

Supporting Information

Quantified zero thermal expansion in magnetic R_2Fe_{17} -based intermetallic compounds (R =rare earth)

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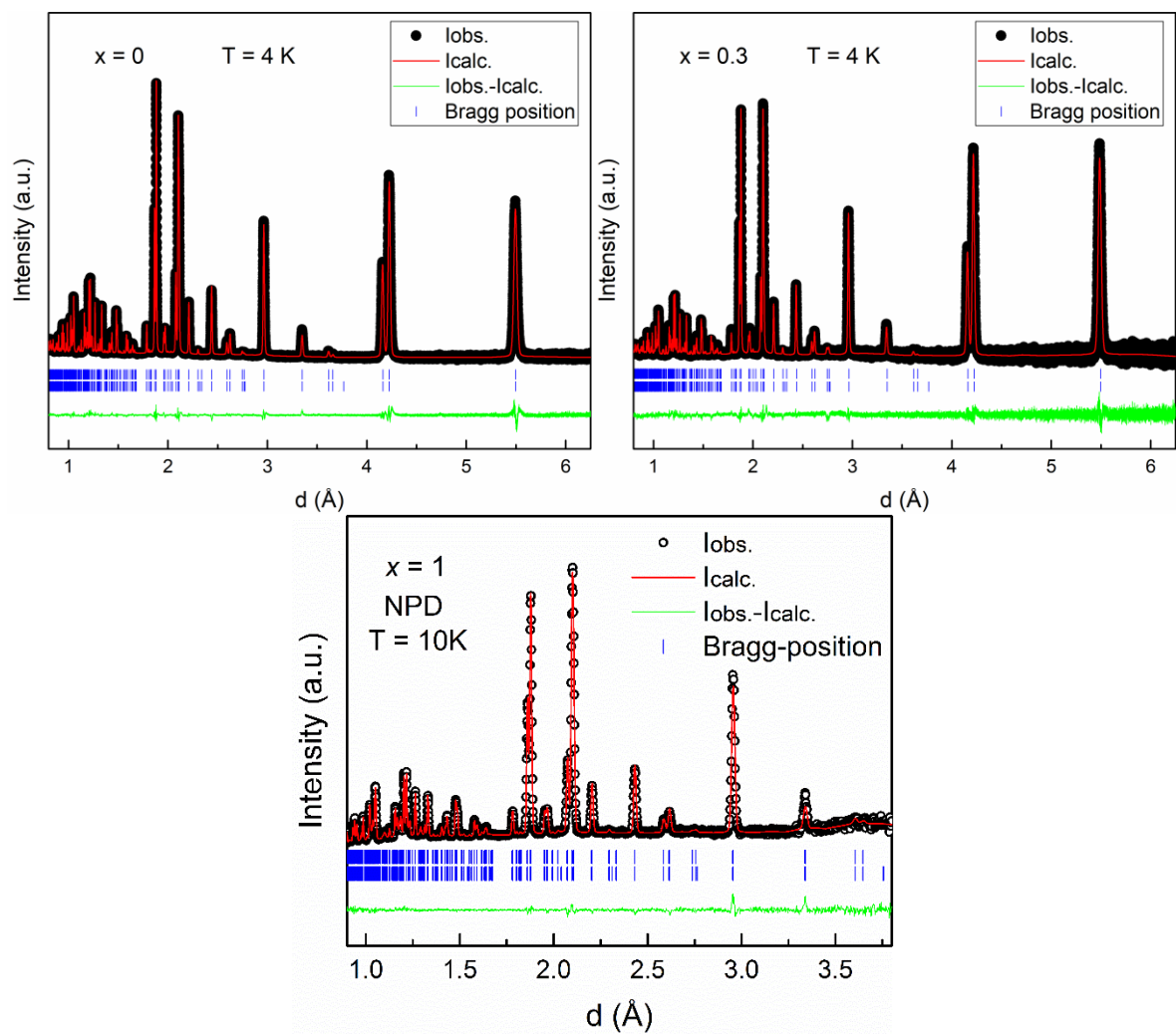


Figure S1. Rietveld refinements of low temperature NPD patterns for $\text{Ho}_2\text{Fe}_{17-x}\text{Si}_x$ ($x = 0, 0.3, 1$).

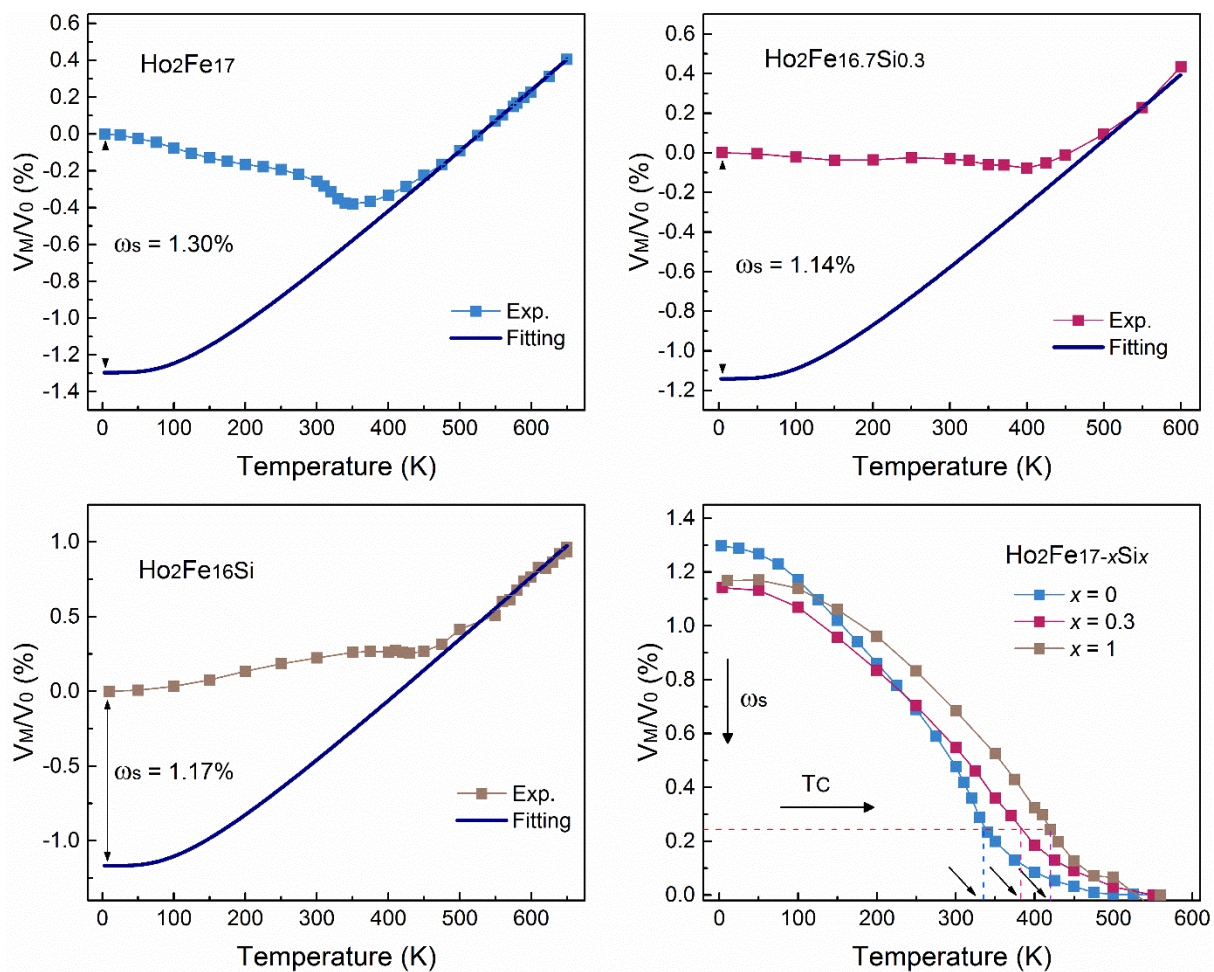


Figure S2. Experimental and calculated volume of unit volume of $\text{Ho}_2\text{Fe}_{17}$, $\text{Ho}_2\text{Fe}_{16.7}\text{Si}_{0.3}$ and $\text{Ho}_2\text{Fe}_{16}\text{Si}$ compounds, respectively. The calculated $V_M(T)$ is normalized by $V_M(T)/V_0 \times 100\%$.

Table S1. V_M/V_0 (near ground state) and T_C for several typical documented R_2Fe_{17} -based materials.

Composition	V_M/V_0 (%)	T_C (K)	Ref.
Er_2Fe_{17}	1.60	303	[1]
Dy_2Fe_{17}	1.60	363	[2]
$Lu_{1.95}Fe_{17}$	1.14	275	[3]
$Lu_{0.7}YFe_{17}$	1.10	290	[4]
Y_2Fe_{17}	1.10	327	[5]
Ho_2Fe_{17}	1.29	340	[6]
$Ho_2Fe_{16}Co$	1.28	470	[6]
$Ho_2Fe_{15}Co_2$	1.22	590	[6]
$Ho_2Fe_{16.7}Si_{0.3}$	1.14	378	This work
$Ho_2Fe_{16.5}Ga_{0.3}$	0.98	391	This work
$Ho_2Fe_{16.5}Cr_{0.5}$	1.04	381	This work
$Er_2Fe_{16.5}Cr_{0.5}$	1.02	380	This work

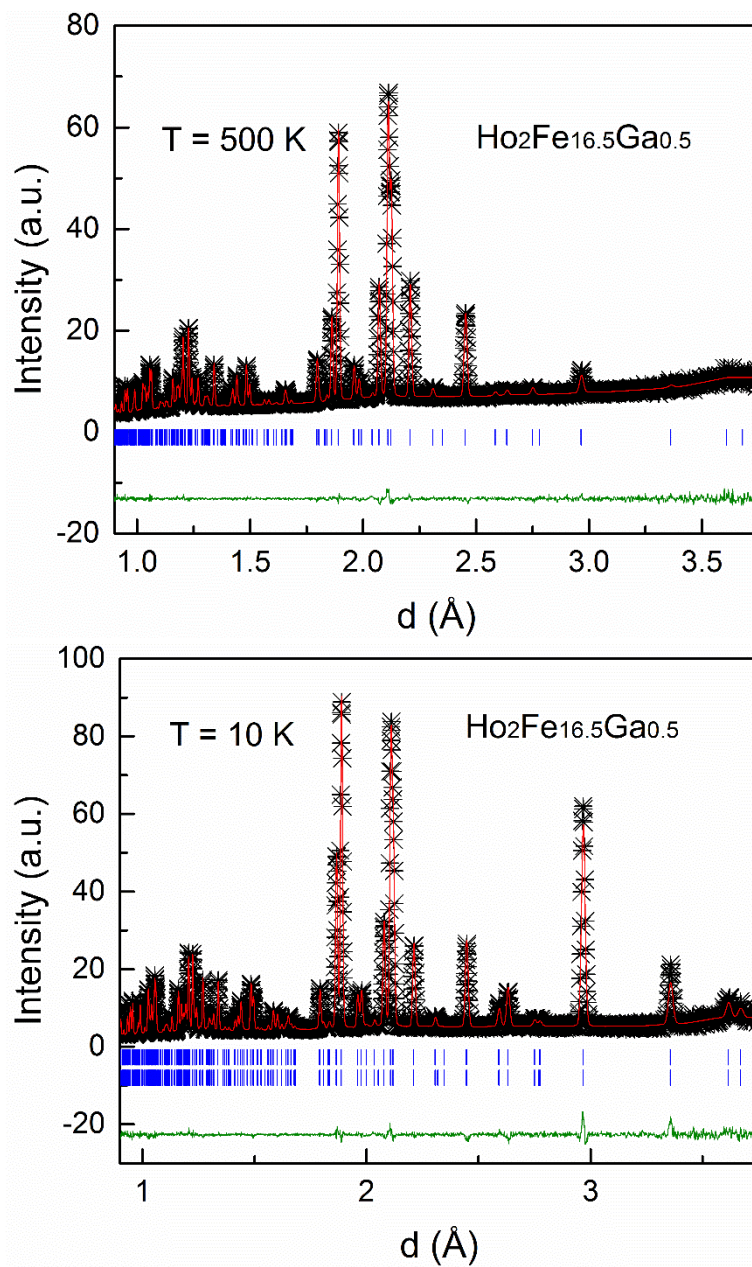


Figure S3. Rietveld refinements of NPD patterns at 500 K and 10 K for $\text{Ho}_2\text{Fe}_{16.5}\text{Ga}_{0.5}$, respectively.

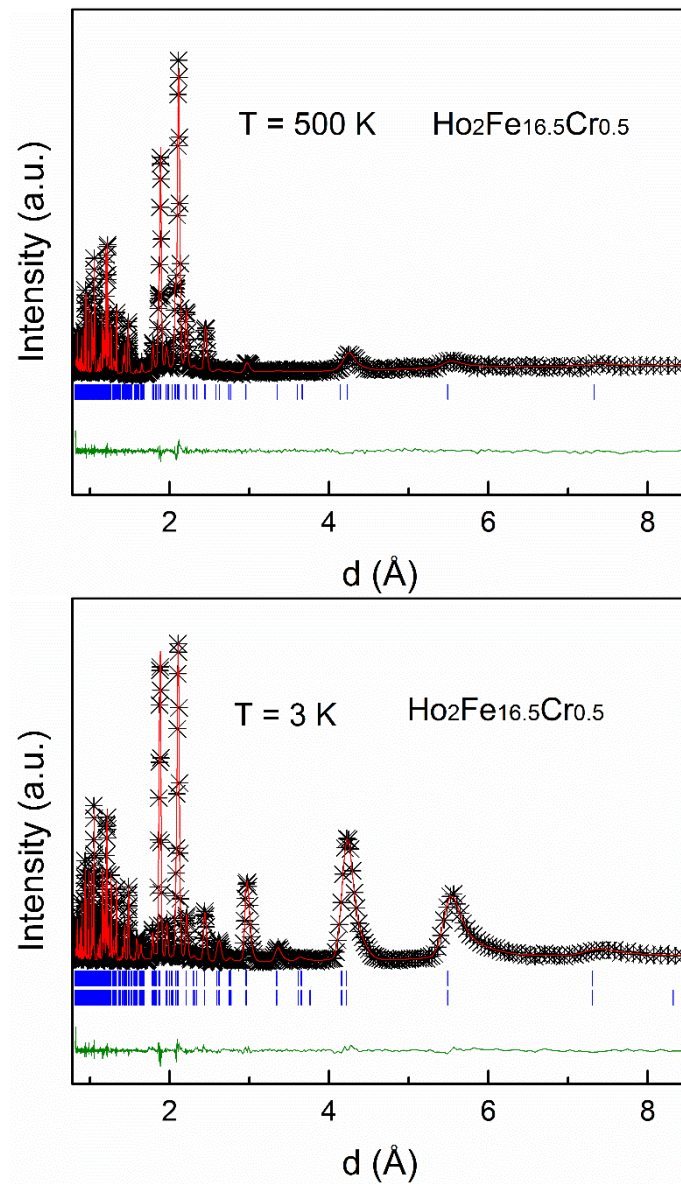


Figure S4. Rietveld refinements of NPD patterns at 500 K and 3 K for $\text{Ho}_2\text{Fe}_{16.5}\text{Cr}_{0.5}$, respectively.

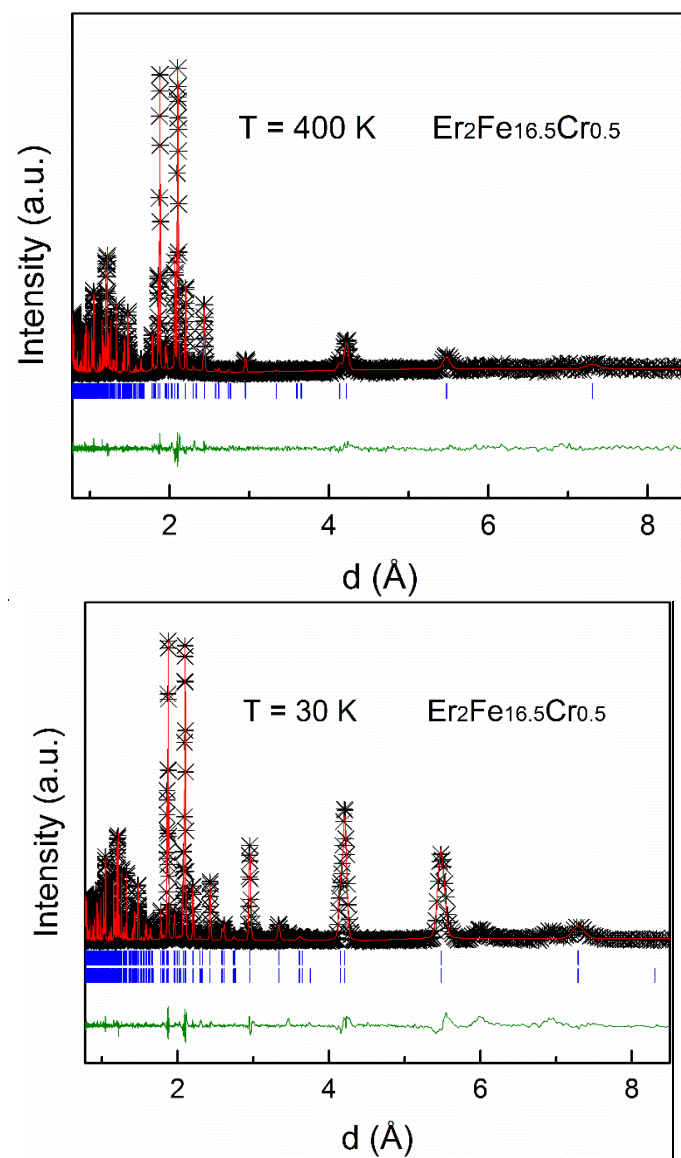


Figure S5. Rietveld refinements of NPD patterns at 400 K and 30 K for $\text{Er}_2\text{Fe}_{16.5}\text{Cr}_{0.5}$, respectively.

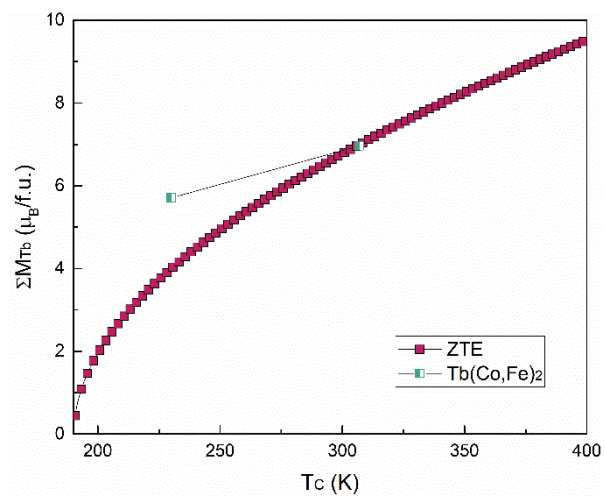


Figure S6. The composition regulated $|\Sigma\mathbf{M}_{\text{Tb}}(T_0)|$, and T_C for TbCo_2 and $\text{TbCo}_{1.9}\text{Fe}_{0.1}$ compounds, respectively.

Reference

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