



# **Pressure-Induced Phase Transitions in AB<sub>2</sub>X<sub>4</sub> Chalcogenide Compounds: 189 (Springer Series in Materials Science)**

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## Pressure-Induced Phase Transitions in AB<sub>2</sub>X<sub>4</sub> Chalcogenide Compounds: 189 (Springer Series in Materials Science)

This book on pressure-induced phase transitions in AB<sub>2</sub>X<sub>4</sub> chalcogenide compounds deals with one important AmBnXp material. The interest in these materials is caused by their properties. The results are discussed for three main groups of structural families: cubic-spinel structures, defective tetragonal structures, and other structures like layered and wurtzite-type modifications. A systematic analysis of the behavior of cubic (spinel), tetragonal (defect chalcopyrites and stannites) and other crystal modifications of AB<sub>2</sub>X<sub>4</sub> compounds under hydrostatic pressure is performed. The behavior of AIIAl<sub>2</sub>S<sub>4</sub>, AIIIGa<sub>2</sub>S<sub>4</sub>, AIIAl<sub>2</sub>Se<sub>4</sub> and AIIIGa<sub>2</sub>Se<sub>4</sub> compounds with defective tetragonal structures, compounds with layered and wurtzite structures under hydrostatic pressure and the pressure dependence of the band gap, lattice parameters, interatomic distances, vibrational modes and pressure-induced phase transitions is discussed. Many of these compounds, except oxide spinels, undergo a pressure-induced phase transition towards the rocksalt-type structure. The phase transition is preceded by disorder in the cation sublattice. The dependence of the transition pressure to the rocksalt-type structure as a function of the compound ionicity and the size criterion is analyzed. At high pressures, all ordered-vacancy compounds are found to exhibit a band anticrossing between several conduction bands that leads to a strong decrease of its pressure coefficient and consequently to a strong non-linear pressure dependence of the direct bandgap energy. Theoretical studies of phase transitions in several ordered-vacancy compounds reveal that the existence of ordered vacancies alter the cation-anion bond distances and their compressibilities. The book is written for students, Ph D. students and specialists in materials science, phase transitions and new materials.

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