

Supporting Information

Exploiting verdazyl radical to assemble 2p-3d-4f one-dimensional chains

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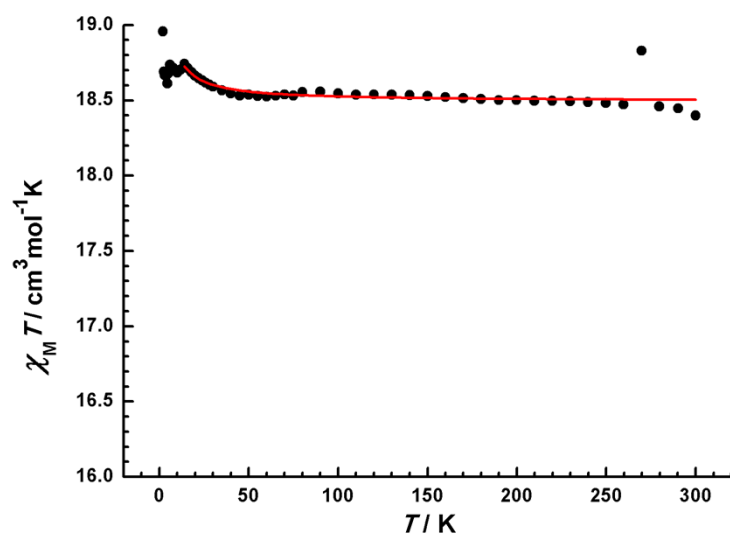


Fig. S1 $\chi_M T$ versus T plots of complex 1, the red curve is simulation of rough model with the parameters of $g = 2.03$, $J = 0.07(1) \text{ cm}^{-1}$.

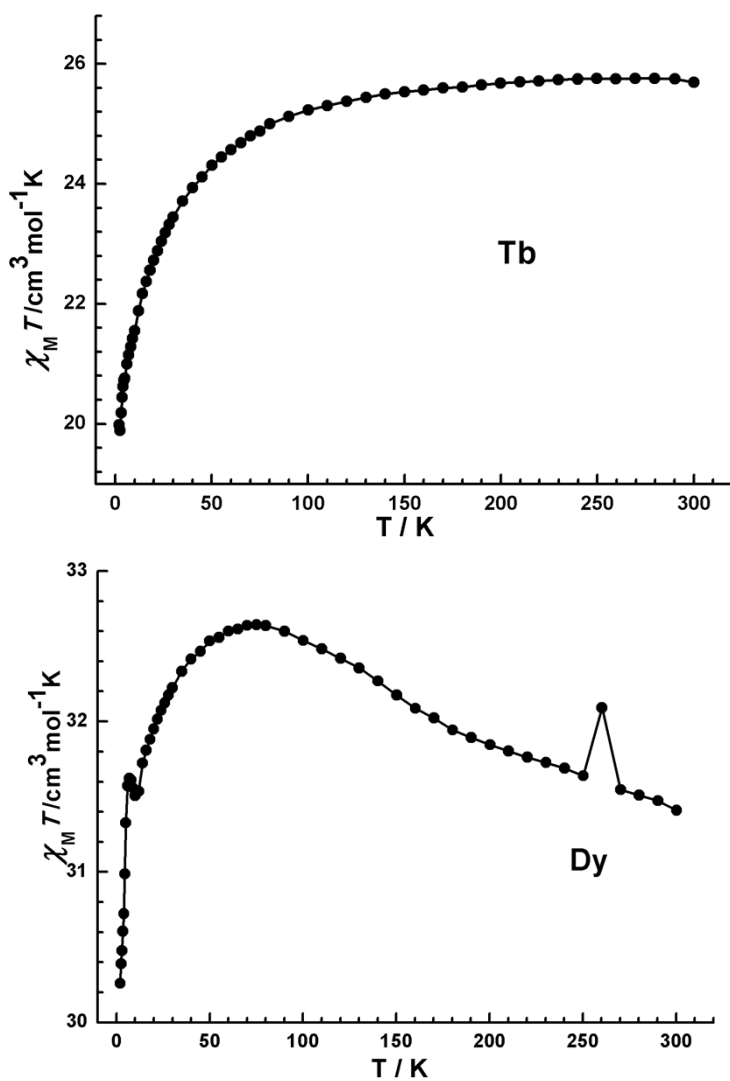


Fig. S2 Temperature dependence of the dc susceptibilities for complexes 2 (top) and 3 (bottom) under 1000 Oe field.

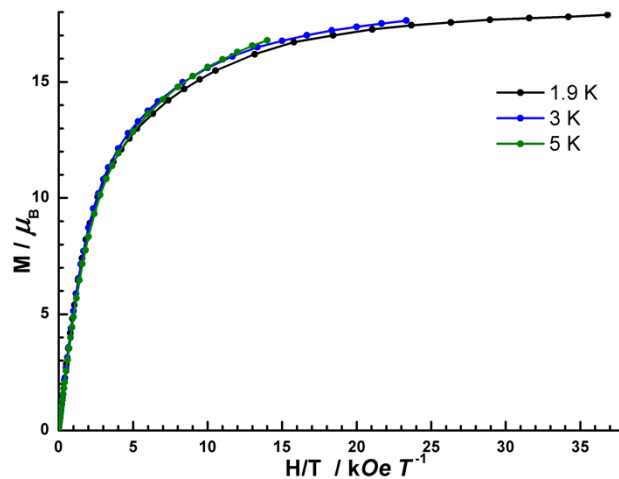


Fig. S3 M versus H/T at temperature of 1.9, 3.0 and 5.0 K for complex **3**, respectively.

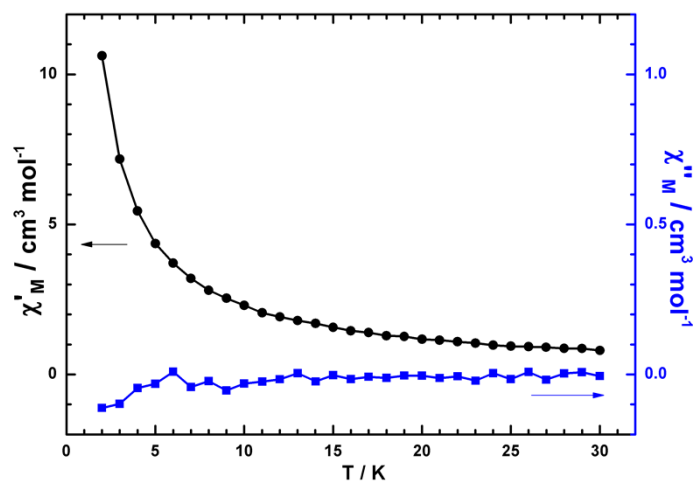


Fig. S4 Temperature dependence of the in-phase (χ' round points) and out-of-phase (χ'' square points) components of the alternating-current susceptibilities for complex **2** under zero dc field at the frequency of 1000 Hz.

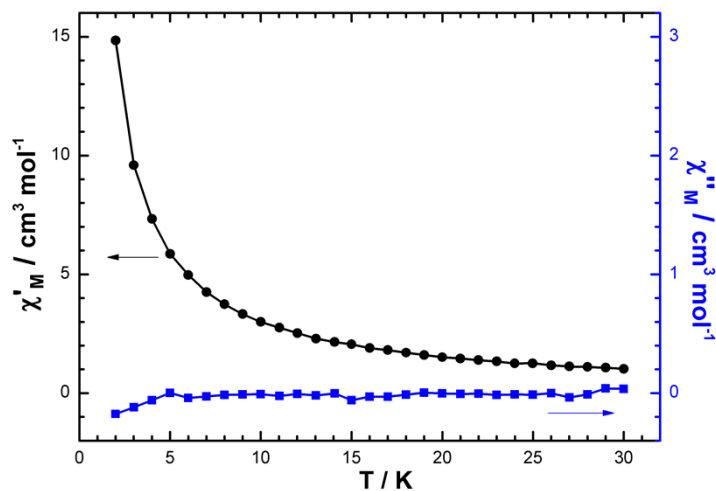


Fig. S5 Temperature dependence of the in-phase (χ' round points) and out-of-phase (χ'' square points) components of the alternating-current susceptibilities for complex **3** under zero dc field at the frequency of 1000 Hz.

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

Cu(1)-N(10)	2.004(5)	Cu(1)-N(9)	2.015(4)
Cu(1)-O(11)	2.101(4)	Cu(1)-O(13)	2.103(5)
Cu(1)-O(12)	2.104(5)	Cu(1)-O(14)	2.115(4)
Cu(2)-O(2)	1.993(4)	Cu(2)-O(3)	2.002(4)
Cu(2)-N(20)	2.008(5)	Cu(2)-N(19)	2.008(5)
Cu(2)-O(4)	2.220(4)	Cu(2)-O(1)	2.227(4)
Gd(1)-O(22)	2.317(5)	Gd(1)-O(19)	2.333(5)
Gd(1)-O(21)	2.338(5)	Gd(1)-O(17)	2.355(4)
Gd(1)-O(18)	2.364(4)	Gd(1)-O(15)	2.374(3)
Gd(1)-O(20)	2.391(5)	Gd(1)-O(16)	2.404(5)
Gd(2)-O(5)	2.321(5)	Gd(2)-O(6)	2.326(5)
Gd(2)-O(23)	2.338(4)	Gd(2)-O(9)	2.351(4)
Gd(2)-O(24)	2.361(5)	Gd(2)-O(8)	2.363(4)
Gd(2)-O(7)	2.384(5)	Gd(2)-O(10)	2.411(5)
N(10)-Cu(1)-N(9)	177.14(19)	O(11)-Cu(1)-O(13)	177.33(17)
O(12)-Cu(1)-O(14)	178.62(17)	O(2)-Cu(2)-O(3)	179.58(17)
N(20)-Cu(2)-N(19)	179.10(19)	O(4)-Cu(2)-O(1)	179.39(15)
O(22)-Gd(1)-O(19)	147.30(20)	O(22)-Gd(1)-O(21)	144.10(20)
O(19)-Gd(1)-O(21)	68.50(20)	O(22)-Gd(1)-O(17)	76.89(18)
O(19)-Gd(1)-O(17)	126.08(18)	O(21)-Gd(1)-O(17)	75.96(18)
O(22)-Gd(1)-O(18)	94.11(16)	O(19)-Gd(1)-O(18)	76.50(15)
O(21)-Gd(1)-O(18)	97.90(17)	O(17)-Gd(1)-O(18)	69.59(15)
O(22)-Gd(1)-O(15)	92.45(15)	O(19)-Gd(1)-O(15)	77.78(16)
O(21)-Gd(1)-O(15)	98.53(16)	O(17)-Gd(1)-O(15)	148.32(16)
O(18)-Gd(1)-O(15)	141.69(15)	O(22)-Gd(1)-O(20)	73.90(20)
O(19)-Gd(1)-O(20)	73.50(20)	O(21)-Gd(1)-O(20)	142.00(20)
O(17)-Gd(1)-O(20)	129.58(17)	O(18)-Gd(1)-O(20)	72.57(16)
O(15)-Gd(1)-O(20)	73.17(16)	O(22)-Gd(1)-O(16)	80.57(19)
O(19)-Gd(1)-O(16)	123.07(18)	O(21)-Gd(1)-O(16)	71.66(19)
O(17)-Gd(1)-O(16)	79.05(16)	O(18)-Gd(1)-O(16)	148.57(15)
O(15)-Gd(1)-O(16)	69.73(16)	O(20)-Gd(1)-O(16)	133.43(19)
O(5)-Gd(2)-O(6)	72.80(20)	O(5)-Gd(2)-O(23)	71.90(20)
O(6)-Gd(2)-O(23)	144.50(20)	O(5)-Gd(2)-O(9)	75.43(17)
O(6)-Gd(2)-O(9)	77.02(16)	O(23)-Gd(2)-O(9)	96.72(15)
O(5)-Gd(2)-O(24)	142.54(19)	O(6)-Gd(2)-O(24)	70.30(20)
O(23)-Gd(2)-O(24)	145.15(17)	O(9)-Gd(2)-O(24)	90.27(15)
O(5)-Gd(2)-O(8)	132.80(17)	O(6)-Gd(2)-O(8)	125.49(18)
O(5)-Gd(2)-O(8)	132.80(17)	O(6)-Gd(2)-O(8)	125.49(18)
O(23)-Gd(2)-O(8)	78.73(16)	O(9)-Gd(2)-O(8)	145.33(16)
O(24)-Gd(2)-O(8)	76.34(15)	O(5)-Gd(2)-O(7)	73.64(16)

O(6)-Gd(2)-O(7)	77.19(15)	O(23)-Gd(2)-O(7)	90.23(15)
O(9)-Gd(2)-O(7)	144.31(15)	O(24)-Gd(2)-O(7)	103.70(15)
O(8)-Gd(2)-O(7)	70.36(14)	O(5)-Gd(2)-O(10)	130.70(19)
O(6)-Gd(2)-O(10)	130.04(18)	O(23)-Gd(2)-O(10)	77.53(17)
O(9)-Gd(2)-O(10)	70.81(16)	O(24)-Gd(2)-O(10)	72.68(18)
O(8)-Gd(2)-O(10)	74.67(15)	O(7)-Gd(2)-O(10)	144.60(15)

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

Cu(1)-N(10)	1.999(6)	Cu(1)-N(9)	2.014(6)
Cu(1)-O(11)	2.101(4)	Cu(1)-O(13)	2.161(6)
Cu(1)-O(12)	2.038(5)	Cu(1)-O(14)	2.049(5)
Cu(2)-O(2)	1.994(5)	Cu(2)-O(3)	1.999(5)
Cu(2)-N(20)	2.014(6)	Cu(2)-N(19)	2.003(6)
Cu(2)-O(4)	2.231(4)	Cu(2)-O(1)	2.238(4)
Tb(1)-O(22)	2.308(5)	Tb(1)-O(19)	2.331(6)
Tb(1)-O(21)	2.341(5)	Tb(1)-O(17)	2.359(5)
Tb(1)-O(18)	2.340(5)	Tb(1)-O(15)	2.350(4)
Tb(1)-O(20)	2.383(5)	Tb(1)-O(16)	2.382(5)
Tb(2)-O(5)	2.321(5)	Tb(2)-O(6)	2.311(6)
Tb(2)-O(23)	2.328(5)	Tb(2)-O(9)	2.322(5)
Tb(2)-O(24)	2.364(4)	Tb(2)-O(8)	2.333(5)
Tb(2)-O(7)	2.369(5)	Tb(2)-O(10)	2.383(6)
N(10)-Cu(1)-N(9)	177.70(30)	O(11)-Cu(1)-O(13)	177.50(20)
O(12)-Cu(1)-O(14)	178.30(20)	O(2)-Cu(2)-O(3)	179.50(20)
N(20)-Cu(2)-N(19)	178.90(20)	O(4)-Cu(2)-O(1)	178.40(17)
O(22)-Tb(1)-O(19)	146.90(20)	O(22)-Tb(1)-O(18)	95.35(18)
O(19)-Tb(1)-O(18)	77.87(19)	O(22)-Tb(1)-O(21)	143.60(20)
O(19)-Tb(1)-O(21)	69.50(20)	O(18)-Tb(1)-O(21)	96.10(18)
O(22)-Tb(1)-O(15)	90.61(18)	O(19)-Tb(1)-O(15)	76.37(19)
O(18)-Tb(1)-O(15)	141.03(18)	O(21)-Tb(1)-O(15)	101.61(18)
O(22)-Tb(1)-O(17)	75.80(20)	O(19)-Tb(1)-O(17)	129.60(20)
O(18)-Tb(1)-O(17)	70.97(18)	O(21)-Tb(1)-O(17)	75.54(18)
O(15)-Tb(1)-O(17)	147.16(18)	O(22)-Tb(1)-O(16)	80.00(20)
O(19)-Tb(1)-O(16)	121.96(19)	O(18)-Tb(1)-O(16)	148.46(18)
O(21)-Tb(1)-O(16)	72.29(19)	O(15)-Tb(1)-O(16)	70.50(17)
O(17)-Tb(1)-O(16)	77.68(17)	O(22)-Tb(1)-O(20)	73.70(20)
O(19)-Tb(1)-O(20)	73.30(20)	O(18)-Tb(1)-O(20)	72.66(18)
O(21)-Tb(1)-O(20)	142.70(20)	O(15)-Tb(1)-O(20)	72.22(17)
O(17)-Tb(1)-O(20)	129.30(17)	O(16)-Tb(1)-O(20)	133.58(19)
O(6)-Tb(2)-O(9)	77.40(20)	O(6)-Tb(2)-O(23)	145.42(19)

O(9)-Tb(2)-O(23)	96.32(18)	O(6)-Tb(2)-O(8)	125.13(19)
O(9)-Tb(2)-O(8)	145.45(19)	O(23)-Tb(2)-O(8)	78.50(18)
O(6)-Tb(2)-O(5)	73.10(20)	O(9)-Tb(2)-O(5)	75.06(19)
O(23)-Tb(2)-O(5)	72.40(20)	O(8)-Tb(2)-O(5)	132.92(18)
O(8)-Tb(2)-O(5)	132.92(18)	O(6)-Tb(2)-O(24)	69.05(19)
O(6)-Tb(2)-O(24)	69.05(19)	O(9)-Tb(2)-O(24)	90.23(17)
O(23)-Tb(2)-O(24)	145.50(19)	O(8)-Tb(2)-O(24)	77.10(17)
O(5)-Tb(2)-O(24)	141.60(20)	O(6)-Tb(2)-O(7)	76.94(19)
O(9)-Tb(2)-O(7)	143.79(19)	O(23)-Tb(2)-O(7)	90.60(18)
O(8)-Tb(2)-O(7)	70.76(18)	O(5)-Tb(2)-O(7)	73.32(19)
O(24)-Tb(2)-O(7)	103.82(18)	O(6)-Tb(2)-O(10)	128.75(19)
O(9)-Tb(2)-O(10)	71.20(19)	O(23)-Tb(2)-O(10)	78.54(19)
O(8)-Tb(2)-O(10)	74.30(18)	O(5)-Tb(2)-O(10)	132.10(20)
O(24)-Tb(2)-O(10)	71.63(19)	O(7)-Tb(2)-O(10)	144.83(18)

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

Cu(1)-N(10)	1.999(4)	Cu(1)-N(9)	2.009(4)
Cu(1)-O(11)	2.078(4)	Cu(1)-O(13)	2.098(5)
Cu(1)-O(12)	2.126(4)	Cu(1)-O(14)	2.122(4)
Cu(2)-O(2)	1.985(4)	Cu(2)-O(3)	1.992(4)
Cu(2)-N(20)	2.018(5)	Cu(2)-N(19)	2.003(5)
Cu(2)-O(4)	2.242(4)	Cu(2)-O(1)	2.231(3)
Dy(1)-O(22)	2.290(5)	Dy(1)-O(19)	2.328(4)
Dy(1)-O(21)	2.330(4)	Dy(1)-O(17)	2.333(4)
Dy(1)-O(18)	2.318(4)	Dy(1)-O(15)	2.342(3)
Dy(1)-O(20)	2.372(5)	Dy(1)-O(16)	2.366(5)
Dy(2)-O(5)	2.320(5)	Dy(2)-O(6)	2.304(5)
Dy(2)-O(23)	2.319(4)	Dy(2)-O(9)	2.323(4)
Dy(2)-O(24)	2.374(4)	Dy(2)-O(8)	2.332(4)
Dy(2)-O(7)	2.368(4)	Dy(2)-O(10)	2.383(5)
N(10)-Cu(1)-N(9)	177.16(18)	O(11)-Cu(1)-O(13)	177.71(17)
O(12)-Cu(1)-O(14)	179.18(16)	O(2)-Cu(2)-O(3)	179.80(16)
N(20)-Cu(2)-N(19)	178.56(18)	O(4)-Cu(2)-O(1)	179.52(15)
O(22)-Dy(1)-O(18)	93.33(16)	O(22)-Dy(1)-O(19)	147.00(20)
O(18)-Dy(1)-O(19)	76.28(15)	O(22)-Dy(1)-O(21)	143.16(19)
O(18)-Dy(1)-O(21)	99.07(17)	O(19)-Dy(1)-O(21)	69.90(20)
O(22)-Dy(1)-O(17)	76.70(17)	O(18)-Dy(1)-O(17)	71.00(15)
O(19)-Dy(1)-O(17)	126.52(17)	O(21)-Dy(1)-O(17)	74.90(16)
O(22)-Dy(1)-O(15)	93.42(15)	O(18)-Dy(1)-O(15)	141.22(15)
O(19)-Dy(1)-O(15)	77.43(15)	O(21)-Dy(1)-O(15)	98.04(15)

O(17)-Dy(1)-O(15)	147.48(15)	O(22)-Dy(1)-O(16)	80.06(18)
O(18)-Dy(1)-O(16)	148.29(15)	O(19)-Dy(1)-O(16)	124.41(18)
O(21)-Dy(1)-O(16)	71.22(18)	O(17)-Dy(1)-O(16)	77.30(15)
O(15)-Dy(1)-O(16)	70.45(15)	O(22)-Dy(1)-O(20)	73.70(20)
O(18)-Dy(1)-O(20)	72.34(17)	O(19)-Dy(1)-O(20)	73.30(20)
O(21)-Dy(1)-O(20)	143.20(20)	O(17)-Dy(1)-O(20)	130.66(16)
O(15)-Dy(1)-O(20)	73.11(15)	O(16)-Dy(1)-O(20)	133.11(19)
O(6)-Dy(2)-O(23)	145.72(19)	O(6)-Dy(2)-O(5)	73.20(20)
O(23)-Dy(2)-O(5)	72.69(18)	O(6)-Dy(2)-O(9)	76.36(17)
O(23)-Dy(2)-O(9)	97.77(15)	O(5)-Dy(2)-O(9)	75.07(16)
O(6)-Dy(2)-O(8)	125.50(17)	O(23)-Dy(2)-O(8)	77.89(15)
O(5)-Dy(2)-O(8)	133.24(16)	O(9)-Dy(2)-O(8)	145.43(15)
O(6)-Dy(2)-O(7)	77.35(16)	O(23)-Dy(2)-O(7)	90.02(14)
O(5)-Dy(2)-O(7)	73.48(16)	O(9)-Dy(2)-O(7)	143.57(15)
O(8)-Dy(2)-O(7)	71.00(14)	O(6)-Dy(2)-O(24)	69.64(19)
O(23)-Dy(2)-O(24)	144.63(16)	O(5)-Dy(2)-O(24)	142.27(18)
O(9)-Dy(2)-O(24)	90.04(14)	O(8)-Dy(2)-O(24)	76.36(14)
O(7)-Dy(2)-O(24)	103.90(15)	O(6)-Dy(2)-O(10)	129.16(17)
O(23)-Dy(2)-O(10)	77.76(15)	O(5)-Dy(2)-O(10)	131.07(18)
O(9)-Dy(2)-O(10)	71.31(15)	O(8)-Dy(2)-O(10)	74.28(14)
O(7)-Dy(2)-O(10)	144.90(14)	O(24)-Dy(2)-O(10)	72.22(16)
