

IR-induced features of AgGaGeS₄ crystalline semiconductors

Abstract

Complex investigations of the photoconductivity and photoinduced absorption together with the piezoelectric features were performed for the AgGaGeS₄ semiconducting single crystals under the influence of 3.5 μs CO₂ (80 mJ) pulsed laser emitting at 10.6 μm. These crystals are transparent in the wide spectral range 0.417 μm, which allows operating due to their properties in the spectral range covering the excitation of the phonons and electron subsystem. The piezoelectric properties show substantial increment during illumination by microsecond CO₂ laser and irreversible relaxation after swathing off the laser excitation. The temperature dependent studies of absorption and photoconductivity confirm the main role of intrinsic defects forming the tails of electronic states below the bottom of conduction band gap. Principal role of IR-induced electronphonon interactions in the observed changes of the piezoelectricity is demonstrated.