

MS40-1-7 Low-temperature study in the mixed crystal series $\text{Ni}_{(1-x)}\text{Cu}_{(x)}\text{Cr}_2\text{O}_4$
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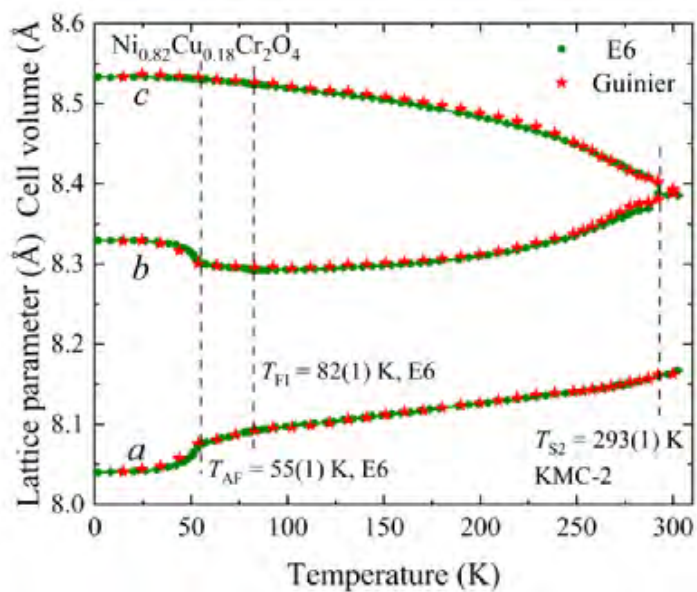
Abstract

Members of the mixed crystal series $\text{Ni}_{1-x}\text{Cu}_x\text{Cr}_2\text{O}_4$ crystallize in a distorted spinel structure [1,2,3]. For the end members NiCr_2O_4 and CuCr_2O_4 strong Jahn-Teller activities on the Ni^{2+} and Cu^{2+} ions at the A site lead to an elongation and a flattening of the NiO_4 and CuO_4 tetrahedra, respectively. Two structural phase transitions were caused by the local distortion, where the crystal structure first undergoes a change from cubic ($Fd\bar{3}m$) to tetragonal symmetry ($I4_1/amd$) followed by a change to orthorhombic space group $Fddd$ at or below room temperature, depending on the Cu-Ni substitution. Low-temperature X-ray diffraction by means of a Guinier diffractometer, hosted at the HZB X-ray Corelab, was applied in combination with neutron powder diffraction data to elucidate the interplay between structural and magnetic distortion in the complex spinel system.

References

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- [2] Reehuis et al., Phys. Rev. B 91 (2015) 024407
- [3] Suchomel et al., Phys. Rev. B 86 (2012) 054406

Lattice parameters of $\text{Ni}_{0.82}\text{Cu}_{0.18}\text{Cr}_2\text{O}_4$



Low-temperature Guinier diffractometer

