Spectroscopic ellipsometry study of $Cu_2ZnSn(S_xSe_{1-x})_4$ bulk polycrystals

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Abstract: The pseudo dielectric function of $Cu_2ZnSn(S_xSe_{1-x})_4$ [x = 0.35, 0.62, 0.81] bulk polycrystals is determined over the range 1.1–4.6 eV at room temperature from the analysis of spectroscopic ellipsometry data using the Adachi model. From the analysis, the lowest E_0 transition and high energy E_{1A} and E_{1B} transitions are clearly identified, and used to follow the evolution of the pseudo dielectric function as a function of the composition. It is shown that the fundamental E_0 and high energy E_{1A} transitions can be tuned by increasing the sulfur content over a range of 0.3 eV. These results show the potential of the kesterite compounds for the design of efficient tailored photovoltaic solar cells.

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