

Spectroscopic ellipsometry study of $\text{Cu}_2\text{ZnSnS}_4$ bulk poly-crystals

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Abstract. The linear optical properties of $\text{Cu}_2\text{ZnSnS}_4$ bulk poly-crystals have been investigated using spectroscopic ellipsometry in the range of 1.2–4.6 eV at room temperature. The characteristic features identified in the optical spectra are explained by using the Adachi analytical model for the interband transitions at the corresponding critical points in the Brillouin zone. The experimental data have been modeled over the entire spectral range taking into account the lowest E_0 transition near the

fundamental absorption edge and E_{1A} and E_{1B} higher energy interband transitions. In addition, the spectral dependences of the refractive index, extinction coefficient, absorption coefficient, and normal-incidence reflectivity values have been accurately determined and are provided since they are essential data for the design of $\text{Cu}_2\text{ZnSnS}_4$ based optoelectronic devices.

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