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Optical constants of Cu₂ZnGeS₄ bulk crystals

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The dielectric functions of Cu₂ZnGeS₄ bulk crystals grown by the Bridgman method were measured over the energy range 1.4 to 4.7 eV at room temperature using variable angle spectroscopic ellipsometry. The observed structures in the dielectric functions were adjusted using the Adachi's model and attributed to interband transitions E₀, E_{1A}, and E_{1B} at Γ :(000), N(A):2 π/a (0.5 0.5 0.5), and T(Z):2 π/a (0 0 0.5) points of the first Brillouin zone, respectively. The model parameters (threshold energy, strength, and broadening) have been determined using the simulated annealing algorithm. The decrease in the first gap, E₀, has been attributed to a higher Ge-S hybridization. The spectral dependence of the complex refractive index, the absorption coefficient, and the normal-incidence reflectivity were also derived.

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Article Outline

- I. INTRODUCTION
- II. EXPERIMENTAL DETAILS
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- V. CONCLUSIONS

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KEYWORDS and PACS

Keywords

absorption coefficients, Brillouin spectra, copper compounds, crystal growth from melt, dielectric function, ellipsometry, energy gap, germanium compounds, reflectivity, refractive index, semiconductor materials, simulated annealing, spectral line broadening, zinc compounds

PACS

- 81.05.Hd**
Other semiconductors
- 78.35.+c**
Brillouin and Rayleigh scattering; other light scattering
- 78.20.Ci**
Optical constants (including refractive index, complex dielectric constant, absorption, reflection and transmission coefficients, emissivity)

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References

- S. Chen, X. G. Gong, A. Walsh, and S. -H. Wei, Phys. Rev. B **79**, 165211 (2009).
- J. G. Albornoz, R. Serna, and M. Leon, J. Appl. Phys. **97**, 103515 (2005).
- S. Adachi and T. Taguchi, Phys. Rev. B **43**, 9569 (1991).
- S. Adachi, J. Appl. Phys. **68**, 1192 (1990).
- T. Kawashima, S. Adachi, H. Miyake, and K. Sugiyama, J. Appl. Phys. **84**, 5202 (1998).
- M. León, R. Serna, S. Levchenko, A. Nateprov, A. Nicorici, J. M. Merino, and E. Arushanov, J. Appl. Phys. **101**, 013524 (2007).
- C. C. Kim, J. W. Garland, H. Abad, and P. M. Raccach, Phys. Rev. B **45**, 11749 (1992).

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