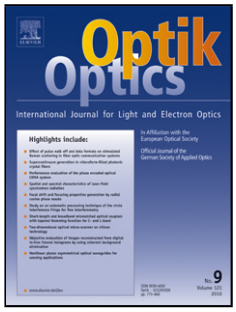

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Temperature dependence of the optical and lattice vibration properties in gallium arsenide

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Abstract

The temperature dependence of the band gaps, refractive index, high-frequency and static dielectric constants and optical phonon frequencies in GaAs has been computed by using a pseudopotential approach. Our findings for all features of interest at given temperatures yielded values that agree with those previously reported. The variation of the features being studied here versus temperature showed a monotonic behavior. The transverse optical (TO) and longitudinal optical (LO) phonon frequencies are shifted towards low frequencies when the temperature is raised from 0 to 600 K. The change in the LO-TO splittings by raising temperature reflects the change in the ionicity character of the material under investigation.

Keywords: Temperature; Optical properties; Lattice vibration; GaAs.