

Supplementary information

A Brilliant Cryogenic Magnetic Coolant. Magnetic and Magnetocaloric Study of the Ferromagnetically Coupled GdF_3

Yan-Cong Chen,¹ Jan Prokleška,² Wei-Jian Xu,¹ Jun-Liang Liu,¹ Jiang Liu,¹ Wei-Xiong Zhang,¹ Jian-Hua Jia,^{*a} Vladimír Sechovský,² and Ming-Liang Tong^{*1}

¹Key Laboratory of Bioinorganic and Synthetic Chemistry of Ministry of Education, School of Chemistry and Chemical Engineering, Sun Yat-Sen University, Guangzhou 510275, P. R. China.

²Faculty of Mathematics and Physics, Department of Condensed Matter Physics, Charles University, Ke Karlovu 5, CZ-12116 Prague 2, Czech Republic

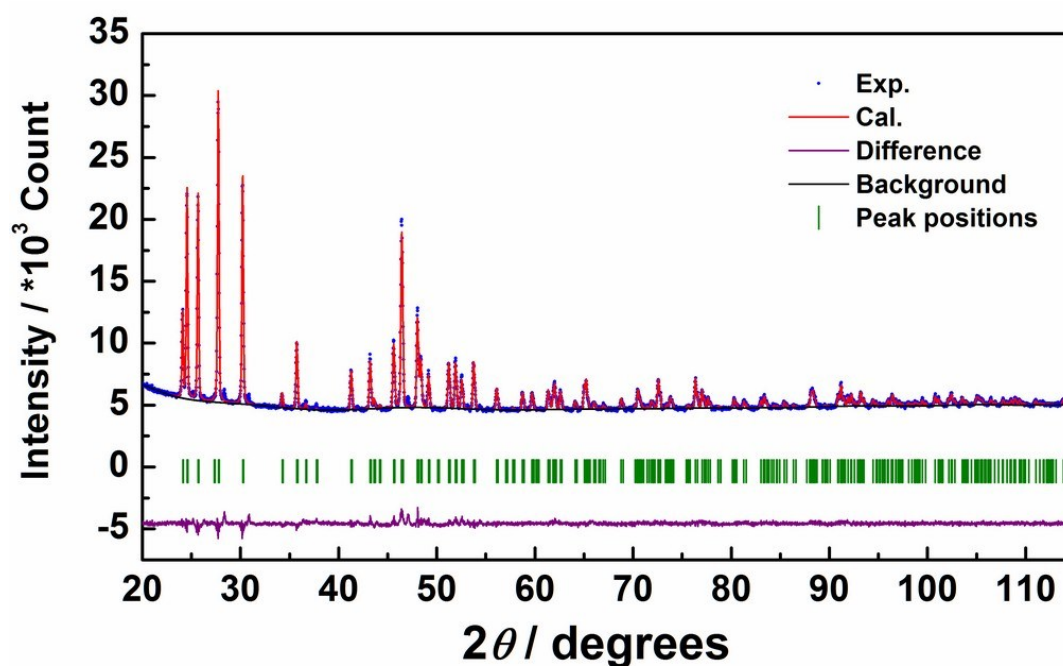


Figure S1 The final Rietveld refinement plot: experimental pattern (circles), calculated pattern (solid line), difference profile (bottom solid line) and background profile (solid line). Stick marks (|) at the bottom of the pattern indicate peak positions allowed by the unit-cell parameters and space group.

Table S1. Selected Bond Lengths (Å) and Bond Angles(°) for GdF₃.^a

Gd(1)-F(1)	2.501	Gd(1)-F(2)-Gd(1)#2	102.66
Gd(1)-F(1)#1	2.331	Gd(1)-F(2)-Gd(1)#11	139.03
Gd(1)-F(1)#2	2.360	Gd(1)-F(2)#3-Gd(1)#2	102.66
Gd(1)-F(2)	2.335	Gd(1)-F(2)#3-Gd(1)#3	139.03
Gd(1)-F(2)#3	2.335	Gd(1)-F(2)#4-Gd(1)#12	115.66
Gd(1)-F(2)#4	2.360	Gd(1)-F(2)#4-Gd(1)#4	139.03
Gd(1)-F(2)#5	2.360	Gd(1)-F(2)#5-Gd(1)#13	139.03
Gd(1)-F(2)#6	2.368	Gd(1)-F(2)#5-Gd(1)#14	115.66
Gd(1)-F(2)#7	2.368	Gd(1)-F(2)#6-Gd(1)#7	102.66
Gd(1)-F(1)-Gd(1)#7	98.88	Gd(1)-F(2)#6-Gd(1)#12	115.66
Gd(1)-F(1)-Gd(1)#8	131.99	Gd(1)-F(2)#7-Gd(1)#7	102.66
Gd(1)-F(1)#1-Gd(1)#9	129.13	Gd(1)-F(2)#7-Gd(1)#14	115.66
Gd(1)-F(1)#1-Gd(1)#1	131.99		
Gd(1)-F(1)#2-Gd(1)#2	98.88		
Gd(1)-F(1)#2-Gd(1)#10	129.13		

^aSymmetry transformations used to generate equivalent atoms:

#1	x, y, -1+z	#2	-0.5+x, 0.5-y, 0.5-z
#3	x, 0.5-y, z	#4	0.5-x, -y, -0.5+z
#5	0.5-x, 0.5+y, -0.5+z	#6	0.5+x, y, 0.5-z
#7	0.5+x, 0.5-y, 0.5-z	#8	x, y, 1+z
#9	0.5+x, 0.5-y, -0.5-z	#10	-0.5+x, 0.5-y, -0.5-z
#11	0.5-x, -y, 0.5+z	#12	1-x, -0.5+y, -z
#13	0.5-x, 1-y, -0.5+z	#14	1-x, 0.5+y, -z

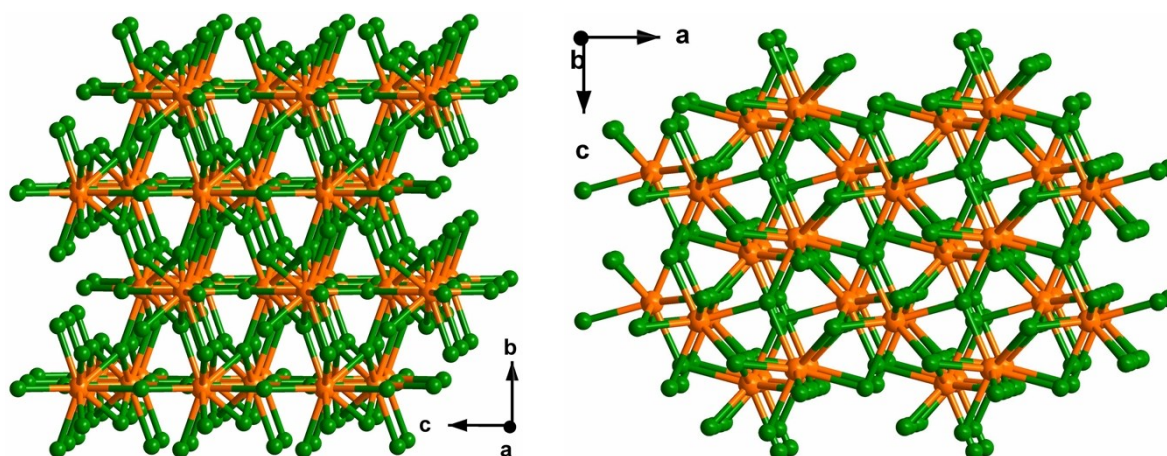


Figure S2 The crystal structure of GdF_3 viewed along the a axis (left) and b axis (right). Colour Codes: Gd, orange; F, green.

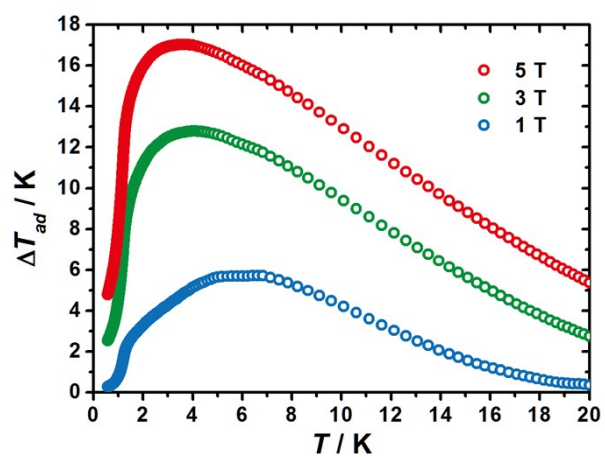


Figure S3 Temperature-dependencies of adiabatic temperature change (ΔT_{ad}) for selected $\Delta\mu_0H$.