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Modeling the optical properties of AlSb, GaSb, and InSb

Abstract.

Optical constants of AlSb, GaSb, and InSb are modeled in the 1–6 eV spectral range. We employ an extension of Adachi's model of the optical constants of semiconductors. The model takes into account transitions at E_0, $E_0+\Delta_0$, E_1, and $E_1+\Delta_1$ critical points, as well as higher-lying transitions which are modeled with three damped harmonic oscillators. We do not consider indirect transitions contribution, since it represents a second-order perturbation and its strength should be low. Also, we do not take into account excitonic effects at E_1, $E_1+\Delta_1$ critical points, since we model the room temperature data. In spite of fewer contributions to the dielectric function compared to previous calculations involving Adachi's model, our calculations show significantly improved agreement with the experimental data. This is due to the two main distinguishing features of calculations presented here: use of adjustable line broadening instead of the conventional Lorentzian one, and employment of a global optimization routine for model parameter determination.

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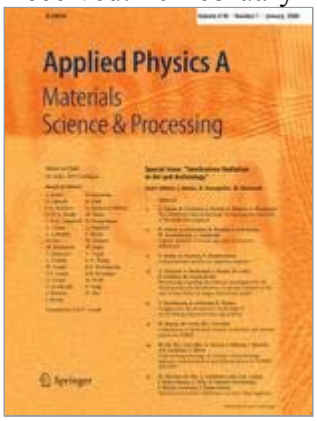

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