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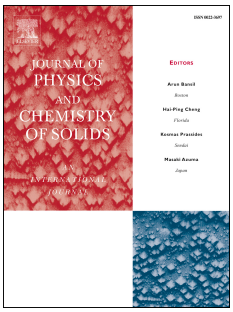

Blue shift in the optical transitions of ZnO thin film due to an external electric field

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Blue shift in the optical transitions of ZnO thin film due to an external electric field

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Abstract

An electric field can act as an efficient external perturbation to induce optical changes in a material. This paper describes the influence of an external electric field on the excitonic and band transitions in zinc oxide thin film investigated through electroreflectance. The electroreflectance spectra were identified as excitonic and band transitions. Both types of transitions were found to shift toward high energy as the magnitude of the electric field increased. Such a blue shift was accompanied by an increase in the exciton binding energy of the system.

Keywords

ZnO; electric field; electroreflectance; blue shift; optical transitions; exciton binding energy

1. Introduction

The large band gap of about 3.32 eV and high exciton binding energy of about 60 meV are two important parameters which make zinc oxide (ZnO)-based devices promising candidates for optoelectronics and short wavelength lasing device applications [1–6]. A comparatively large