Optical anisotropy of oligothiophene-phenylene crystals

Abstract.

Conjugated organic semiconductors are very interesting as promising materials for optical and electronic devices. Spectrally narrowed emission and the high carrier mobility make these materials potentially useful for the development of optoelectronic devices and transistors. In present work we have determined the energy dispersions of the anisotropic refractive indices of the thiophene/phenylene co-oligomer (TPCO) crystals in the transparency region. Refractive indices for three crystal axes were estimated by fringes analysis in the transmission spectra of single crystal thin films for normal and oblique incidence of light. The optical constants of the TPCO crystals have large optical anisotropy and strong energy dispersion because of the molecular transition dipole moments oriented as H-aggregates. In particular, the refractive index of the axis perpendicular to crystal plane and its energy dispersion are much larger than those of the other axes. The strong energy dispersion of the refractive indices results in the large effective refractive indices of the TPCO crystals, that must be considered in the development of optical devices based on these crystals, such as organic injection lasers. The paper also describes the peculiarities of TPCO single crystals growth.

Diploma work
student 625 group
Iovlev A.V.

Scientific supervisor
PhD Golovnin I.V.