

Contributed Article

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Dielectric functions of $\text{CuIn}_{1+2n}\text{Se}_{2+3n}$ and $\text{CuGa}_{1+2n}\text{Se}_{2+3n}$ ($n = 2.5, 3.0, 3.5$)

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Abstract

The dielectric functions $\epsilon(\omega) = \epsilon_1(\omega) + i\epsilon_2(\omega)$ of $\text{CuIn}_{1+2n}\text{Se}_{2+3n}$ and $\text{CuGa}_{1+2n}\text{Se}_{2+3n}$ ($n = 2.5, 3.0, 3.5$) have been determined in the photon energy range from 0.8 to 4.7 eV by spectroscopic ellipsometry. The measurements reveal distinct structures at energies of the critical points in the Brillouin zone. The structure observed in the spectral dependence of the dielectric functions, the complex refractive index, the absorption coefficient and the normal-incidence reflectivity has been modelled using a modification of the Adachi's model. The results are in a good agreement with the experimental data over the entire range of photon energies. The model parameters (strength, threshold energy and broadening) have been determined using the simulated annealing algorithm. (© 2009 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim)

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