

Preparation and characterization of Ga₂O₃ and GaN nanoparticles

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Abstract

In this communication, we present results on preparation of GaN nanoparticles by conversion of Ga₂O₃ nanocrystals in a flow of NH₃ and H₂. The monoclinic Ga₂O₃ nanoparticles have been prepared by hydrothermal method with gallium nitrate and sodium hydroxide as precursors. Ga₂O₃ nanowires are produced with increasing the duration of the hydrothermal process up to 24 hours. The production of β-phase Ga₂O₃ has been confirmed by X-ray diffraction (XRD) and Fourier transform infrared (FTIR) spectroscopy. According to XRD, Raman and FTIR spectra, wurtzite type GaN nanocrystals with an average size of 28.6 nm are obtained by nitridation of Ga₂O₃ nanoparticles. Doping of Ga₂O₃ nanomaterial with Eu³⁺ ions in the hydrothermal process is demonstrated, and the emission spectra of this Eu-doped nanomaterial are compared with those of Eu-doped nanoparticles prepared previously by solid state reactions.