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New narrow-gap semiconducting solid solutions

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Abstract

Within the frames of the method based on the genesis of an electronic spectrum out of atomic p-states (p-model [1]) the band structure rearrangement in dependence on composition of cubic solid solutions $(TIB^5C^6_2)_{1-x}(2A^4B^6)_x$ $(2A^4B^6)$xhas been investigated. These compounds are shown to be narrow-gap semiconductors. The existence of a new group of solid solutions $(TlSbC^6_2)_{1-x}(2PbB^6)_x$ and $(TlBiC^6_2)_{1-x}(2SnTe)_x$ has been predicted, for which the transition through a gapless state in characteristic. The dependencies of the band gap and of effective masses on composition have been calculated.