

Inverse spinel structure of Co-doped gahnite

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ABSTRACT

Powder ZnAl₂O₄ (gahnite) samples doped with 0–100 at% Co were obtained by a sol-gel technique. X-ray powder diffraction was used to characterize the samples. Gahnite samples are cubic with the normal spinel structure, space group *Fd $\bar{3}$ m*. Cobalt doping caused a nonuniform increase of unit-cell parameter. The structure of the gahnite samples was refined by the Rietveld method. The location of Co²⁺ was determined by EPR spectroscopy. Cobalt doping of gahnite induces the inverse spinel structure at only 4 at% Co, and the inversion parameter increases with Co²⁺ doping level. Metal-oxide distances in the (Al,Co)O₆ octahedra dominantly influence the unit-cell parameter of Co-doped gahnite.

Keywords: Co-doped gahnite, spinel structure, X-ray powder diffraction, Rietveld method