Multiple Single Molecule Magnet Behaviors in Dysprosium Dinuclear Complexes Involving A Multiple Functionalized Tetrathiafulvalene-Based Ligand

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Supporting information for

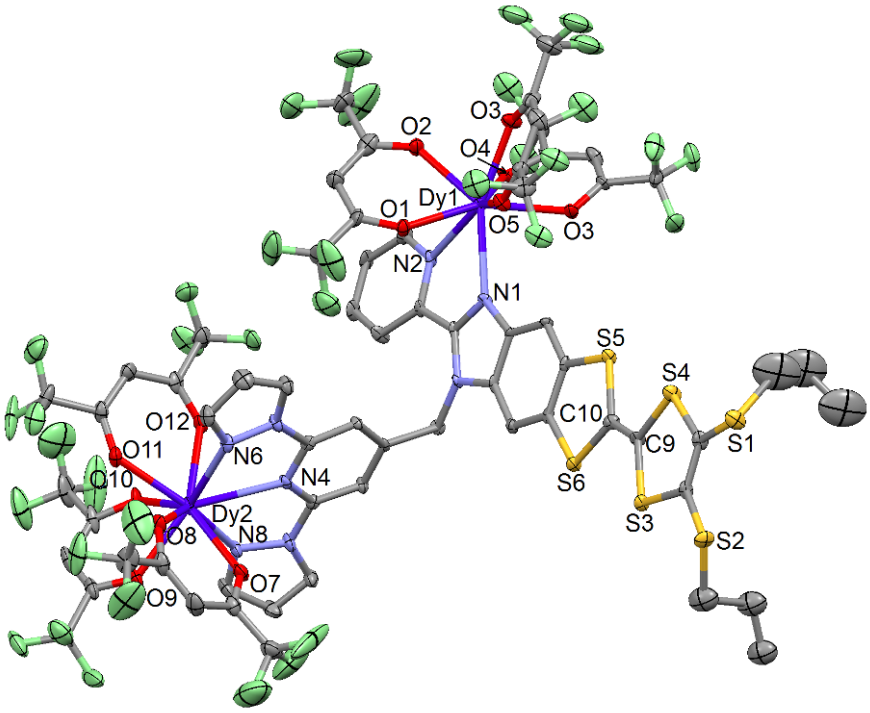

Figure S1. ORTEP view of the complex $[Dy_2(hfac)_6(\mathbf{L})]\cdot(CH_2Cl_2)_2\cdot C_6H_{14}$ (**1**). Thermal ellipsoids are drawn at 30% probability. Hydrogen atoms and molecules of crystallization are omitted for clarity.

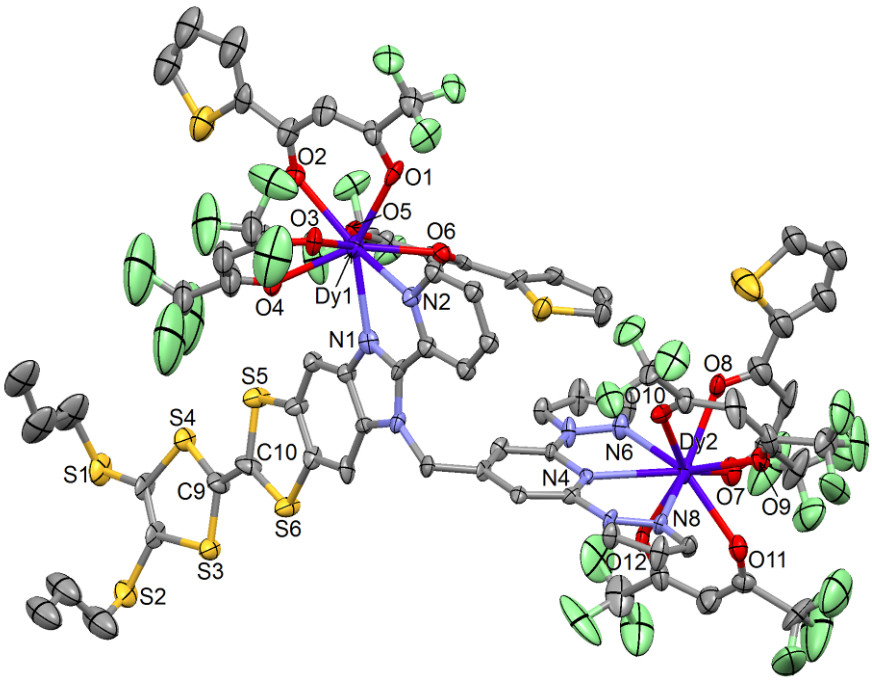

Figure S2. ORTEP view of the complex $[Dy_2(hfac)_3(tta)_3(\mathbf{L})]$ (**2**). Thermal ellipsoids are drawn at 30% probability. Hydrogen atoms are omitted for clarity.

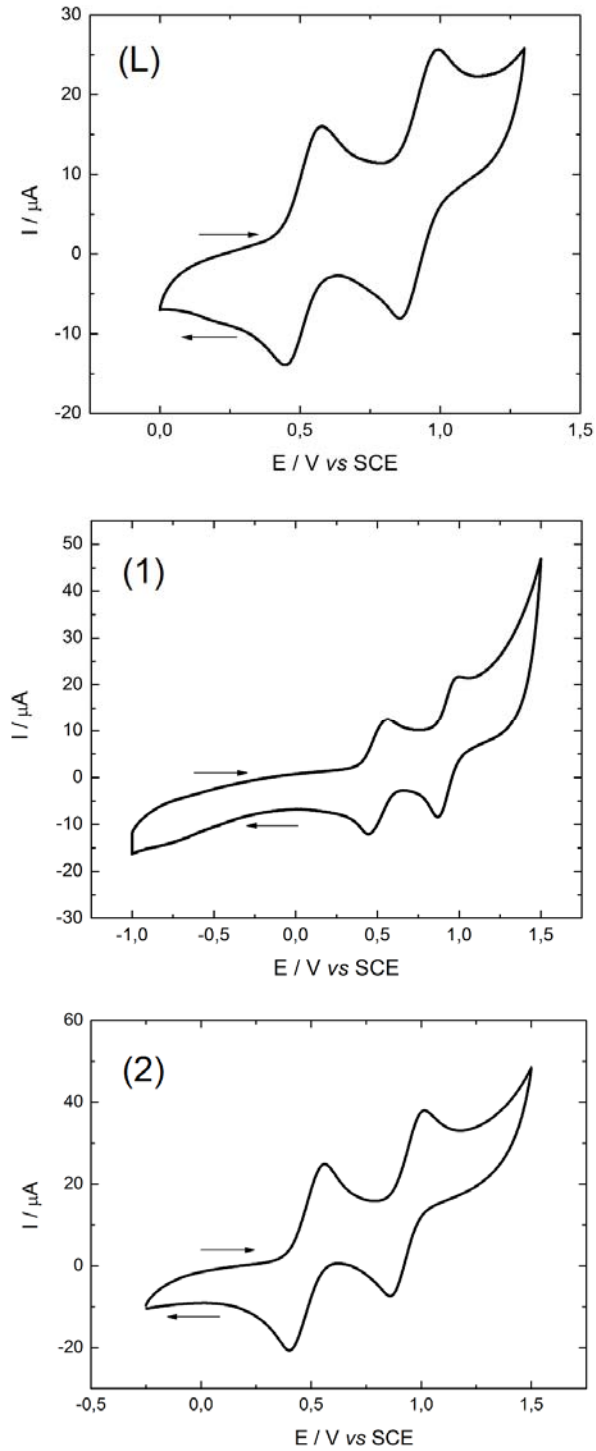

Figure S3. Cyclic voltametry of the ligand **L** and compounds **1** and **2** in CH_2Cl_2 at a scan rate of 100 $mV.s^{-1}$. The potentials were measured *versus* a saturated calomel electrode (SCE); glassy carbon as the working electrode; Pt wire as the counter electrodes.

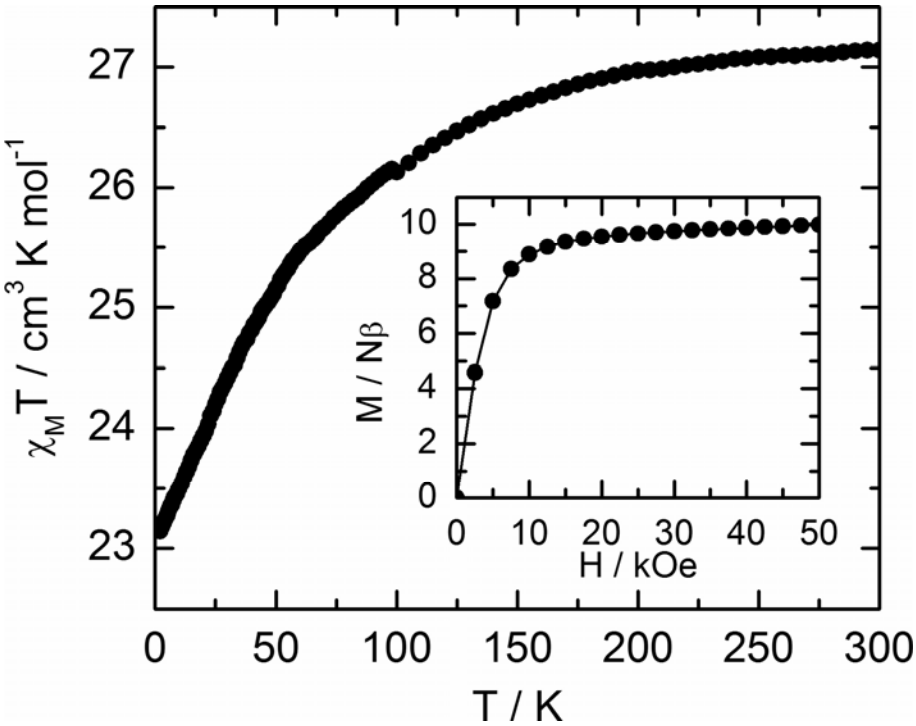

Figure S4. Thermal variation of $\chi_M T$ product for **1**. In inset, field dependence of the magnetization for **1** at 2 K.

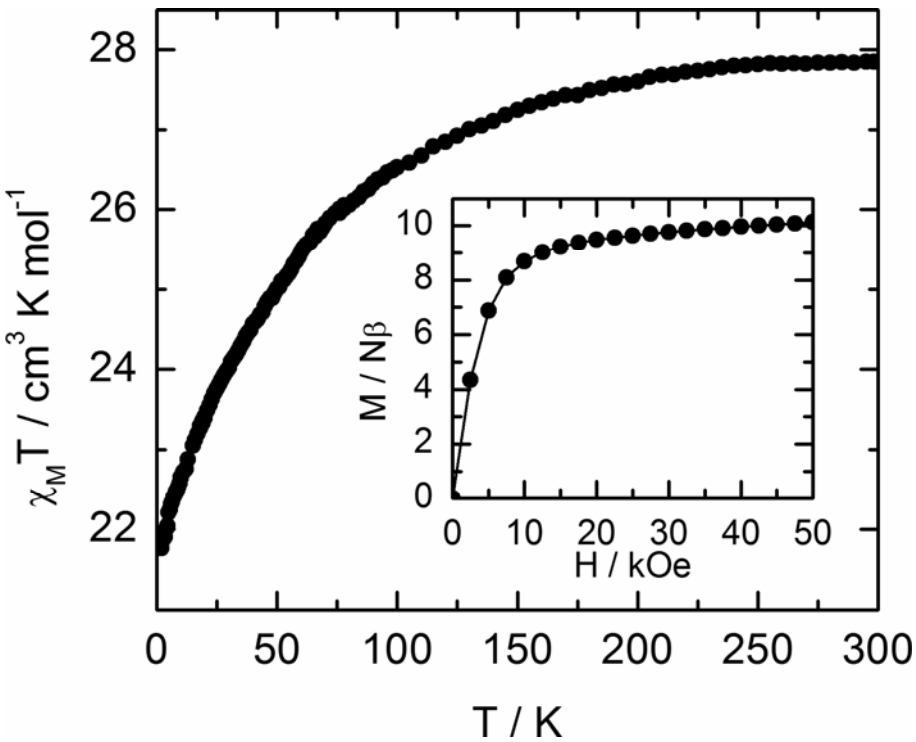

Figure S5. Thermal variation of $\chi_M T$ product for **2**. In inset, field dependence of the magnetization for **2** at 2 K.

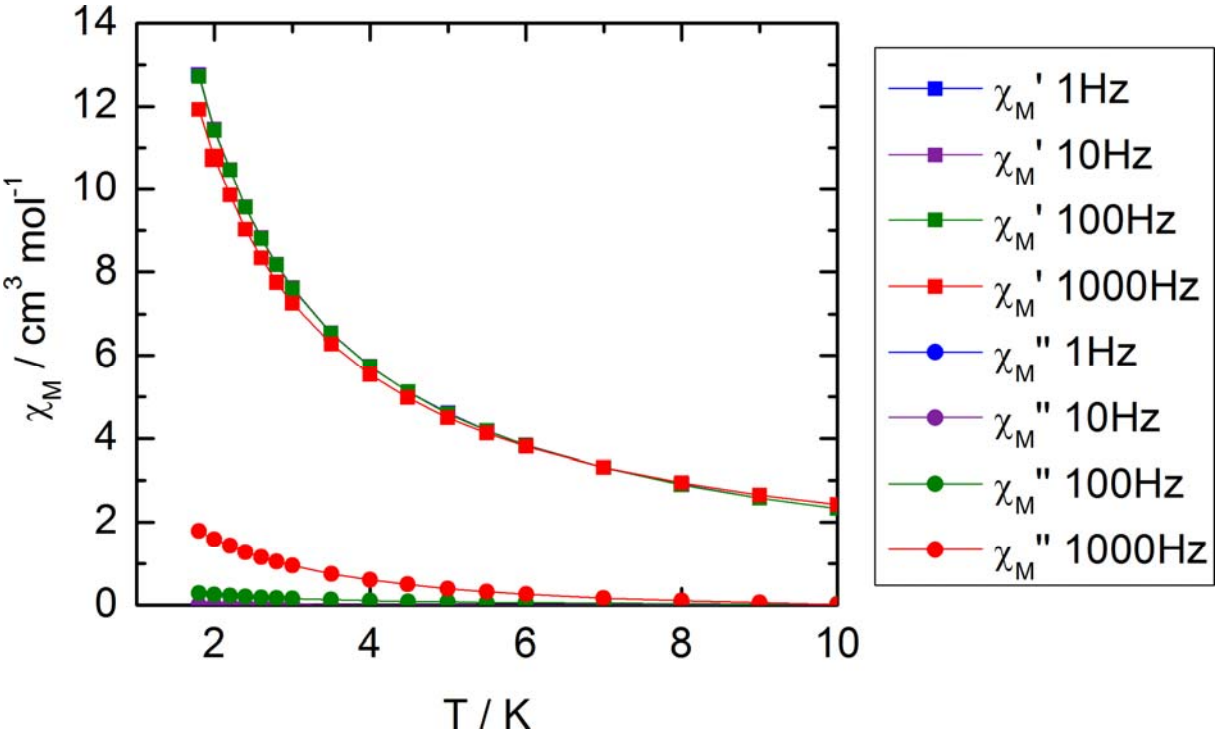

Figure S6. Temperature dependences of χ_M' and χ_M'' measured between 1 Hz and 1000 Hz for **1** in a zero dc magnetic field. Full square symbols correspond to χ_M' and full circles symbols to χ_M''.

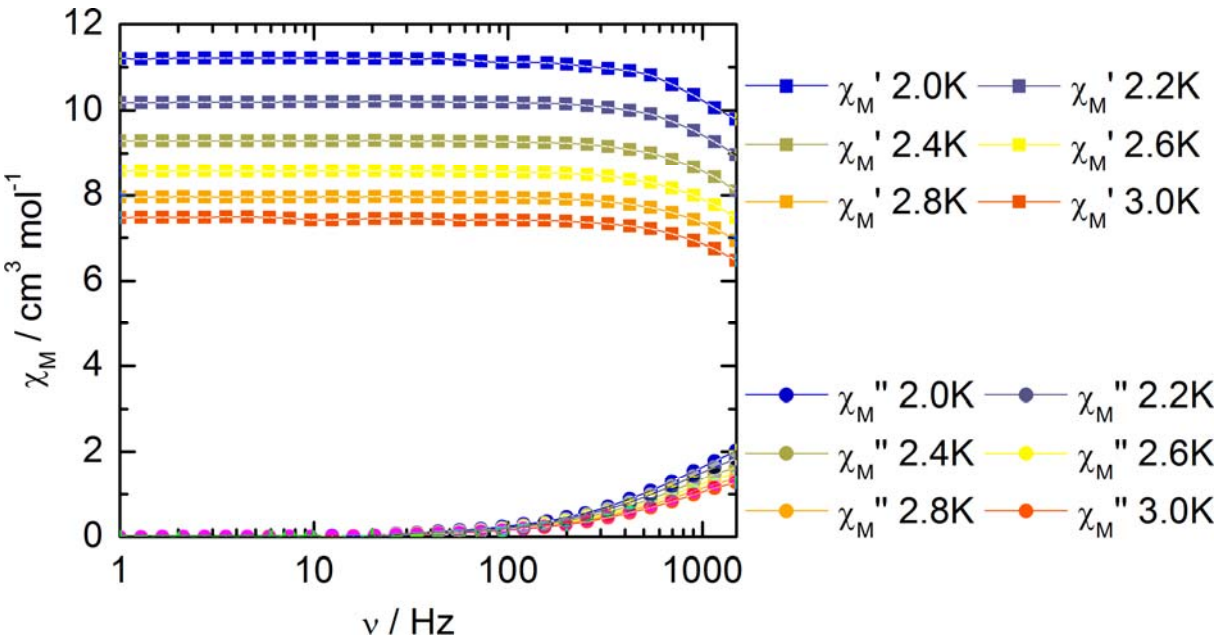

Figure S7. Frequency dependences of χ_M' and χ_M'' measured between 2 and 3.5 K for **1** in a zero dc magnetic field. Full square symbols correspond to χ_M' and full circles symbols to χ_M''.

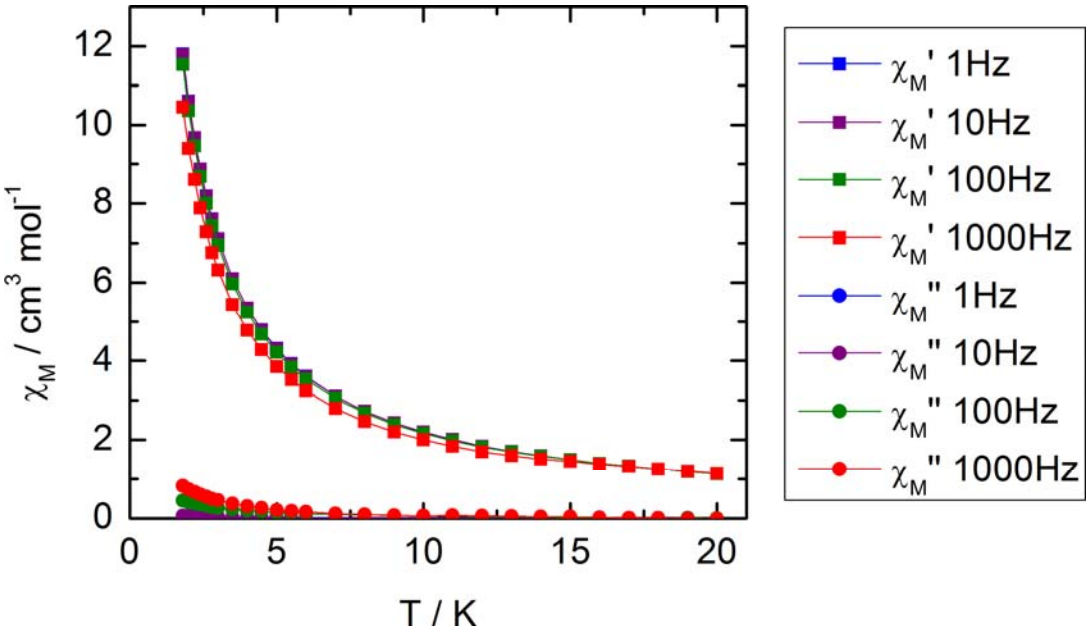

Figure S8. Temperature dependences of χ_M' and χ_M'' measured between 1 Hz and 1000 Hz for **2** in a zero dc magnetic field. Full square symbols correspond to χ_M' and full circles symbols to χ_M''.

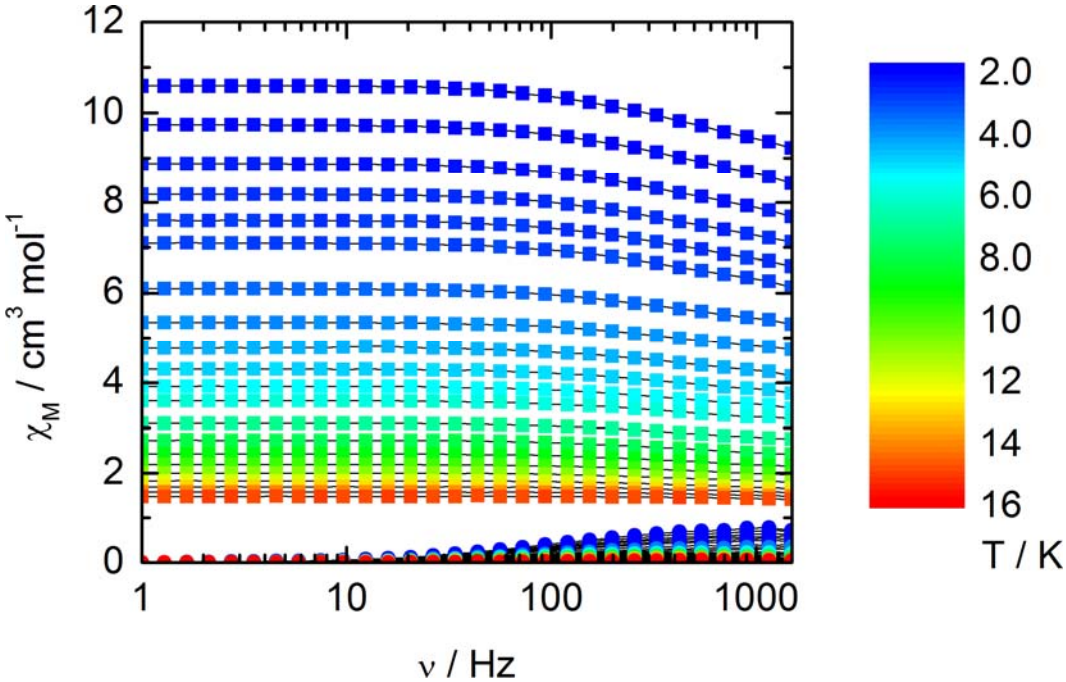

Figure S9. Frequency dependences of χ_M' and χ_M'' measured between 2 and 15 K for **2** in a zero dc magnetic field. Full square symbols correspond to χ_M' and full circles symbols to χ_M''.

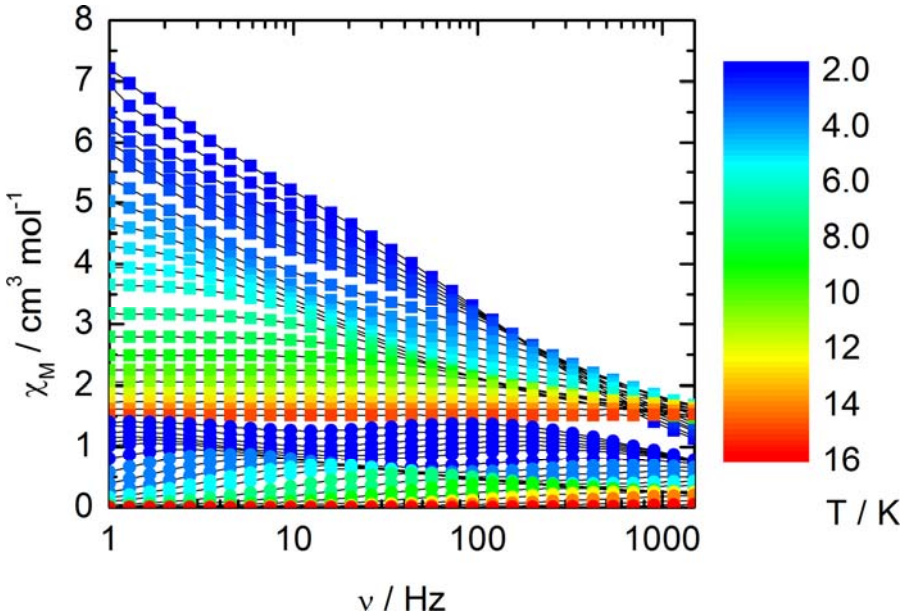

Figure S10. Frequency dependences of χ_M' and χ_M'' measured between 2 and 15 K for **1** in a 1500 Oe applied magnetic field. Full square symbols correspond to χ_M' and full circles symbols to χ_M''.

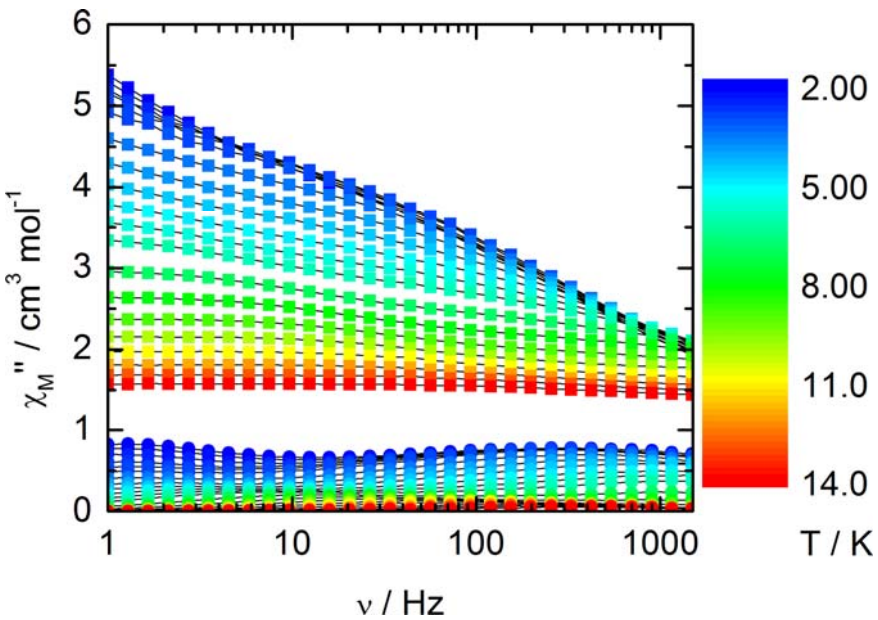

Figure S11. Frequency dependences of χ_M' and χ_M'' measured between 2 and 15 K for **2** in a 3000 Oe applied magnetic field. Full square symbols correspond to χ_M' and full circles symbols to χ_M''.

Table S1. Best fitted parameters (χ_T, χ_S, τ_1, τ_2, α_1, α_2 and β) with the extended Debye model featuring two relaxation times for compound **1** at 1500 Oe in the temperature range 2-14 K (NA for Non Accessible).

T / K	χ_T / cm^3 mol^{-1}	χ_S / cm^3 mol^{-1}	β	α_1	τ_1 / s	α_2	τ_2 / s	R^2
2	9.60927	0.24169	0.44725	0.35091	0.17465	0.43597	0.00112	1
2.2	8.76314	0.21728	0.38407	0.25471	0.15923	0.45615	0.00109	0.99996
2.4	8.39983	0.28994	0.41744	0.29141	0.16758	0.44633	8.58E-04	0.99999
2.6	7.86849	0.31464	0.41243	0.27704	0.14705	0.44546	7.17E-04	0.99999
2.8	7.46413	0.34596	0.42215	0.27454	0.13036	0.44044	5.82E-04	0.99999
3	7.05456	0.38685	0.42947	0.26849	0.11025	0.43592	4.80E-04	0.99999
3.5	6.174	0.43333	0.44328	0.24913	0.06855	0.4321	2.88E-04	0.99999
4	5.47043	0.4975	0.46152	0.2328	0.04131	0.42101	1.81E-04	0.99999
4.5	4.90084	0.45583	0.46411	0.21497	0.02556	0.43028	1.07E-04	0.99999
5	4.42344	0.61843	0.49513	0.19847	0.01629	0.41253	8.27E-05	0.99998
5.5	4.04019	0.45835	0.45892	0.17279	0.01121	0.48183	4.50E-05	0.99998
6	3.71577	0.65079	0.49115	0.16181	0.00778	0.47593	4.17E-05	0.99997
7	3.22045	1.63698	1 (fixed)	0.22403	0.00323	NA	NA	0.99974
8	2.82089	1.51246	1 (fixed)	0.20293	0.00179	NA	NA	0.99985
9	2.50715	1.44513	1 (fixed)	0.18586	9.89E-04	NA	NA	0.99991
10	2.2648	1.34846	1 (fixed)	0.21653	4.46E-04	NA	NA	0.9999
11	2.06095	1.34643	1 (fixed)	0.20505	2.19E-04	NA	NA	0.99995
12	1.87953	1.35138	1 (fixed)	0.1981	9.68E-05	NA	NA	0.99998
13	1.73956	1.46302	1 (fixed)	0.10831	7.70E-05	NA	NA	0.99999
14	1.62157	1.52747	1 (fixed)	1.64E-14	7.33E-05	NA	NA	0.99999

Table S2. Best fitted parameters (χ_T, χ_S, τ_1, τ_2, α_1, α_2 and β) with the extended Debye model featuring two relaxation times for compound **2** at 3000 Oe in the temperature range 2-14 K (NA for Non Accessible).

T / K	χ_T / cm^3 mol^{-1}	χ_S / cm^3 mol^{-1}	β	α_1	τ_1 / s	α_2	τ_2 / s	R^2
2	6.01465	0.08061	0.23596	0.18268	0.17329	6.24E-01	4.17E-04	0.99999
2.2	5.89152	0.38658	0.25682	0.20394	0.18907	5.90E-01	4.94E-04	0.99999
2.4	5.67339	0.30314	0.1854	0.10742	0.197	6.13E-01	5.23E-04	0.99997
2.6	5.36583	0.53132	0.1642	0.10369	0.15736	5.78E-01	5.58E-04	0.99995
2.8	5.23591	0.62044	0.1639	0.12875	0.17883	5.61E-01	5.29E-04	0.99996
3	5.10386	0.63315	0.16467	0.14738	0.1898	5.55E-01	4.72E-04	0.99997
3.5	4.81665	0.85956	0.22581	0.2952	0.23062	5.04E-01	3.92E-04	0.99999
4	4.32215	0.84982	0.17681	0.2175	0.16239	5.18E-01	3.05E-04	0.99999
4.5	4.0381	0.8236	0.2148	0.33981	0.12916	4.94E-01	1.98E-04	0.99998
5	3.63442	0.90349	0.17504	0.22981	0.0696	5.18E-01	1.58E-04	0.99999
5.5	3.35766	0.96822	0.18916	0.22314	0.04488	5.03E-01	1.21E-04	0.99999
6	3.1151	1.11602	0.22247	0.22229	0.02868	4.82E-01	9.97E-05	0.99999
7	2.72782	2.1316	1	0.27759	0.00993	NA	NA	0.99999
8	2.43062	1.88059	1	0.31898	0.00502	NA	NA	0.99994
9	2.17344	1.74127	1	0.26446	0.00352	NA	NA	0.99996
10	1.96785	1.62707	1	0.21441	0.00253	NA	NA	0.99998
11	1.80309	1.50326	1	0.24211	0.00148	NA	NA	0.99997
12	1.6502	1.41559	1	2.35E-01	9.51E-04	NA	NA	0.99998
13	1.53397	1.35761	1	2.04E-01	6.89E-04	NA	NA	0.99998
14	1.43246	1.30315	1	1.73E-01	4.68E-04	NA	NA	0.99999