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Optical constants of $\text{Cu}(\text{In}_{1-x}\text{Ga}_x)_5\text{Se}_8$ crystals

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Spectroscopic ellipsometry has been used to characterize the dielectric functions of bulk $\text{Cu}(\text{In}_{1-x}\text{Ga}_x)_5\text{Se}_8$ crystals. Spectra were measured at room temperature over the energy range 0.74–5.2 eV. The dielectric functions as well as the complex refractive index, the absorption coefficient, and the normal-incidence reflectivity have been modeled using a modification of the **Adachi** 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. The transition energies E_0 and E_{1A} are found to shift linearly to higher energies as the gallium content increases.

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Article Outline

- I. INTRODUCTION
- II. EXPERIMENTAL METHODS AND ANALYSIS METODOLOGY
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References

- J. M. Merino, J. L. Martín de Vidales, S. Mahanthy, R. Díaz, F. Rueda, and M. León, *J. Appl. Phys.* **80**, 5610 (1996).
- S. B. Zhang, S. -H. Wei, A. Zunger, and H. Katayama-Yoshida, *Phys. Rev. B* **57**, 9642 (1998).
- D. Schmid, M. Ruckh, F. Granwald, and H. W. Schock, *J. Appl. Phys.* **73**, 2902 (1993).
- L. Stolt, J. Hedstrom, J. Kessler, M. Puch, K. O. Velthaus, and H. W. Schock, *Appl. Phys. Lett.* **62**, 597 (1993).
- H. Z. Xiao, L. Yang Chung, and A. Rockett, *J. Appl. Phys.* **76**, 1503 (1994).
- A. J. Nelson, G. S. Horner, K. Sinha, and M. H. Bode, *Appl. Phys. Lett.* **64**, 3600 (1994).
- M. I. Alonso, K. Wakita, J. Pascual, M. Garriga, and N. Yamamoto, *Phys. Rev. B* **63**, 075203 (2001).
- M. I. Alonso, M. Garriga, C. A. Durante Rincon, and M. Leon, *J. Appl. Phys.* **88**, 5796 (2000).
- M. León, R. Serna, S. Levchenko, A. Nateprov, A. Nicorici, J. M. Merino, and E. Arushanov, *J. Appl. Phys.* **101**, 013524 (2007).



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M. León, R. Serna, S. Levchenko, A. Nicorici, J. M. Merino, E. J. Friedrich, and E. Arushanov, *J. Appl. Phys.* **103**, 103503 (2008).

M. León, R. Serna, S. Levchenko, G. Gurieva, J. M. Merino, E. J. Friedrich, and E. Arushanov, *J. Appl. Phys.* **104**, 093507 (2008).

J. G. Albornoz, R. Serna, and M. Leon, *J. Appl. Phys.* **97**, 103515 (2005).

S. Adachi, *Phys. Rev. B* **35**, 7454 (1987).

T. Kawashima, S. Adachi, H. Miyake, and K. Sugiyama, *J. Appl. Phys.* **84**, 5202 (1998).

T. Kawashima, H. Yoshikawa, S. Adachi, S. Fuke, and K. Ohtsuka, *J. Appl. Phys.* **82**, 3528 (1997).

A. B. Djurišić and E. H. Li, *J. Appl. Phys.* **85**, 2848 (1999).

J. E. Jaffe and A. Zunger, *Phys. Rev. B* **28**, 5822 (1983).

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