

Author's Accepted Manuscript

Perovskite solid solutions $\text{La}_{0.75}\text{Bi}_{0.25}\text{Fe}_{1-x}\text{Cr}_x\text{O}_3$:
preparation, structural, and magnetic properties

S.A. Ivanov, P. Beran, G. Bazuev, R. Tellgren, T.
Sarkar, P. Nordblad, R. Mathieu



PII: S0022-4596(17)30252-9
DOI: <http://dx.doi.org/10.1016/j.jssc.2017.06.031>
Reference: YJSSC19849

To appear in: *Journal of Solid State Chemistry*

Received date: 21 May 2017
Revised date: 27 June 2017
Accepted date: 30 June 2017

Cite this article as: S.A. Ivanov, P. Beran, G. Bazuev, R. Tellgren, T. Sarkar, P. Nordblad and R. Mathieu, Perovskite solid solutions $\text{La}_{0.75}\text{Bi}_{0.25}\text{Fe}_{1-x}\text{Cr}_x\text{O}_3$ preparation, structural, and magnetic properties, *Journal of Solid State Chemistry*, <http://dx.doi.org/10.1016/j.jssc.2017.06.031>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Perovskite solid solutions $\text{La}_{0.75}\text{Bi}_{0.25}\text{Fe}_{1-x}\text{Cr}_x\text{O}_3$: preparation, structural, and magnetic properties**S. A. Ivanov^{a,b}, P. Beran^c, G. Bazuev^d, R. Tellgren^e, T. Sarkar^b, P. Nordblad^b, R. Mathieu^b**^aDepartment of Inorganic Materials, Karpov' Institute of Physical Chemistry, 105064 Moscow, Russia^bDepartment of Engineering Sciences, Box 534, Uppsala University, SE-751 21 Uppsala, Sweden^cNuclear Physics Institute of the CAS, Hlavni 130, 250 68 Řež, Czech Republic^dInstitute of Solid State Chemistry, Ural Branch of the Russian Academy of Sciences, 620990, Ekaterinburg, Russia^eDepartment of Chemistry, Angström Laboratory, Uppsala University, Box 538, SE-751 21 Uppsala, Sweden**Abstract**

Solid solutions of $\text{La}_{0.75}\text{Bi}_{0.25}\text{Fe}_{1-x}\text{Cr}_x\text{O}_3$ ($x = 0.1, 0.25, 0.5, \text{ and } 0.75$) prepared by conventional solid state reaction have been studied by means of X-ray powder diffraction (XRPD), neutron powder diffraction (NPD) and magnetic measurements. The NPD and XRPD patterns indicate orthorhombic structure (space group $Pnma$) for all compositions in the whole temperature range investigated (4-900 K). The lattice parameters of $\text{La}_{0.75}\text{Bi}_{0.25}\text{Fe}_{1-x}\text{Cr}_x\text{O}_3$ were found to decrease with the Cr content. It was established that the Fe^{3+} and Cr^{3+} cations are randomly positioned at the B -site of the perovskite structure.

All samples order antiferromagnetically below transition temperatures that decrease with increasing Cr content, from around 700 K for $x = 0.1$ to about 300 K for $x = 0.75$. The antiferromagnetic arrangement of the $\text{Fe}^{3+}/\text{Cr}^{3+}$ magnetic moments in the B -site is of G -type along the x -axis (G_x mode) with propagation vector $k = (0,0,0)$ for all concentrations of Cr. Effects of the composition on several structural distortion parameters were investigated and an anomalous variation of the octahedral deformation with Cr content was found. Whilst the overall octahedral deformation varies irregularly with increasing Cr content, the octahedral tilting was found to decrease monotonously.

Graphical abstract

Left: Representations of the (top) crystal and (bottom) magnetic structure of $\text{La}_{0.75}\text{Bi}_{0.25}\text{Fe}_{1-x}\text{Cr}_x\text{O}_3$. Right: Temperature dependence of the Fe/Cr-site magnetic moment extracted from NPD data.

Download English Version:

<https://daneshyari.com/en/article/5153567>

Download Persian Version:

<https://daneshyari.com/article/5153567>

[Daneshyari.com](https://daneshyari.com)