

Abstract

Thin films of the quaternary compound semiconductor Cu₂ZnSnS₄ (CZTS) were produced by ion beam sputtering at substrate temperatures of 323 K, 423 K, and 573 K. The chemical and structural properties of the thin films were studied by electron microprobe analysis and grazing incidence x-ray diffraction. It was shown that, similarly to the corresponding crystals, the main phase in the thin films was Cu₂ZnSnS₄ with a tetragonal lattice and the space group I4⁻I4⁻. The transmittance spectra near the fundamental absorption edge were used to establish the energies and nature of optical transitions. The energies of crystal-field splitting (Δ_{cr}) and spin-orbit splitting (Δ_{so}) of the valence band of the Cu₂ZnSnS₄ quaternary compound were calculated on the basis of the Hopfield quasi-cubic model.

Keywords

Cu₂ZnSnS₄ transmittance spectra thin films