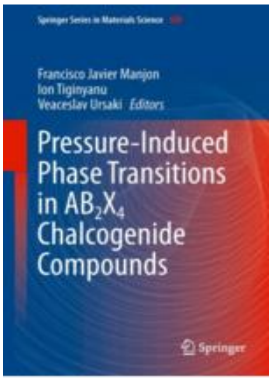

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Relation of $A^{II}B_2^{III}X_4^{VI}$ Compounds to Other Materials, Their Properties and Applications (Instead of Introduction)

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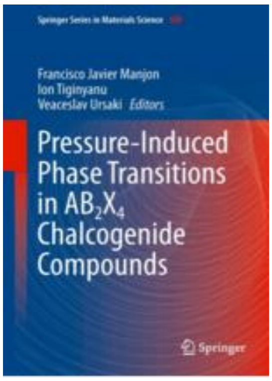
Abstract

This chapter provides a review of $A^{II}B_2^{III}X_4^{VI}$ compounds as a class of materials in a wide family of ternary compounds. The origin and the place of these materials in the hierarchy of ternary compounds are presented. The technological methods for the growth of these compounds are analyzed and the procedures for obtaining larger crystals for practical applications are evidenced. The crystal structure and the energy band structure are discussed in terms of the production of spinel, layered, or tetragonal structure according to the number of octahedral and tetrahedral cationic sites. The "ordered-vacancy compounds" are analyzed taking into account different degrees of possible disorder. The relationship of the electronic band structures of these compounds with the band structure of their parent chalcopyrite compounds $A^{I}B^{III}X_2^{VI}$ and their grand parent $A^{II}B^{VI}$ compounds is clarified. The influence of the crystallographic structure upon the energy band structure is evidenced by comparing crystal modifications with different space groups. Optical, radiative, and vibrational properties are discussed and the energy level scheme explaining the extrinsic optical properties of $A^{II}B_2^{III}X_4^{VI}$



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semiconductors is presented. It is shown that a source of interest in $A^{II}B_2^{III}X_4^{VI}$ compounds is their crystal structures derived from the diamond type, but modified to accommodate three or more atoms of different sizes, allowing additional symmetries and thus an increase in the selection of electro-optic, acousto-optic, and non-linear materials for device applications. Another source of interest related to the variety of $A^{II}B_2^{III}X_4^{VI}$ crystal structures comes from their importance for the investigation of the role of structure and composition in a response to the applied pressure.

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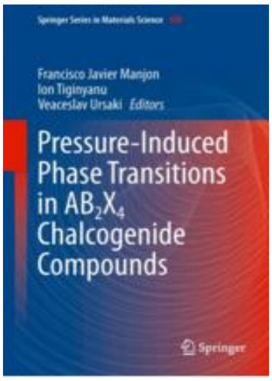

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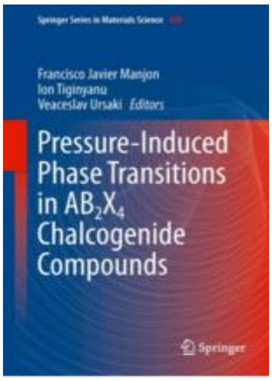

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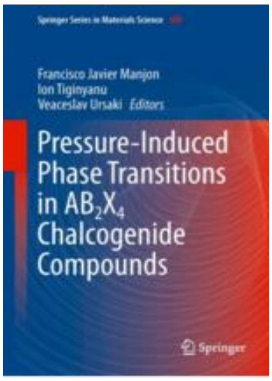

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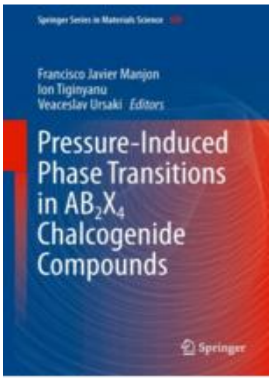

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