

Crystallographic and Magnetic Properties of LiCoPO_4 at Low Temperature

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Polycrystalline LiCoPO_4 powder was synthesized by using a solid-state reaction method. The temperature dependences of the crystallographic characteristics were analyzed by using high-resolution powder neutron diffraction at various temperatures. We found that the octahedron formed with one cobalt and six oxygen ions was distorted in one direction at low temperature. Above 23 K, the distances between cobalt and each of two oxygen ions were about 2.11 Å; however at temperatures below 23 K, the distances changed to about 2.05 and 2.15 Å, respectively. The temperature dependence of the magnetization was also measured by using a superconducting quantum interference device magnetometer at temperatures ranging from 5 to 100 K. Although LiCoPO_4 showed an anti-ferromagnetic behavior, a rapid increase in magnetization was observed at temperatures below 8 K and a large coercivity of 335 Oe was observed at 5 K. The Néel temperature (T_N) of LiCoPO_4 was determined to be 23 K.