文献数

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Optical properties and exciton binding energy and related parameters of CdTe: Pressure-induced effects
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抄録 (Abstract)
The present paper reports on the hydrostatic pressure dependence of the direct and indirect energy band-gaps, refractive index, static and high-frequency dielectric constants, exciton banding energy and exciton Bohr radius for CdTe in the zinc-blende structure. The applied pressure is taken in the range 0–30 kbar. The calculations are performed using a pseudopotential approach. At zero pressure, our results show a good accord with experiment for most studied optical properties. Nevertheless, for exciton binding energy and Bohr radius the use of Adachi's expression [S. Adachi, Properties of Group-IV, III–V, and II–VI Semiconductors, Wiley, Chichester, 2005] has given poor results as compared to experiment. In this respect, a modified Adachi's expression formula have been proposed and found to give meaningful accord with experiment. Upon compression up to 30 kbar, the material of interest is found to remain a direct (Γ-Γ) band-gap semiconductor. All optical features being studied here have shown a monotonic behavior under compression. The present study can be useful for infrared applications. © 2018 Elsevier GmbH

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