

Temperature dependence of the electronic gaps of semiconductors

M. Cardona and R. K. Kremer

Max-Planck-Institut für Festkörperforschung
Heisenbergstrasse 1, 70569 Stuttgart, Germany

Understanding the temperature dependence of the direct and indirect gaps is indispensable for optimizing the applications of semiconductors. Experimentally, this temperature dependence can be very precisely determined by ellipsometry, by absorption or by luminescence spectroscopy. We have re-analyzed the temperature dependence of the direct and indirect gaps of some prominent tetrahedral semiconductors and improved available fits by applying a simple modified approach which uses statistical factors and the knowledge of prominent TA and TO bands in the measured or calculated phonon density of states of the semiconductors under consideration.