

Experimental report

13/02/2019

Proposal: 5-31-2410

Council: 4/2015

Title: Magnetic ordering in $\text{LaCo}_{1-x}\text{Rh}_x\text{O}_3$ ($x = 0.4, 0.5$ and 0.6)

Research area: Physics

This proposal is a new proposal

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Experimental team: Hanjie GUO

Local contacts: Maria Teresa FERNANDEZ DIAZ

Samples: $\text{LaCo}_{1-x}\text{Rh}_x\text{O}_3$

Instrument	Requested days	Allocated days	From	To
D1B	0	3	08/07/2016	11/07/2016
D2B	4	0		

Abstract:

Both LaCoO_3 and LaRhO_3 are nonmagnetic compounds below room temperature. However, the substitution of Rh at the Co site stabilizes the high spin state of Co^{3+} ions and ferromagnetic-like ordering has been reported for compounds $\text{LaCo}_{1-x}\text{Rh}_x\text{O}_3$ with x in the range from 0.1 to 0.4. Our recent first neutron powder diffraction experiments on the half-doped compound ($x = 0.5$) reveal that additional peaks appear at low temperatures, indicating possible antiferromagnetic transitions. These results suggest a drastic change of the ground state around $x = 0.5$. In order to study the magnetic ordering in the vicinity of $x = 0.5$, and clarify the evolution of the ground state with different doping levels, we propose to perform neutron powder diffraction experiments on the samples with $x = 0.4, 0.5$ and 0.6 using the D2B diffractometer.

Some of our results in that beamtime have been already published, see:

Hanjie Guo, Maria-Teresa Fernández-Díaz, Alexander Christoph Komarek, Sungjoon Huh, Peter Adler, and Martin Valldor, *Eur. J. Inorg. Chem.* **2017**, 3829 (2017).

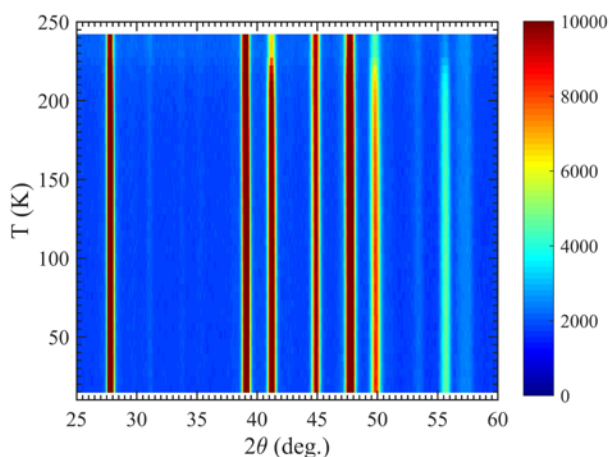


Fig. 1 Temperature dependence of the NPD pattern for $\text{SrFe}_2\text{S}_2\text{O}$.

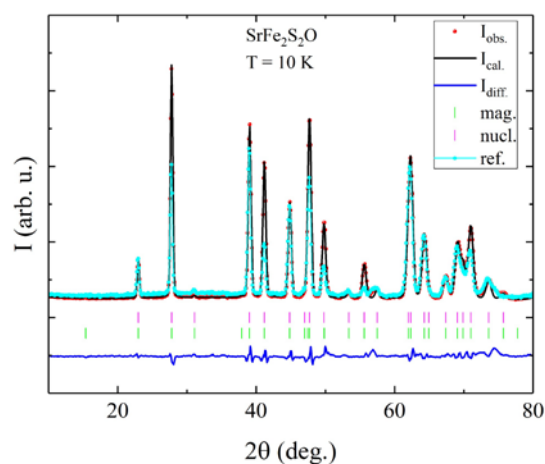


Fig. 2 Rietveld refinement of the NPD pattern measured at 10 K for $\text{SrFe}_2\text{S}_2\text{O}$. The pattern measured at 247 K in the paramagnetic phase is shown as a reference.

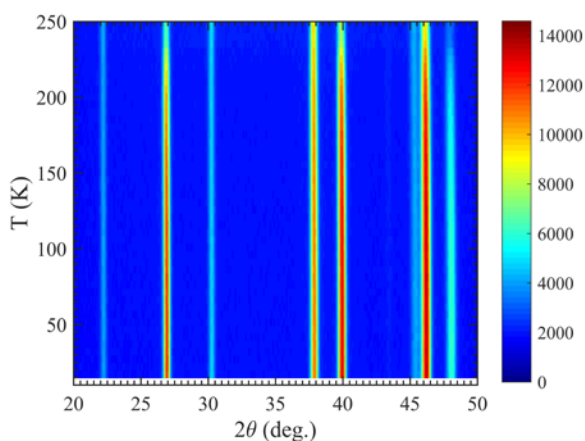


Fig. 3 Temperature dependence of the NPD pattern for $\text{SrFe}_2\text{Se}_2\text{O}$.

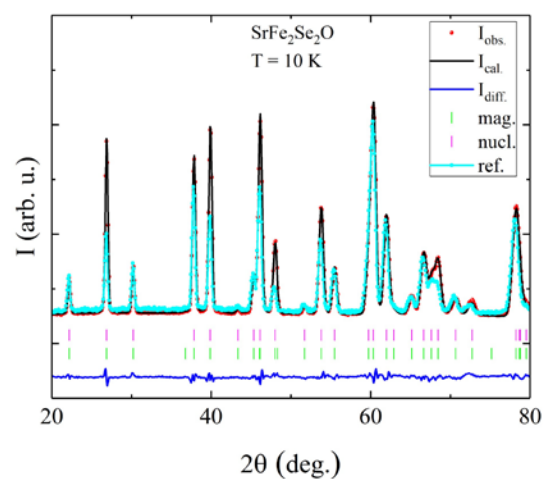


Fig. 4 Rietveld refinement of the NPD pattern measured at 10 K for $\text{SrFe}_2\text{Se}_2\text{O}$. The pattern measured at 237 K in the paramagnetic phase is shown as a reference.