SEMINAR NOTICE

TITLE: Absorption Spectroscopy Analysis of Ionic Activity in β-$NaFeO_2$ at Varying Temperatures

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LOCATION: Hall A25, 2-nd floor, Faculty of Sciences building, Str. Dr. Ion Raţiu 7-9.

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Abstract

To investigate the effect of heat on the electronic, crystal structure, and ionic conductivity properties of β-$NaFeO_2$ materials, a temperature-dependent ionic activity investigation of the sodium oxide material was performed. To demonstrate the physical background impact of temperature change on material atoms, x-ray absorption (XAS) and x-ray absorption fine structure (XAFS) spectroscopy data were collected and processed at comparable temperatures. Among the materials, sodium atoms were shown to be the most responsible for ionic conductivity loss as temperature increased. When sodium atoms detach from the spinel structure of the Fe-O ligand, their ionic capacitance increases as the temperature rises, resulting in decreased ionic conductivity. Soft x-ray XAS and XAFS studies were carried out to study the temperature-related background process. The XAFS data were collected from the Fe K-edge, whereas the soft x-ray XAS data were obtained from the Fe $L_{3,2}$-edge and the O K-edge. Corresponding investigations confirmed an exceptionally stable (FeO_2)-ligand structure; however, as the temperature rises, sodium atoms become partially free, causing an increase in ionic resistance via Coulombic interactions. The temperature was elevated to 100 °C to investigate how temperature affects the -$NaFeO_2$ material. This caused a substantial release of sodium atoms, which were determined to be bonded to the ligand as "$Na^+(FeO_2)^-$" after cooling to create the β-NaFeO2 material.