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Exciton and phonon spectra of acoustooptic Tl_3AsS_3 crystals

Gitsu D. V., Syrbu N. N., Prunich P. I., Popesku A. A.

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Abstract

The λ-modulated exciton reflection spectra of Tl_3AsS_3 crystals are investigated at 8 and 77 K, in which the ground (n=1) and excited (n=2, 3) exciton states are revealed. Taking into account the spatial dispersion, the shapes of λ-modulated reflection spectra of the n=1 line are calculated and the basic parameters of excitons and bands are determined (the translational and reduced masses of excitons and the effective masses of electrons and light and heavy holes). The one-phonon reflection spectra are studied in the region from 50 to 500 cm−1 in polarizations E ∥ c and E ⊥ c. The shapes of one-phonon reflection spectra are calculated and the parameters of vibrational modes E and A_2 are determined.