Supplementary Information for

Hysteresis enhancement on a hybrid Dy(III) Single Molecule Magnet/iron oxide nanoparticle system

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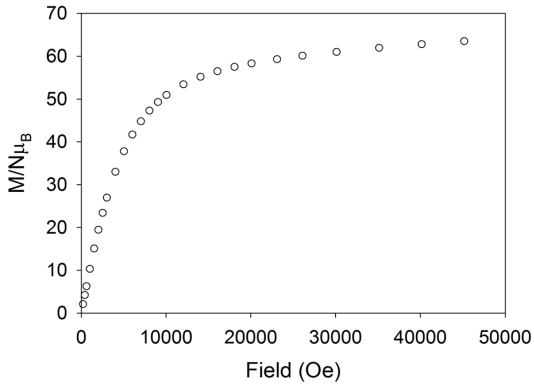
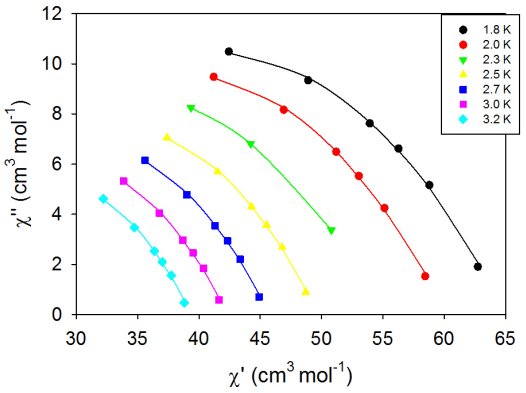
Table S1. Debye model fitting data for Dy_{12}

T (K)	**1.8**	**2**	**2.3**	**2.5**	**2.7**	**3**	**3.2**
Xs	8.8119	11.0062	10.3494	15.8542	16.775	18.2227	19.8113
XT	56.688	54.4936	55.1508	49.6458	48.7251	47.2774	45.6886
Tau(o)	8.49E-05	6.73E-05	3.28E-05	4.21E-05	2.92E-05	2.36E-05	2.11E-05
alfa	0.4746	0.4701	0.5101	0.4634	0.4733	0.4759	0.476

Arrhenius plot





τo=1.8275e-7 s^{-1}

Ueff = 5.75 K

r^2= 0.9743979049

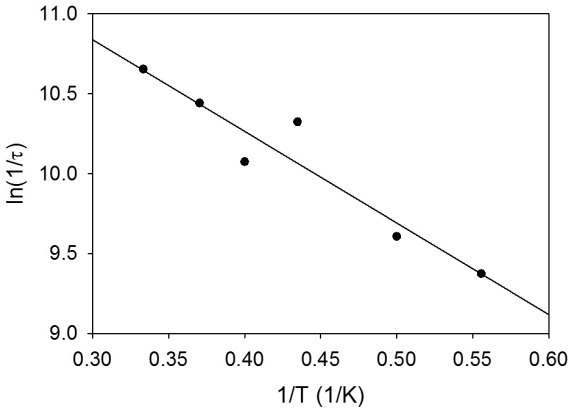


Figure S1. Magnetic properties of Dy_{12}: Magnetization vs. field plot at 2 K, Argand plot between 1.8 and 3.2 K (solid lines are a fitting using the Debye model) and Arrhenius plot for Dy_{12}.

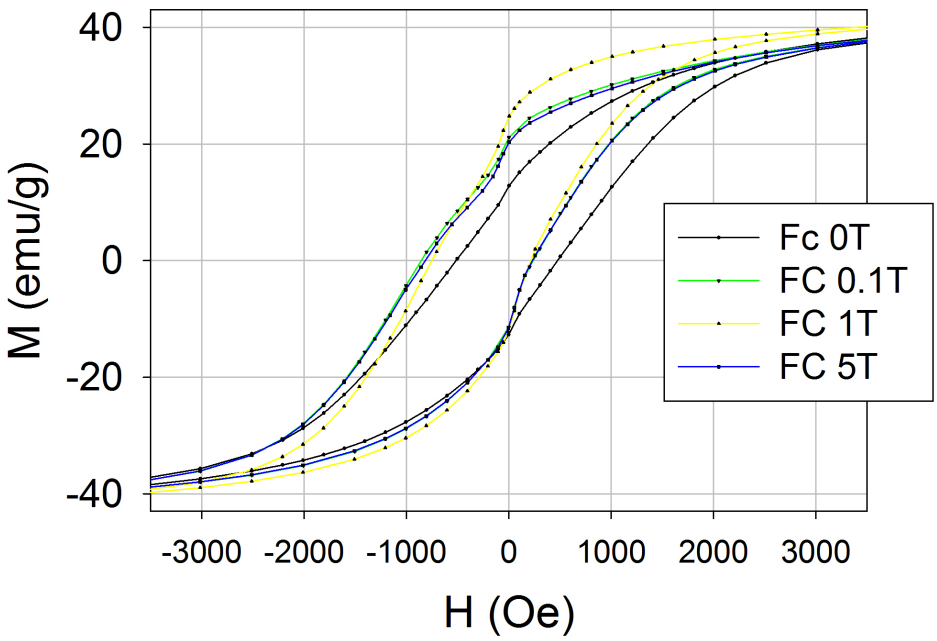


Figure S2. Field cool magnetization vs. field hysteresis for NP-Dy_{12} (10.4 nm) at 2 K. Field cool and exchange bias (HE): 5e-3 T, HE = -78 Oe; 0.1 T, HE = -354 Oe 1.0 T, HE = -273 Oe and 5.0 T, HE = 287 Oe.

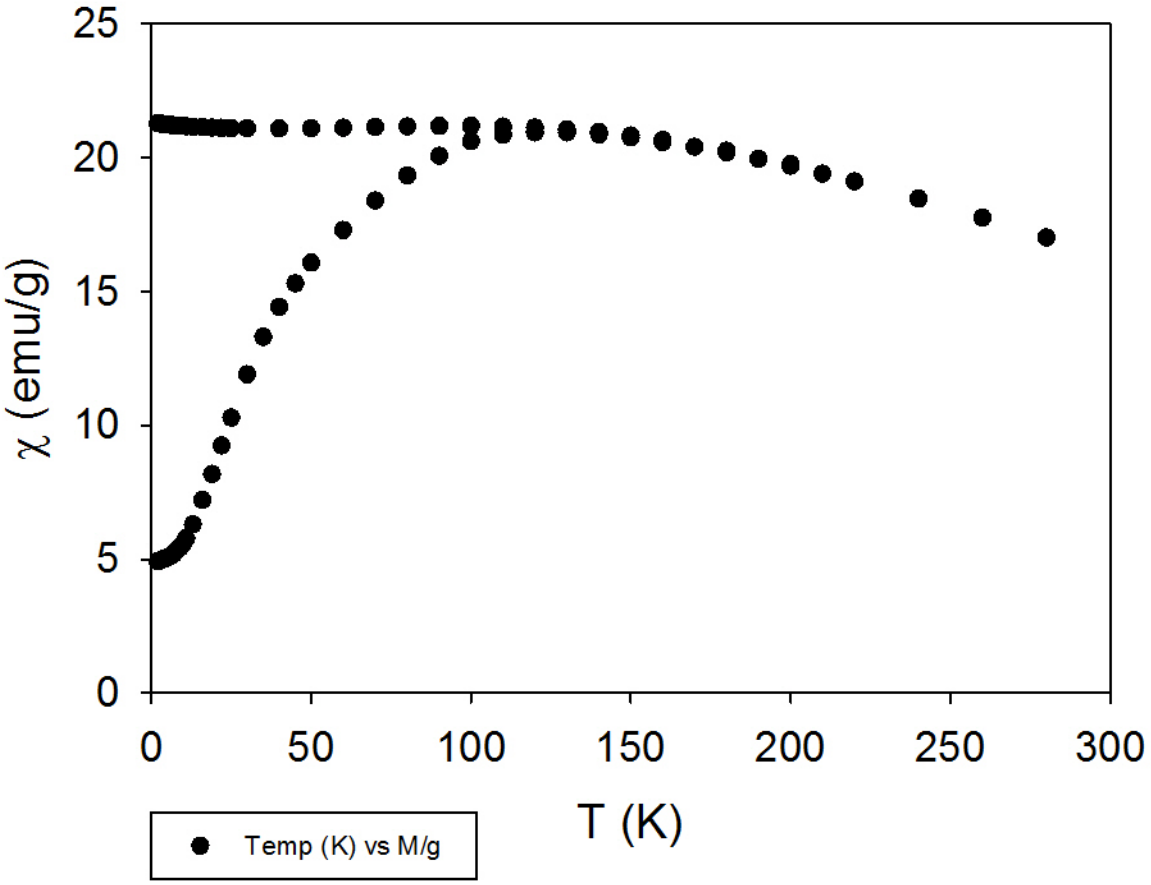


Figure S3. FC/ZFC curves NP-Dy_{12} (10.4 nm) at 500 Oe.

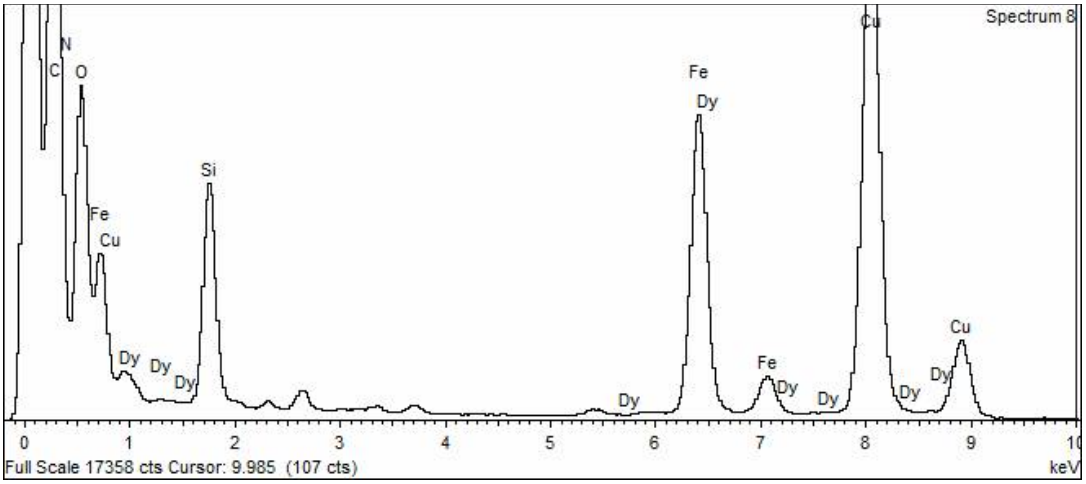


Figure S4. EDX spectrum for NP-Dy_{12}.

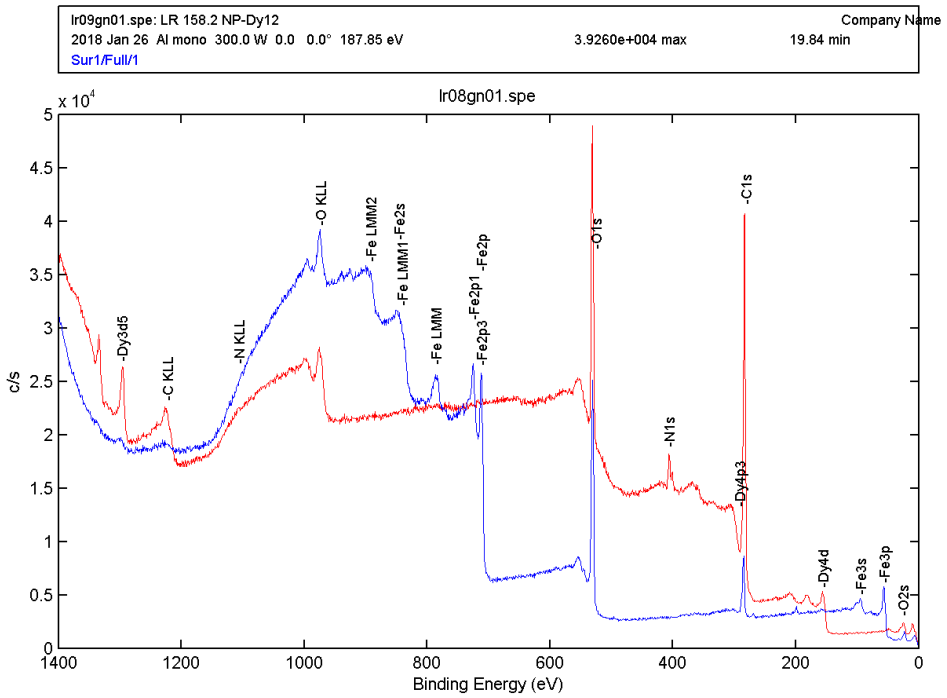
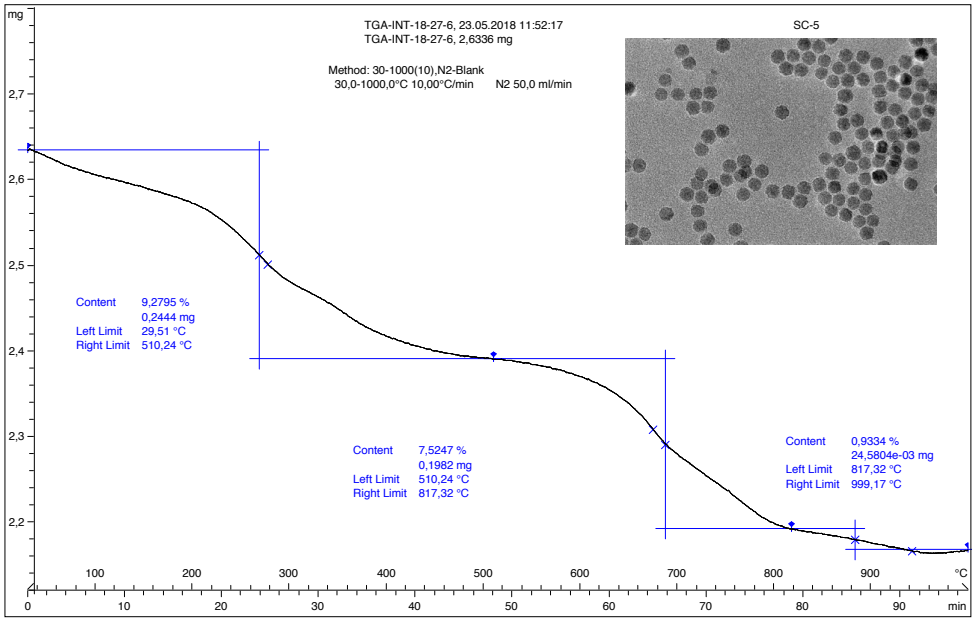


Figure S5. XPS spectra of Dy_{12} (red) and NP-Dy_{12} (10.4 nm) hybrid system (blue).

Table S02. Properties of the NP and hybrid systems NP-Dy_{12}. NP* is a blank trial for which NP' underwent the functionalization process without the Dy_{12} SMM.

	NP	**NP-Dy_{12}**	**NP'**	**NP'***	**NP-Dy_{12}'**
d (nm)	10.4	10.4	13.1	13.4	13.3
TGA loss %	9.2	11.4	6.3	6.2	7.4
Hc (Oe)	50	487	375	1808	2028
M_{rem}/M_{sat}	0.20	0.24		0.18	0.18
TB (K) AC 10 Hz	110	120	179	200	200
Surface/volume %	19.23	19.23	15.29	14.93	14.95



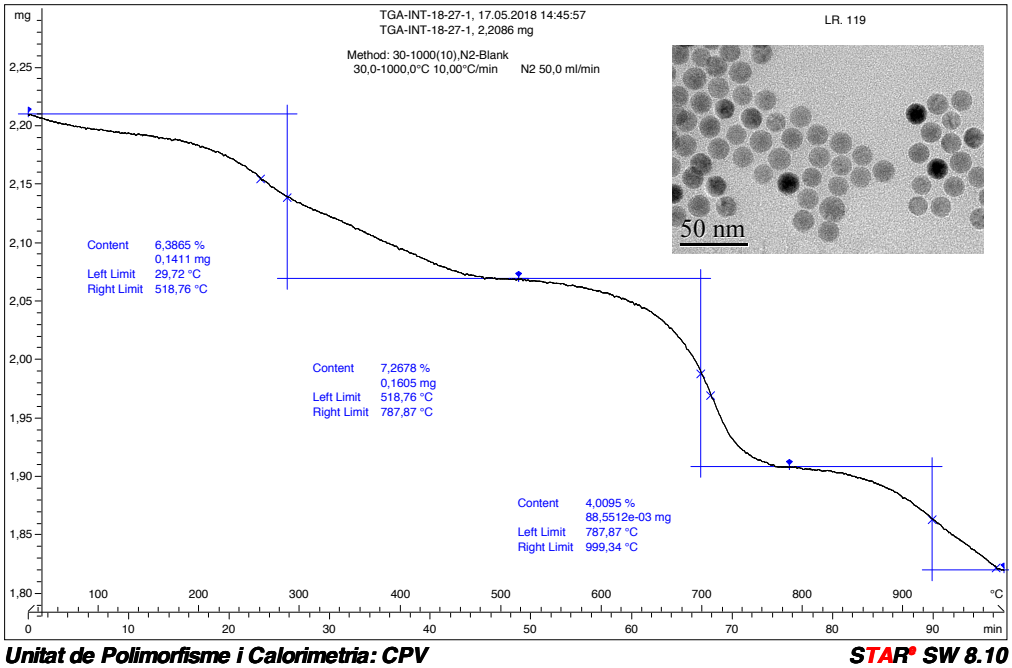
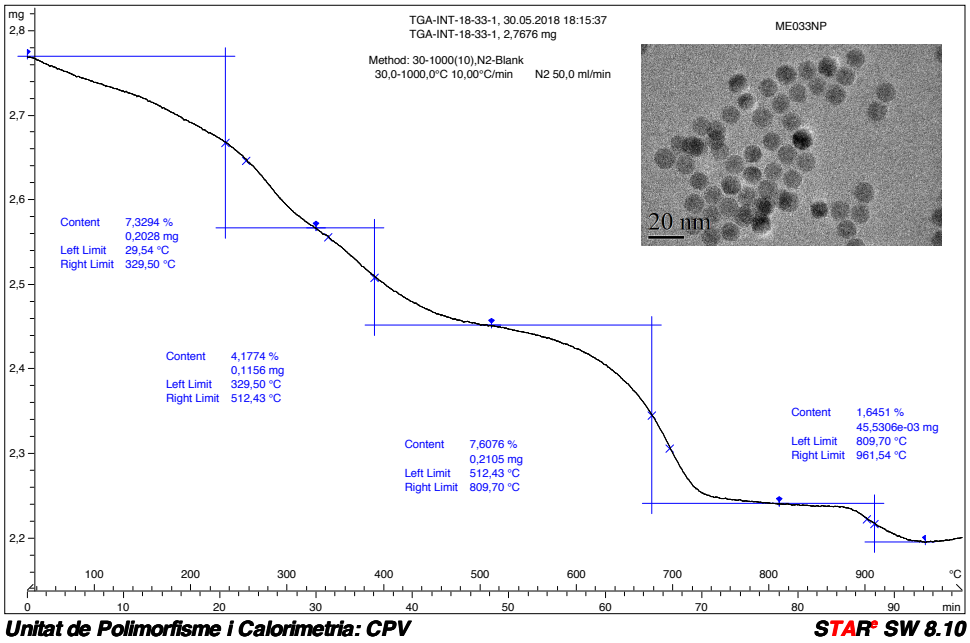


Figure S6. TGA of parent NP (top, d = 10.4 nm, bottom d = 13.3 nm).



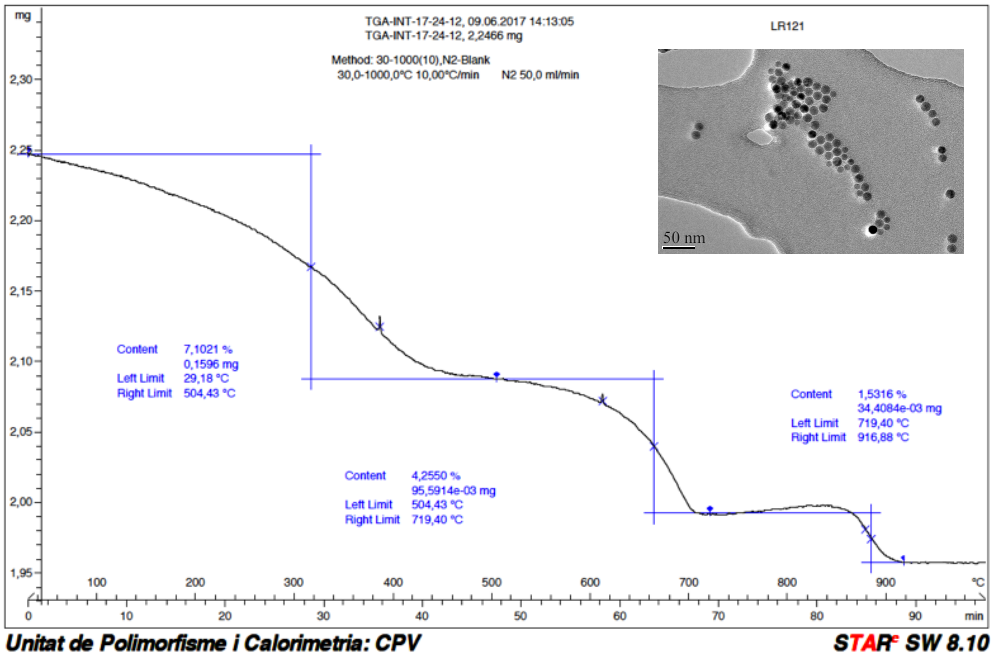


Figure S7. TGA of the hybrid system NP-Dy_{12} (top, d = 10.4 nm, bottom d = 13.4 nm).

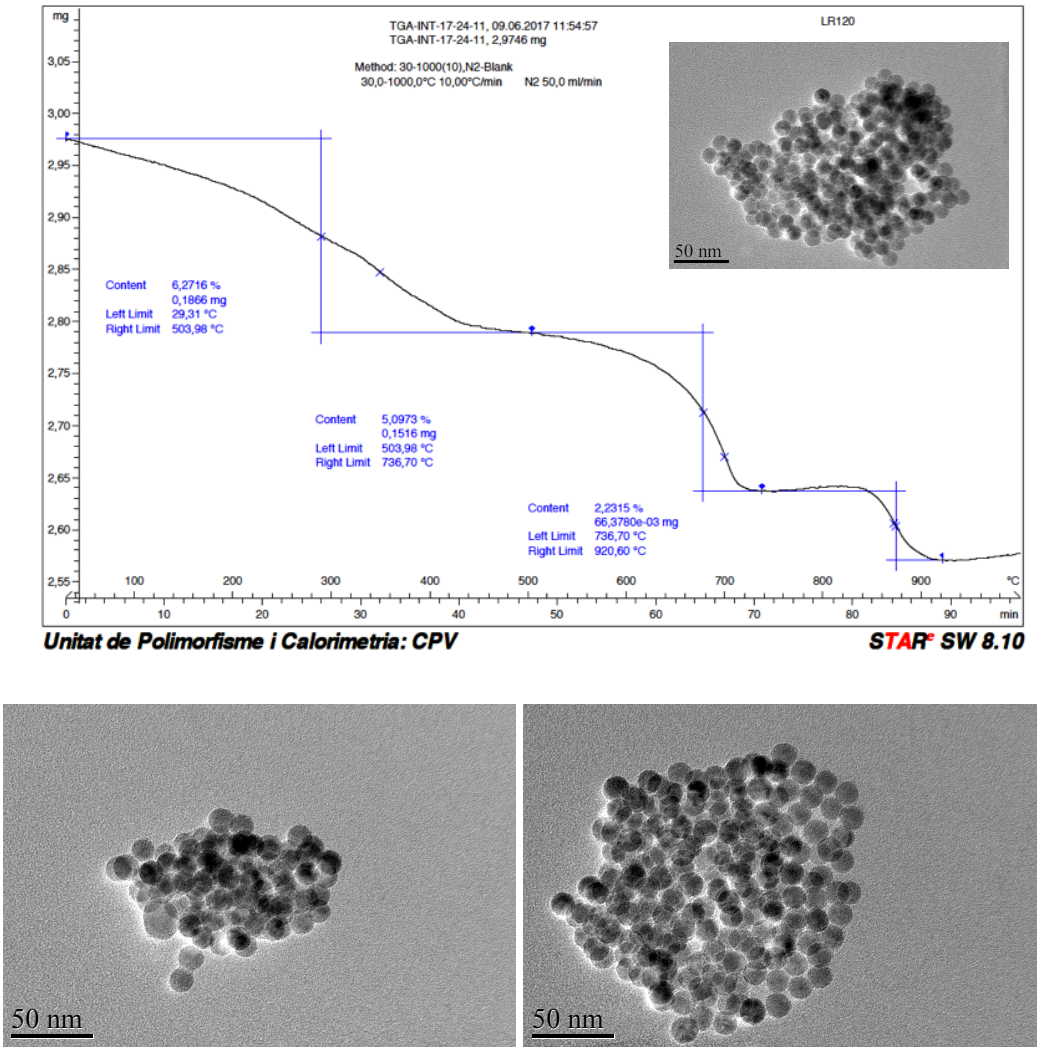
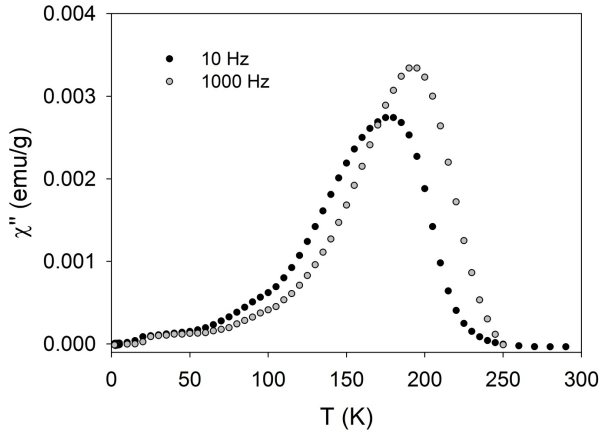
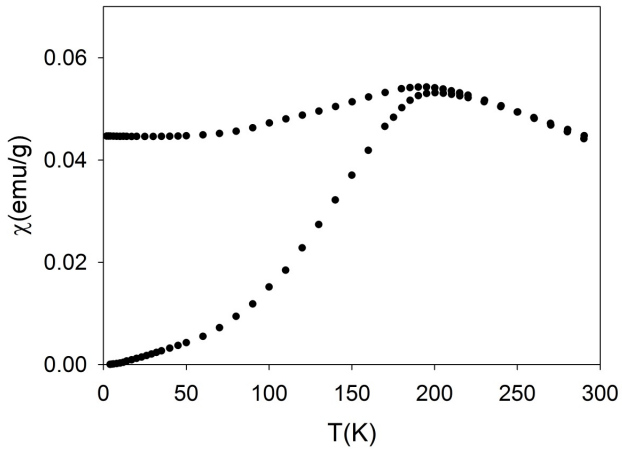


Figure S8. TGA and TEM of a blank sample of NP, treated as to prepare NP-Dy_{12} without Dy_{12} in the mixture (13.4 nm with RSD 5.6%).





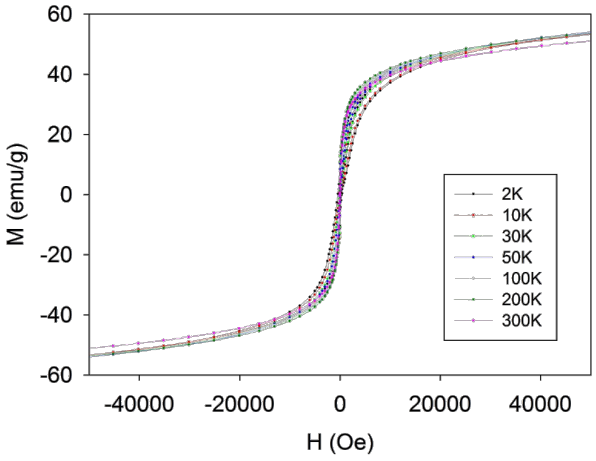
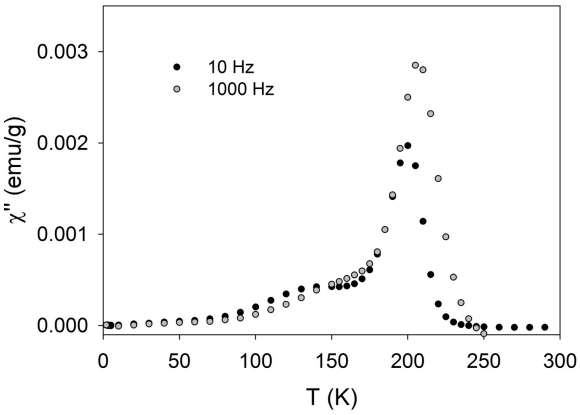
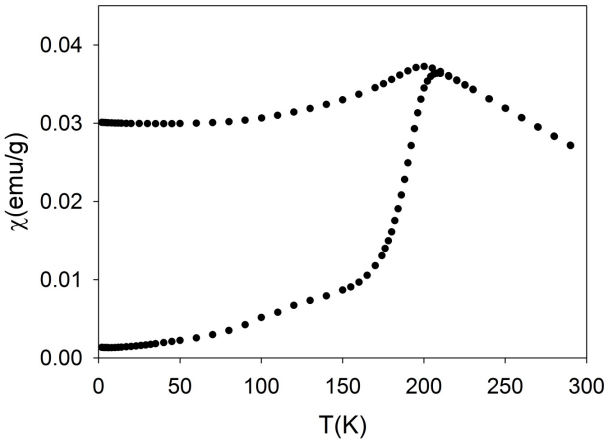


Figure S08. Magnetic properties of parent NPs (d = 13.1 nm). Magnetization loops are measured at 2 K.


10 Hz
1000 Hz
χ'' (emu/g)
T (K)


χ(emu/g)
T(K)

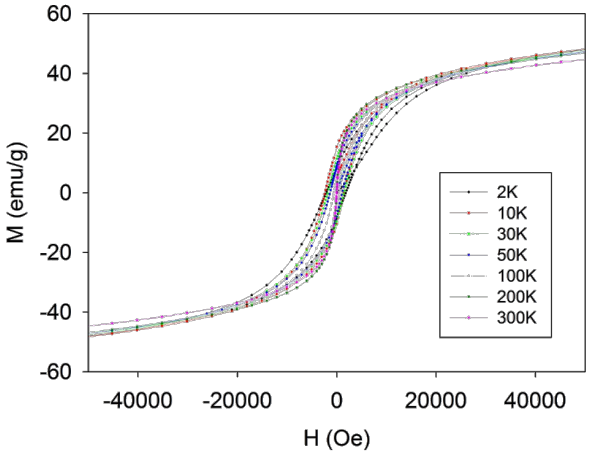

2K
10K
30K
50K
100K
200K
300K
M (emu/g)
H (Oe)

Figure S09. Magnetic properties of NP-Dy_{12} hybrid system (parent NPs d= 13.1 nm). Magnetization loops are measured at 2 K.