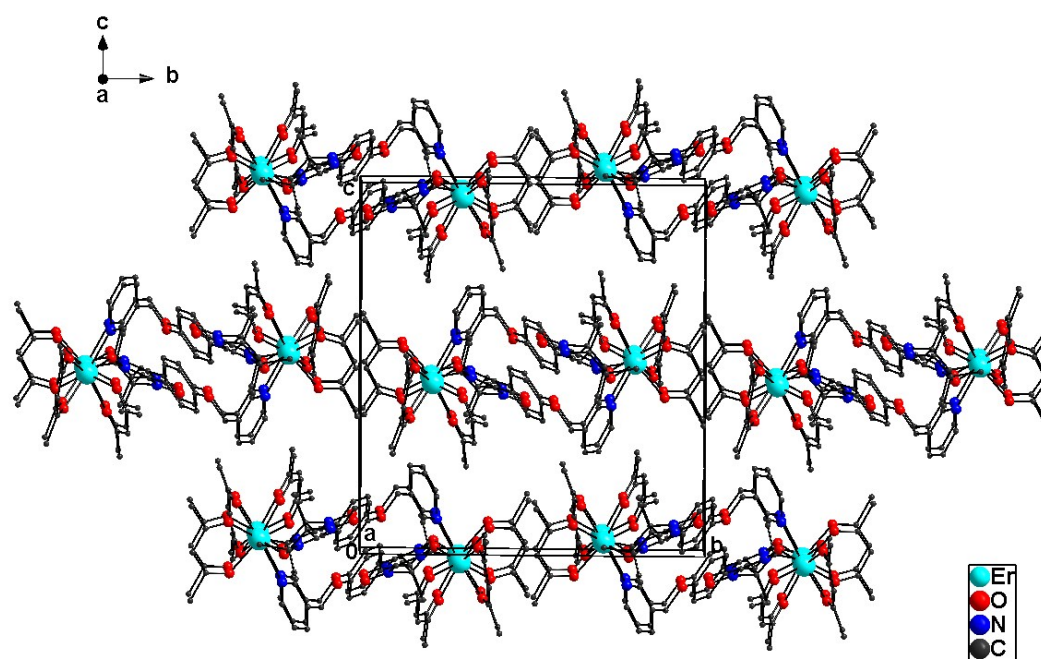
**Figure S5.** Packing diagram of complex **2**, hydrogen and fluorin atoms are not shown for the sake of clarity.



**Figure S6.** Packing diagram of complex **3**, hydrogen and fluorin atoms are not shown for the sake of clarity.

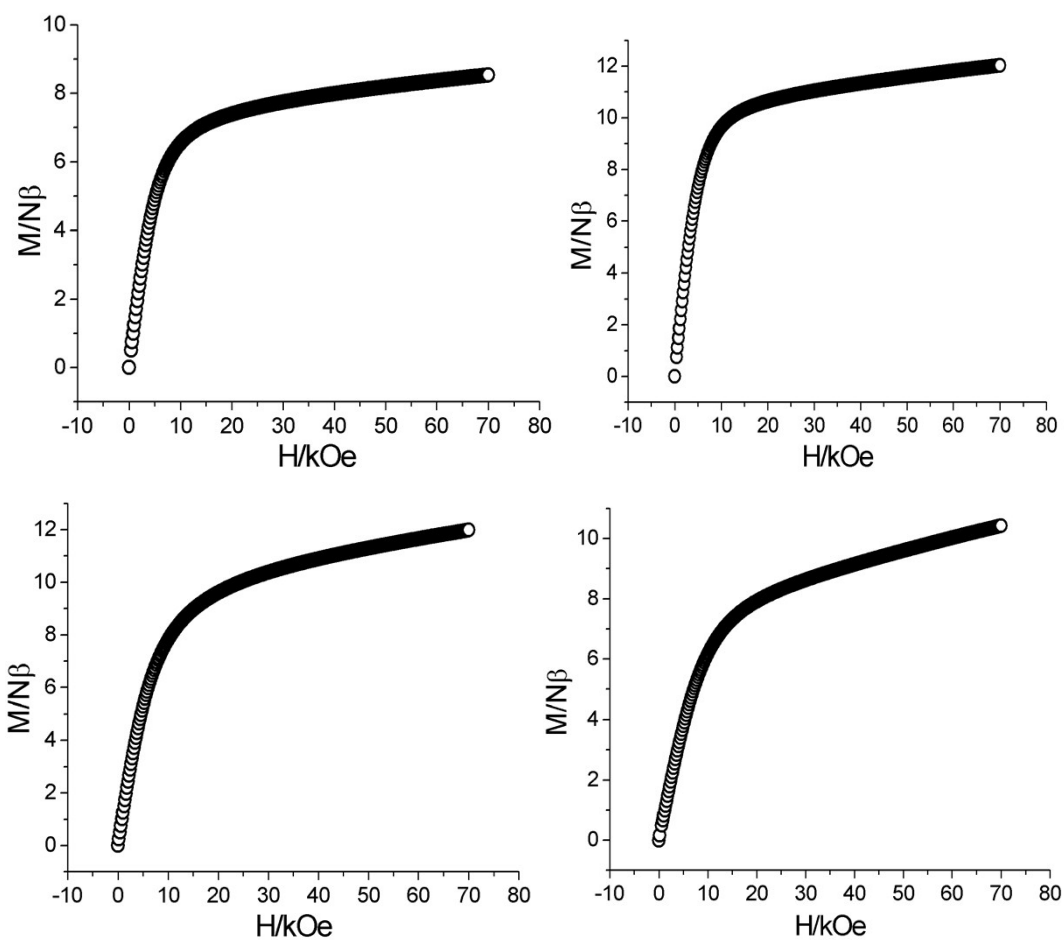


**Figure S7.** Packing diagram of complex 4, hydrogen and fluorin atoms are not shown for the sake of clarity.

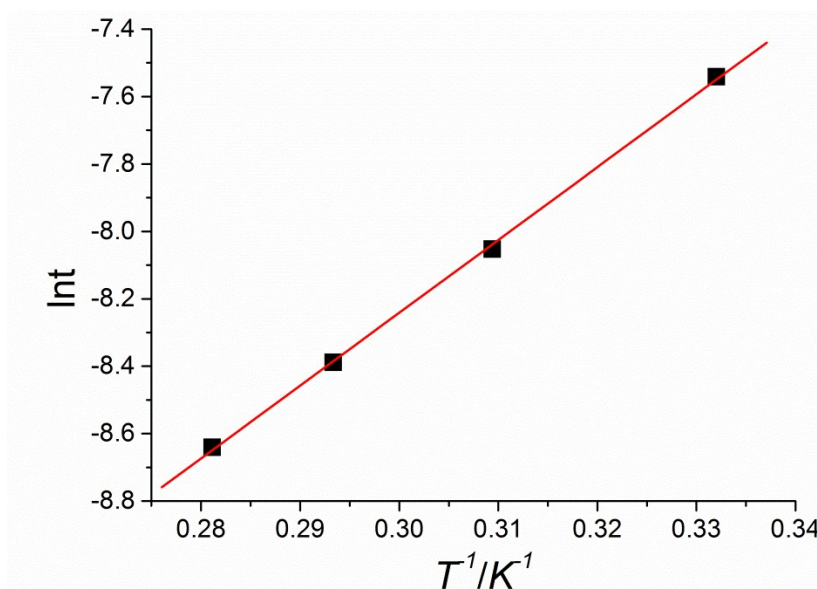


**Figure S8.** Packing diagram of complex 5, hydrogen and fluorin atoms are not shown for the sake of clarity.

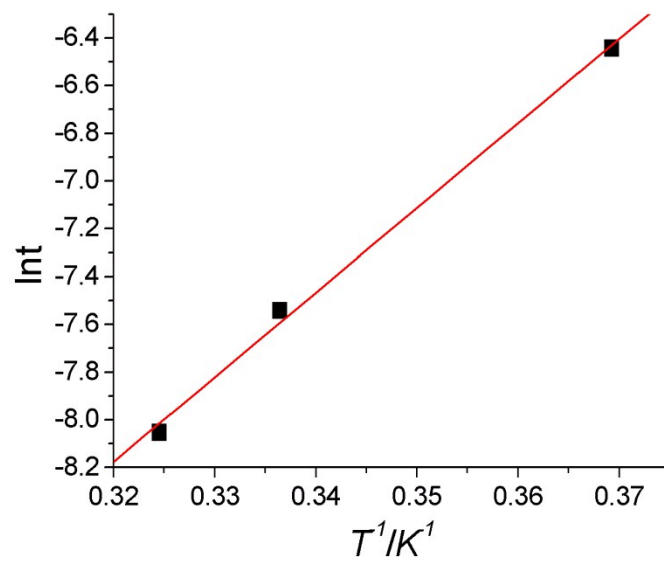




**Figure S9.**  $M$  versus  $H$  plot at 2 K for complex **2**(top left), **3**(top right), **4**(bottom left), and **5**(bottom right).



**Figure S10** Plots of  $\ln\tau$  versus  $T^{-1}$  fitting to the Arrhenius law for complex **2**.



**Figure S11** Plots of  $\ln\tau$  versus  $T^{-1}$  fitting to the Arrhenius law for complex **3**.