Table S1 Selected bond lengths (Å) for **1**−**9**

1		**2**		**3**	
Sm1−O4	2.416(3)	Eu1−O4	2.400(3)	Gd1−O4	2.409(3)
Sm1−O5	2.537(3)	Eu1−O5#1	2.524(3)	Gd1−O5	2.536(3)
Sm1−O6	2.472(3)	Eu1−O6#1	2.458(3)	Gd1−O6	2.468(3)
Sm1−O7#1	2.444(3)	Eu1−O7	2.428(3)	Gd1−O7	2.599(3)
Sm1−O7#2	2.602(3)	Eu1−O7#2	2.590(3)	Gd1−O7#1	2.442(3)
Sm1−O8#2	2.513(4)	Eu1−O8#2	2.500(3)	Gd1−O8	2.513(3)
Sm1−O1W	2.465(4)	Eu1−O1W	2.458(3)	Gd1−O1W	2.474(3)
Sm1−O2W	2.450(4)	Eu1−O2W	2.418(3)	Gd1−O2W	2.429(3)
Sm1−O3W	2.440(4)	Eu1−O3W	2.416(3)	Gd1−O3W	2.436(3)
Cu1−O1	1.946(3)	Cu1−O1	1.939(3)	Cu1−O1	1.942(3)
Cu1−O1#3	1.946(3)	Cu1−O1#3	1.939(3)	Cu1−O1#2	1.942(3)
Cu1−O3#1	2.6123(42)	Cu1−O3#4	2.6075(37)	Cu1−O3#4	2.6084(37)
Cu1−O3#5	2.6123(42)	Cu1−O3#5	2.6075(37)	Cu1−O3#5	2.6084(37)
Cu1−N1	1.969(4)	Cu1−N1	1.972(4)	Cu1−N1	1.972(4)
Cu1−N1#3	1.969(4)	Cu1−N1#3	1.972(4)	Cu1−N1#2	1.972(4)
4		**5**		**6**	
Tb1−O4	2.380(2)	Dy1−O4	2.375(2)	Er1−O4	2.361(2)
Tb1−O5	2.509(2)	Dy1−O5	2.498(2)	Er1−O5#2	2.489(2)
Tb1−O6	2.428(2)	Dy1−O6	2.414(2)	Er1−O6#2	2.389(2)
Tb1−O7	2.398(2)	Dy1−O7	2.385(2)	Er1−O7	2.591(2)
Tb1−O7#1	2.590(2)	Dy1−O7#1	2.583(2)	Er1−O7#1	2.364(2)
Tb1−O8	2.468(2)	Dy1−O8	2.451(2)	Er1−O8	2.429(2)
Tb1−O1W	2.421(3)	Dy1−O1W	2.404(2)	Er1−O1W	2.380(2)
Tb1−O2W	2.386(3)	Dy1−O2W	2.369(2)	Er1−O2W	2.347(2)
Tb1−O3W	2.393(3)	Dy1−O3W	2.370(2)	Er1−O3W	2.346(2)
Cu1−O1	1.940(2)	Cu1−O1	1.939(2)	Cu1−O1	1.940(2)
Cu1−O1#2	1.940(2)	Cu1−O1#2	1.939(2)	Cu1−O1#3	1.940(2)
Cu1−O3#4	2.6197(26)	Cu1−O3#4	2.6235(25)	Cu1−O3#4	2.6322(26)
Cu1−O3#5	2.6197(26)	Cu1−O3#5	2.6235(25)	Cu1−O3#5	2.6322(26)
Cu1−N1	1.963(3)	Cu1−N1	1.962(3)	Cu1−N1	1.965(3)
Cu1−N1#2	1.963(3)	Cu1−N1#2	1.962(3)	Cu1−N1#3	1.965(3)
7		**8**		**9**	
Er1−O2	2.274(2)	Yb1−O2	2.253(3)	Lu1−O2	2.244(2)
Er1−O4	2.234(3)	Yb1−O4	2.209(3)	Lu1−O4	2.201(2)
Er1−O5	2.289(3)	Yb1−O5	2.528(3)	Lu1−O5	2.519(2)
Er1−O5#1	2.531(3)	Yb1−O5#1	2.272(3)	Lu1−O5#1	2.267(2)
Er1−O6	2.363(3)	Yb1−O6	2.339(3)	Lu1−O6	2.329(3)
Er1−O7	2.359(3)	Yb1−O7	2.346(4)	Lu1−O7	2.336(3)
Er1−O8	2.377(3)	Yb1−O8	2.356(3)	Lu1−O8	2.339(2)
Er1−O1W	2.361(3)	Yb1−O1W	2.346(3)	Lu1−O1W	2.323(2)
Cu1−O1	1.944(2)	Cu1−O1	1.948(3)	Cu1−O1	1.943(2)
Cu1−O1#2	1.944(2)	Cu1−O1#2	1.948(3)	Cu1−O1#2	1.943(2)

Cu1−O3#3	2.5815(26)	Cu1−O3#3	2.5887(38)	Cu1−O3#3	2.5913(26)
Cu1−O3#5	2.5815(26)	Cu1−O3#5	2.5887(38)	Cu1−O3#5	2.5913(26)
Cu1−N1	1.964(3)	Cu1−N1	1.962(3)	Cu1−N1	1.963(3)
Cu1−N1#2	1.964(3)	Cu1−N1#2	1.962(3)	Cu1−N1#2	1.963(3)

Symmetry codes: for **1**: #1 $x + 1, y, z$; #2 $-x - 2, -y + 1, -z$; #3 $-x, -y + 2, -z + 1$; #5 $-1 - x, 2 - y, 1 - z$. For **2**: #1 $x - 1, y, z$; #2 $-x - 2, -y, -z$; #3 $-x - 1, -y + 1, -z + 1$; #4 $x + 1, y, z$; #5 $-2 - x, 1 - y, 1 - z$. For **3**: #1 $-x, -y + 1, -z + 1$; #2 $-x - 1, -y, -z$; #4 $-1 + x, y, z$; #5 $-x, -y, -z$. For **4**: #1 $-x + 1, -y + 1, -z + 2$; #2 $-x, -y, -z + 1$; #4 $-1 + x, y, z$; #5 $1 - x, -y, 1 - z$. For **5**: #1 $-x + 2, -y + 1, -z + 1$; #2 $-x + 1, -y, -z$; #4 $x - 1, y, z$; #5 $2 - x, -y, -z$. For **6**: #1 $-x - 1, -y + 1, -z$; #2 $-x - 2, -y + 1, -z$; #3 $-x, -y + 2, -z + 1$; #4 $1 + x, y, z$; #5 $-1 - x, 2 - y, 1 - z$. For **7**: #1 $-x - 1, -y + 1, -z$; #2 $-x, -y + 2, -z + 1$; #3 $x + 1, y, z$; #5 $-1 - x, 2 - y, 1 - z$. For **8**: #1 $-x + 1, -y + 2, -z + 1$; #2 $-x, -y + 1, -z$; #3 $x - 1, y, z$; #5 $1 - x, 1 - y, -z$. For **9**: #1 $-x + 3, -y + 2, -z + 1$; #2 $-x + 2, -y + 1, -z$; #3 $x - 1, y, z$; #5 $3 - x, 1 - y, -z$.

Table S2 Coordination geometries of the metal ions in **6** and **7**

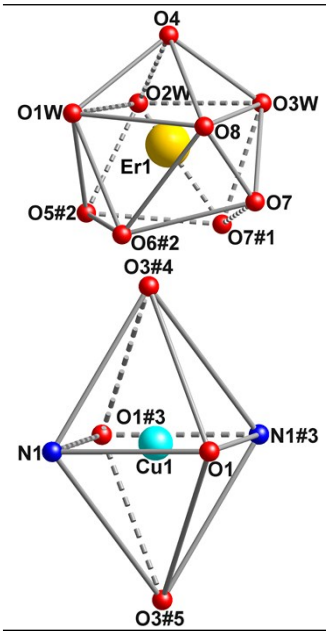
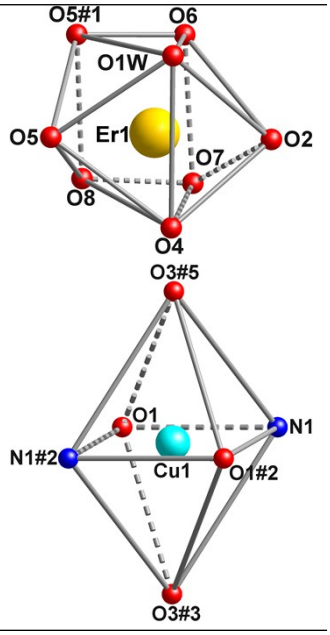
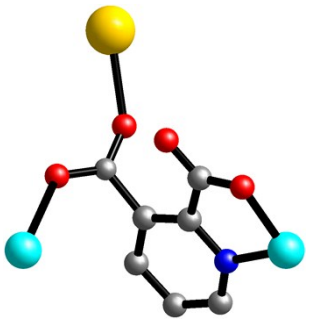
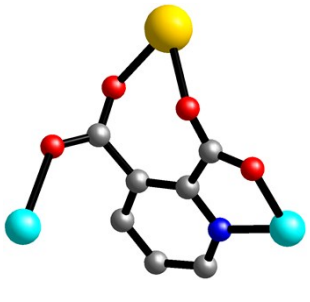
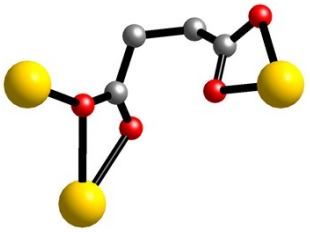
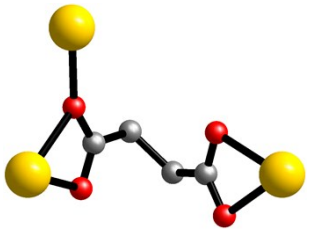
6	**7**
	

Table S3 Hydrogen-bonding geometries (Å, °) of **6** and **7**

	D−H···A	D−H	H···A	D···A	D−H···A
6	O2W−H2WB···O5	0.8504(20)	1.9241(19)	2.7595(27)	167.048(140)
7	C3−H3A···O7	0.9294(44)	2.5022(35)	3.3818(57)	158.004(256)

Table S4 Coordination modes of the 2,3-pydc and suc anions in **6** and **7**

6	**7**
	
	

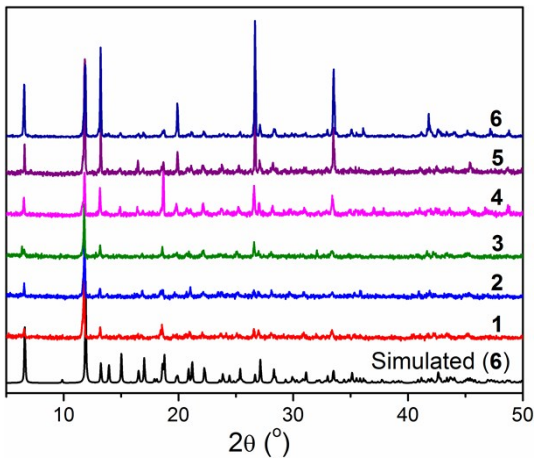


Fig. S1 Simulated PXRD pattern of **6** and as-synthesized PXRD patterns of **1**−**6**.

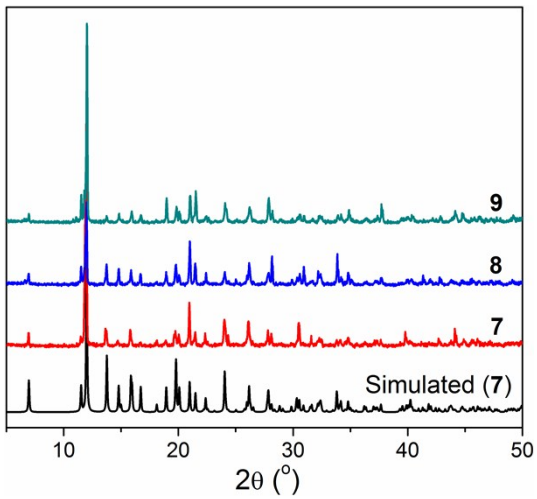


Fig. S2 Simulated PXRD pattern of **7** and as-synthesized PXRD patterns of **7**−**9**.

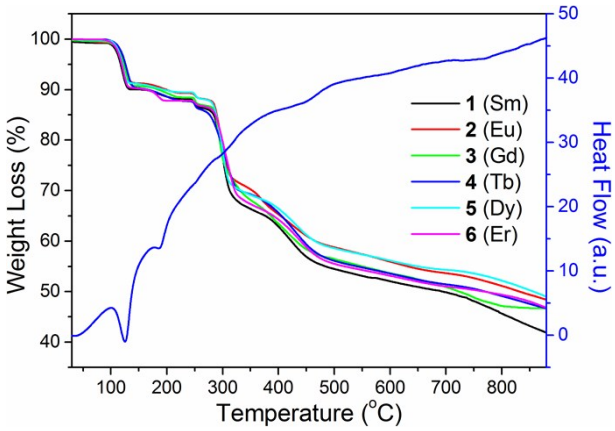


Fig. S3 TG curves of **1**−**6** and DTA curve of **6**.

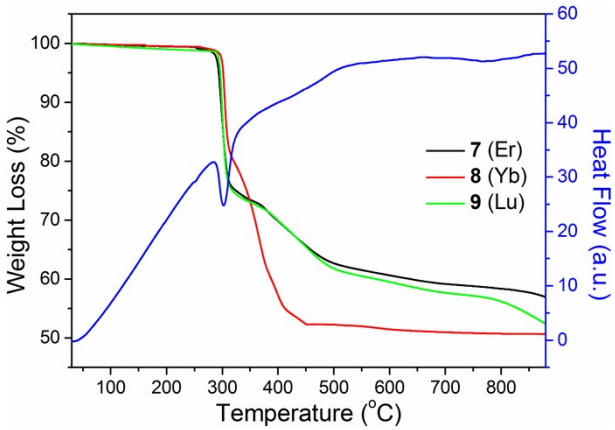


Fig. S4 TG curves of **7**−**9** and DTA curve of **7**.

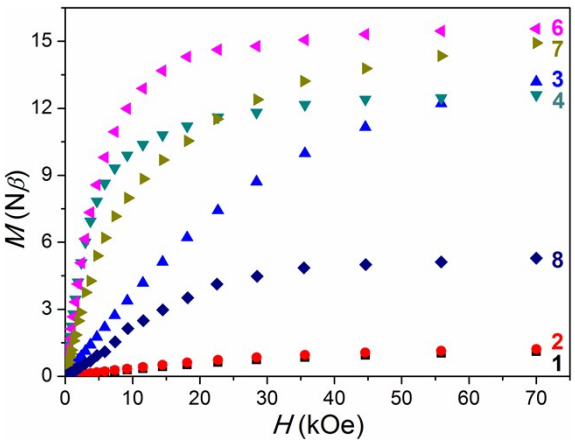


Fig. S5 Plots of *M* versus *H* for **1**−**4** and **6**−**8** at 2 K.

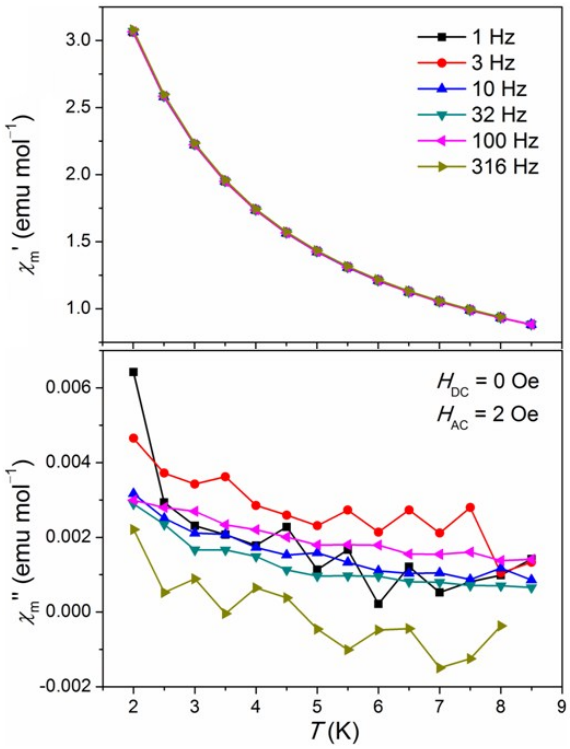


Fig. S6 Temperature dependence of the in-phase (χ') and out-of-phase (χ'') AC susceptibility for **5** under a 0 Oe DC field at different frequencies. Solid lines are guides to the eye.