Supporting Information

[(Cu-Radical)$_2$-Ln]: Structure and Magnetic Properties of a Hetero-tri-spin Chain of Rings (Ln = Y^{III}, Gd^{III}, Tb^{III}, Dy^{III})

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CONTENT

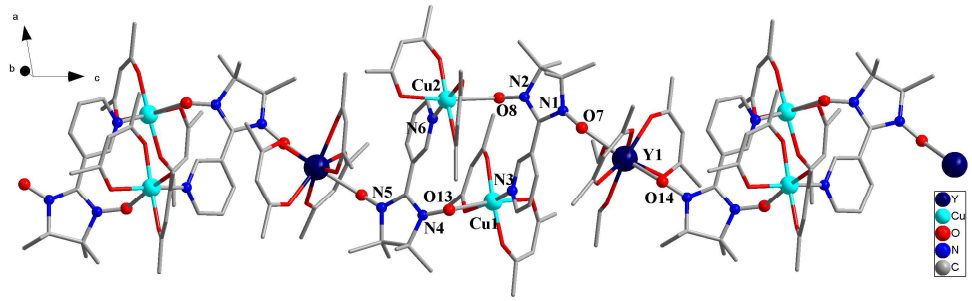


Figure S1. Crystal structure of complex **1**. (All hydrogen and fluorine atoms are omitted for clarity).

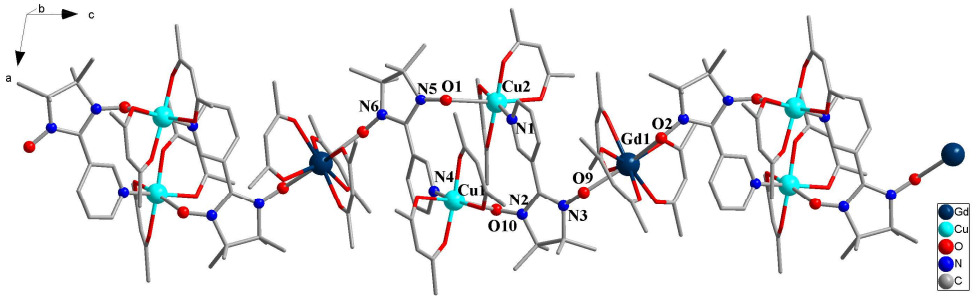


Figure S2. Crystal structure of complex **2**. (All hydrogen and fluorine atoms are omitted for clarity).

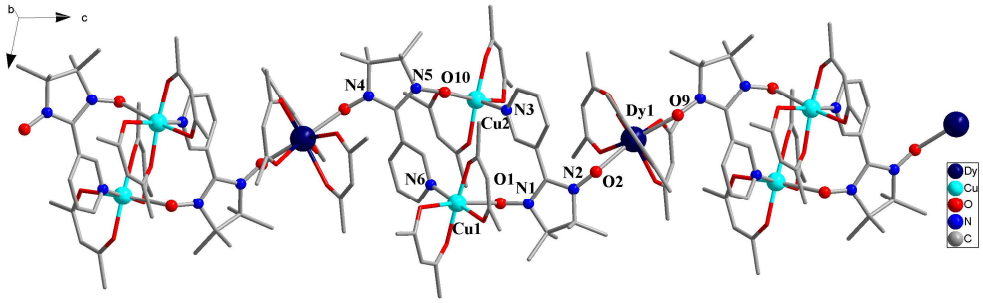


Figure S3. Crystal structure of complex **4**. (All hydrogen and fluorine atoms are omitted for clarity).

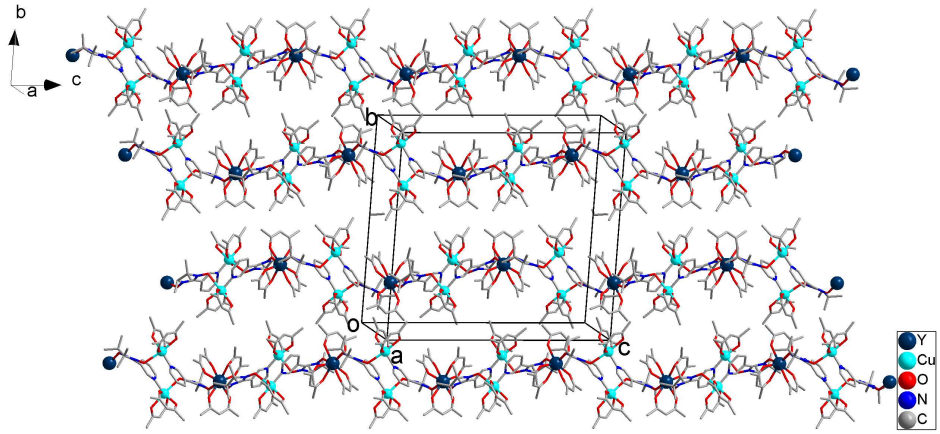


Figure S4. Crystal packing of complex **1**. (All hydrogen and fluorine atoms are omitted for clarity).

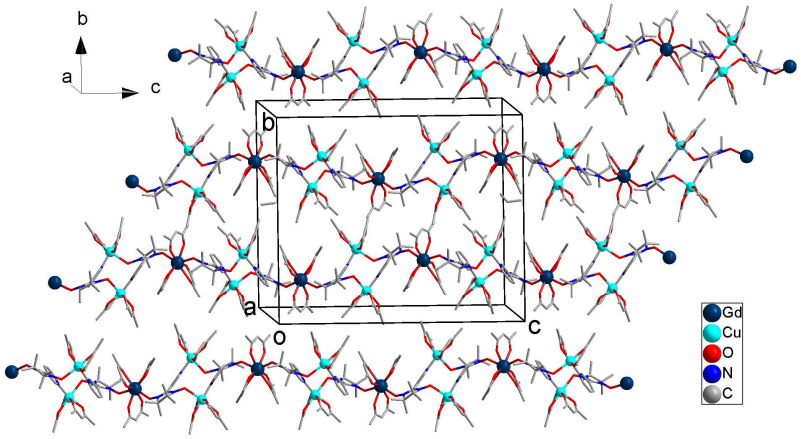


Figure S5. Crystal packing of complex **2**. (All hydrogen and fluorine atoms are omitted for clarity).

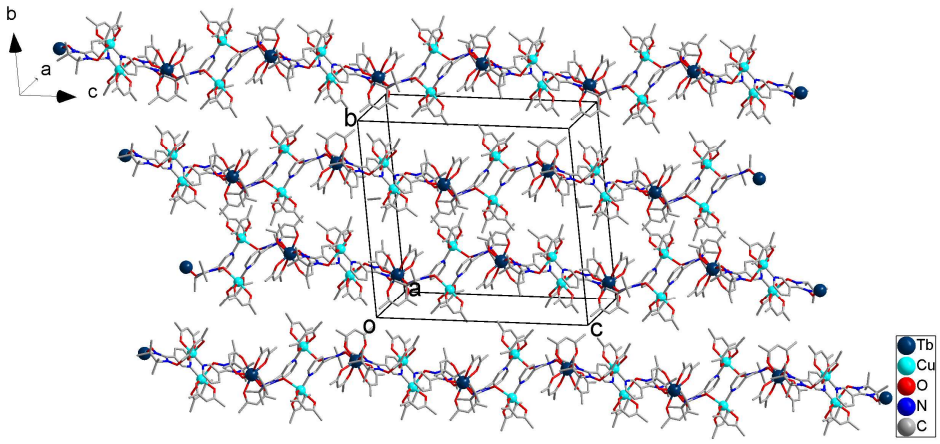


Figure S6. Crystal packing of complex **3**. (All hydrogen and fluorine atoms are omitted for clarity).

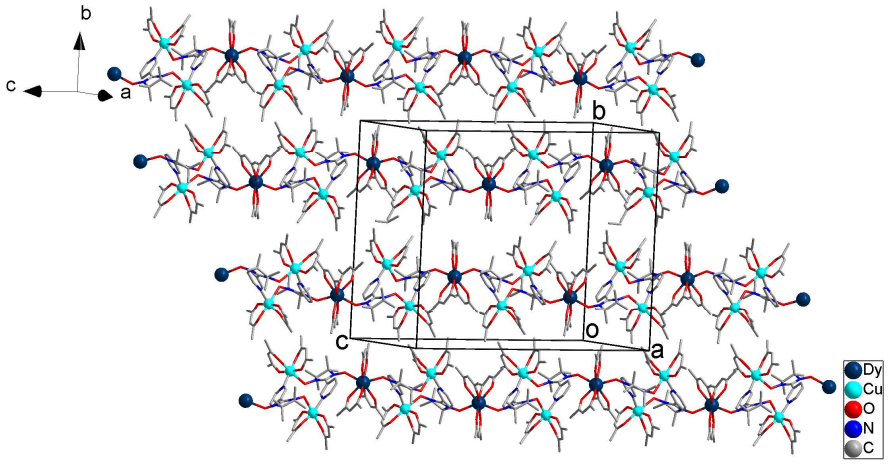


Figure S7. Crystal packing of complex **4**. (All hydrogen and fluorine atoms are omitted for clarity).

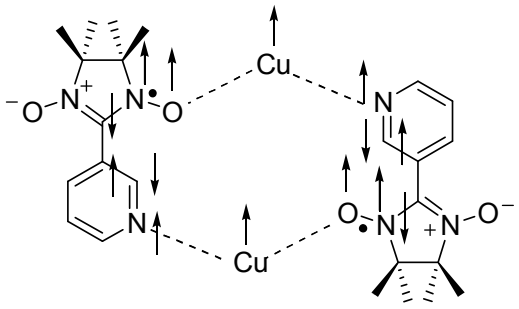
Table S1 Crystallographic data for complexes **1**-**4**.

Complex	**1** Y	**2** Gd	**3** Tb	**4** Dy
Empirical formula		$C_{65}H_{53}Cu_2F_{42}N_6O_{18}Ln$		
***M*r**	2220.14	2288.48	2290.16	2293.73
***T*, (K)**	113(2)	113(2)	113(2)	113(2)
Crystal system	monoclinic	monoclinic	monoclinic	monoclinic
Space group	$P2_1/c$	$P2_1/c$	$P2_1/c$	$P2_1/c$
***a* /Å**	12.320(3)	12.319(3)	12.342(3)	12.302(3)
***b* /Å**	24.477(5)	24.455(5)	24.479(5)	24.362(5)
***c* /Å**	28.744(6)	28.738(6)	28.691(6)	28.685(6)
***β* /º**	101.86(3)	102.03(3)	101.99(3)	101.92(3)
***V* /Å^3**	8483(3)	8468(3)	8479(3)	8412(3)
Z	4	4	4	4
***D*$_{calcd}$ /g cm^{-3}**	1.738	1.795	1.794	1.811
***μ* /mm^{-1}**	1.335	1.432	1.482	1.541
***θ* /º**	1.67-25.01	1.45-25.01	1.10-27.96	1.45-25.01
***F*(000)**	4415	4515	4519	4523
Reflections collected	46804	45817	66971	51750
Unique reflns *R*$_{int}$	14225/ 0.1340	14911/0.0401	20067/0.0577	14833/0.0458
GOF (*F*^{2})	1.013	1.018	1.080	1.056
***R*$_1$, *wR*$_2$ (*I* > 2*σ*(*I*))**	0.1001, 0.2119	0.0470, 0.1316	0.0564, 0.1520	0.0442, 0.1279
***R*$_1$, *wR*$_2$ (all data)**	0.1558, 0.2473	0.0578, 0.1442	0.0719, 0.1669	0.0550, 0.1417

$R_1 = \Sigma(||F_o| - |F_c||)/\Sigma|F_o|$. $wR_2 = [\Sigma w(|F_o|^2 - |F_c|^2)^2/\Sigma w(|F_o|^2)^2]^{1/2}$.

Table S2 SHAPE analysis for complexes **1**-**4**.

complex	**SAPR-8**	**TDD-8**	**BTPR-8**
1 Y	1.780	**0.357**	1.910
2 Gd	1.810	**0.406**	1.932
3 Tb	1.766	**0.413**	1.935
4 Dy	1.778	**0.388**	1.908



Scheme S1. Spin polarization mechanism for the magnetic coupling mediated by NIT-3Py ligand.

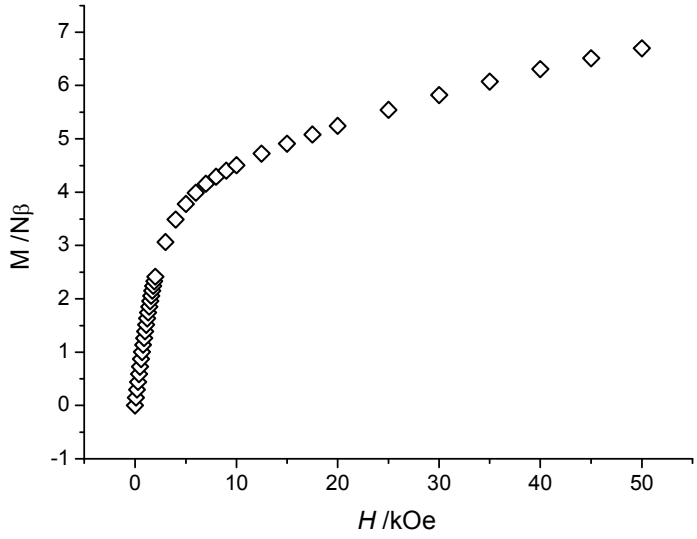


Figure S8. *M* versus *H* curves for complex **3**.

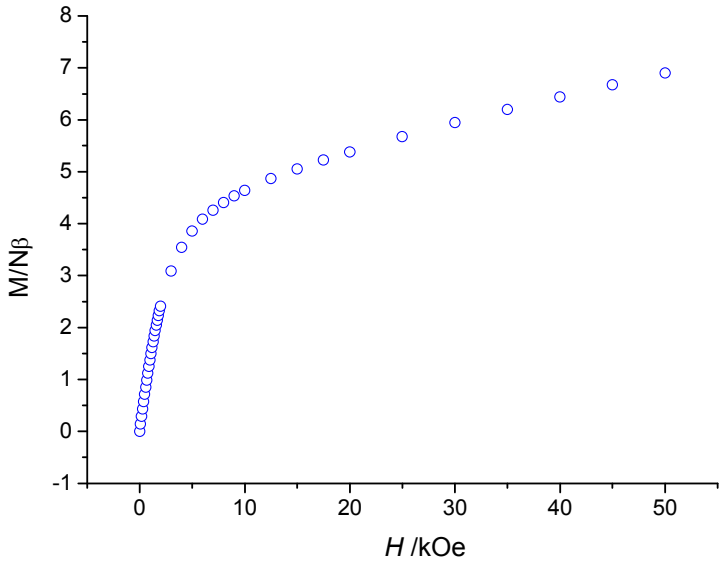


Figure S9. *M* versus *H* curves for complex **4**.

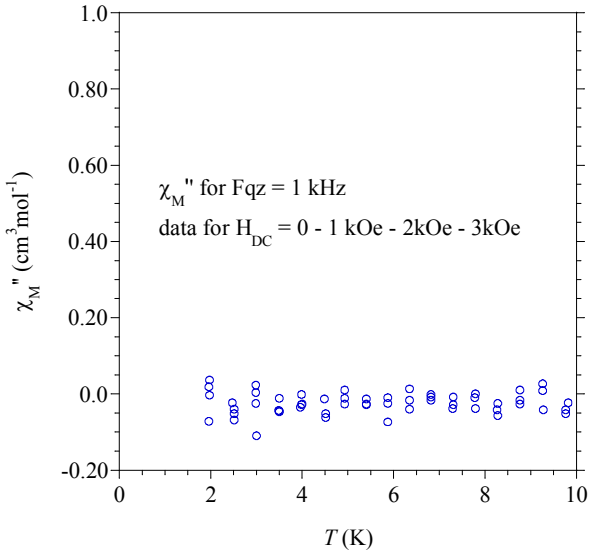


Figure S10. Temperature dependence of the out-of-phase components of ac susceptibility for **4** in zero dc field and an applied DC field of 1 kOe, 2 kOe and 3 kOe.