



Crystallographic and magnetic properties of α -NaFeO₂ using Mössbauer spectroscopy

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Abstract

The NaFeO₂ sample was synthesized using the solid-state reaction method. X-ray diffraction (XRD) was performed to confirm the crystal structure of NaFeO₂ using an X-ray diffractometer. The crystal structure of NaFeO₂ was confirmed to be a trigonal structure with a space group of R-3 m. The lattice parameters were found to be $a_0 = b_0 = 3.0251$ Å and $c_0 = 16.0983$ Å. The temperature dependence of the zero-field-cooled (ZFC) and field-cooled (FC) curves from temperatures of 4.2–295 K was measured using the vibrating sample magnetometer (VSM). From the ZFC–FC curves, it was found that the Néel temperature (T_N) of NaFeO₂ was 11 K. The temperature dependence of the Mössbauer spectra from 4.2 to 295 K indicates that the magnetic hyperfine field (H_{hf}) and isomer shift (δ) decreased with increasing temperature. The electric quadrupole splitting (ΔE_Q) rapidly increased at T_N .

Keywords Mössbauer spectroscopy · Magnetic properties · NaFeO₂ · Cathode material