

Optical, magnetic, thermodynamic, and dielectric studies of the disordered rock salt $\text{Li}_{1.3}\text{Nb}_{0.3}\text{Fe}_{0.4}\text{O}_2$ cathode for Li-ion batteries”

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Abstract

While most studies in disordered rock salt cathode materials focus on synthesis and electrochemical investigation, detailed investigations on their optical and thermodynamic properties are a matter of interest. Here, we report on complementary measurements of transient absorption spectroscopy, thermodynamic, and dielectric properties for $\text{Li}_{1.3}\text{Nb}_{0.3}\text{Fe}_{0.4}\text{O}_2$ (LNFO) disordered rock salt Li-excess. The structure was studied using powder x-ray diffraction and scanning electron microscopy, which showed the fine crystallization of LNFO. The ultra-fast laser spectroscopy is used to study the dynamics of charge carriers and electron–phonon coupling in the system. Our thermodynamic measurements have revealed a magnetically ordered phase with small spontaneous magnetization. The dielectric properties of LNFO illustrate high permittivity with losses at low frequencies. Furthermore, the behavior of the dielectric modulus and AC conductivity vs temperature and frequency were discussed.

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