

Optical nonreciprocity at collinear acousto-optic interaction in chiral cubic crystals

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In this paper the features of collinear acousto-optical interaction in not centrosymmetric cubic crystals with an electroinduced anisotropy had been investigated. It has been shown, that such interaction is accompanied by nonreciprocal effects, which one can be used for obtaining the regime of unidirectional and single-frequency laser oscillation. It has been established the dependence of value of amplitude nonreciprocity dI on a propagation direction both polarized light and ultrasonic waves, and also on orientation of an external electric field. The maximum value of dI will be achieved, when the wave vectors of ultrasonic and light waves are collinear to the direction $[110]$, the external electrical field is oriented along the axis $[010]$, and the ultrasonic wave is polarized collinear to $[111]$. The capability of switching of direction of generation of a circular ring laser by means of changing the direction of controlling field has been found. The results of the paper can be applied for development and optimization of parameters of electro- and polarizable controlled acousto-optical nonreciprocal element on the basis of cubic chiral crystals.