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Na-Ion Dynamics in the Solid Solution Ca1-xNaxCr2O4 Studied by Muon Spin Rotation and Neutron Diffraction

Content

Strongly anisotropic and especially one-dimensional or quasi-one-dimensional (Q1D) compounds are gaining increasing attention from the scientific community. In the field of condensed matter physics, 1D magnets have been extensively studied for fundamental research purposes, but recently also for their potential use in spintronic applications. In the area of energy materials, the anisotropic materials are important for the development of all-solid-state devices where a better control of the ion-diffusion is highly desirable
In this work we present the results of a systematic series of measurements carried out by muon spin rotation/relaxation (mu+SR) and neutron diffraction (ND) on the Q1D solid solution Ca1-xNaxCr2O4. This study was aimed at investigating the Na-ion dynamics connected to the Q1D diffusion channels in presence of defects, introduced by the Ca doping. The ion diffusion mechanism has been identified as interstitialcy and the diffusion coefficient for each member of the solid solution has been estimated.

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