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Anisotropic polarization of emitted and absorbed light in ZnSe based laser structures and thin ZnSe films

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We report on the linearly polarized luminescence observed in ZnSe based laser structures. Different mechanisms of anisotropic polarization of the luminescence are identified. The incorporation of extended defects, an anisotropic relaxation of the residual strain and the influence of small environmental differences between local nearly equivalent sites of electronic binding potentials manifest themselves in variations of the degree of linearly polarized luminescence. An anisotropy of an efficient absorption process is investigated, which is assumed to reduce drastically the light emission efficiency of the optoelectronic device. The corresponding absorption coefficient is estimated. In order to reveal different origins of the anisotropic polarization, the luminescence of thin epitaxially grown ZnSe films is analyzed in detail. A considerable linear polarization collinear to a $[\bar{1}10]$ axis of the Y line at 2.61 eV detected in the photoluminescence spectra of thin ZnSe will be presented. The luminescence associated with point defects on lattice sites, e.g. the nitrogen acceptor, exhibits a preferential direction of the electric field vector **E** in the plane perpendicular to the axis of growth, when the layer thickness is in the order of 1 μm. A propagation of extended defects is studied by the time dependent changes of the degree of linearly polarized luminescence. The electronic structure and the symmetry of defects are analyzed by luminescence spectroscopy in high magnetic fields.