Temperature dependence of the indirect band gap, steepness parameter and related optical constants of [Kx(NH₄)1-x]₂ZnCl₄ mixed crystals

A. Abu El-Fadl, A.S. Soltan, N.M. Shaalan

Abstract:

Optical transmittance measurements near the absorption edge of [Kx(NH₄)1-x]₂ZnCl₄ mixed crystals, where x = 0.00, 0.232, 0.522, 0.644, 0.859 and 1.00, are reported over 276–350K range. Analysis reveals that the type of transition is the indirect allowed one. The absorption edge shifted towards lower energy with increasing temperature. It is shown that [Kx(NH₄)1-x]₂ZnCl₄ mixed crystals with xp0.644 reveal a phase transition at 319 K, this phase disappeared at high concentrations of K⁺ ions. The steepness parameter is given, its value is used to estimate the temperature dependence of the indirect energy gap. In the region of the absorption edge, the absorption coefficient obeys Urbach’s rule. Urbach parameters are investigated as a function of temperature. r 2007 Elsevier Ltd. All rights reserved.

Keywords:

[Kx(NH₄)1-x]₂ZnCl₄ mixed crystals; Optical energy gap

Published In:

Optics & Laser Technology, 39, 1310-1318