Experimental report

21/10/2022

Proposal: CRG-2817 **Council:** 10/2020

Title: Investigation of the crystal and magnetic structures of Entropy stabilized Perovskite and Pyrochlore oxides

Research area:

This proposal is a new proposal

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Local contacts: Claire COLIN

Samples: LaxSr1-x(Zr0.2Sn0.2Ti0.2Hf0.2Mn0.2)O3 (x=0,0.02,0.04,0.06 and 0.08)
Dy2(Ti0.2Zr0.2Sn0.2Hf0.2Ge0.2)2O7

Instrument	Requested days	Allocated days	From	To
D1B	8	2	10/06/2021	12/06/2021

Abstract:

Experiment: CRG 2817
Title: Investigation of the crystal structure of entropy-stabilized perovskite and pyrochlore oxides
Instrument: D1B
Local Contact: Claire Colin

Two entropy-stabilized pyrochlore samples were studied during this experiment: $RE_2(TiZrHfGeSn)_2O_7$ (with RE = Dy and Tb). For each compound, a diffractogram was acquired at room temperature (using λ = 1.28 Å), which allows us to refine the structure. As an example, the obtained refinement pattern is shown is **Figure 1a** for the Tb-based compound. Moreover, additional diffractograms were acquired at low temperature (1.5, 5, 10 and 40K) using the λ = 2.52 Å setup. The magnetic diffuse scattering signal was obtained by subtracting "high-temperature" data (i.e. at 40K), and **Figure 1b** shows it for the Tb-based sample. This signal was fitted using the so-called Gardner-Berlinsky model, which was proposed to explain the diffuse scattering observed on $Tb_2Ti_2O_7$, meaning that similar correlation occur in $Tb_2(TiZrHfGeSn)_2O_7$. The corresponding fit is shown in **Figure 1c**.

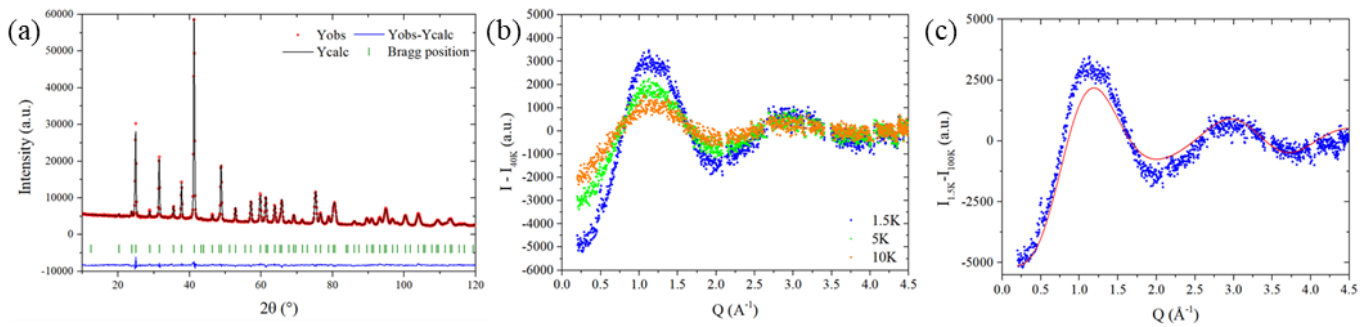

Figure 1. (a) Rietveld refinement of the PND pattern of $Tb_2(TiZrHfGeSn)_2O_7$ acquired on D1B (at 300K with λ = 1.28Å). **(b)** Magnetic diffuse scattering of $Tb_2(TiZrHfGeSn)_2O_7$ observed at 1.5, 5 and 10K (measured with λ = 2.52Å) and **(c)** its fit using the Gardner-Berlinsky model (shown for the data at 1.5K).