
Literaturverzeichnis

- [AG02] M. Artaud-Gillet, S. Duchemin, R. Odedra, G. Orsal, N. Rega, S. Rushworth und S. Siebentritt. *Evaluation of copper organometallic sources for CuGaSe₂ photovoltaic applications.* J. Cryst. Growth (2002).
- [AG03] J. Alvarez-García, E. Rudigier, N. Rega, B. Barcones, R. Scheer, A. Pérez-Rodríguez, A. Romano-Rodríguez und J. R. Morante. *Growth process monitoring and crystalline quality assessment of CuInS(Se)₂ based solar cells by Raman spectroscopy.* Thin Solid Films 431 - 432 (2003), S. 122 – 125.
- [Alb90] D. Albin, J. Tuttle, G. Mooney, J. Carapella, A. Duda, A. Mason und R. Noufi. *A Study on the optical and microstructural characteristics of quaternary Cu(In,Ga)Se₂ polycrystalline thin films.* IEEE (1990).
- [Alb99] V. Alberts, J. H. Schön und E. Bucher. *Material properties and growth mechanism of CuInSe₂ prepared by H₂Se treatment of metallic alloys.* J. Mat. Sci.: Mat. Elec. 10 (1999), S. 469 – 474.
- [Alb00] V. Alberts, J. Bekker, M. J. Witcomb, J. H. Schön und E. Bucher. *Control of V_{Se}–defect levels in CuInSe₂ prepared by rapid thermal processing of metallic alloys.* Thin Solid Films 361–362 (2000), S. 432 – 436.
- [Alo01] M. Alonso, K. Wakita, J. Pascual, M. Garriga und N. Yamamoto. *Optical functions and electronic structure of CuInSe₂, CuGaSe₂, CuInS₂, and CuGaS₂.* Phys. Rev. B 63 (2001), S. 75203.
- [Aru93] E. Arushanov, L. Essaleh, J. Galibert, J. Leotin und S. Askenazy. *Shubnikov-De Haas oscillations in n-CuInSe₂.* Physica B: Condensed Matter 184 (1993) (1-4), S. 229–231.
- [Atz79] H. Atzmüller, F. Fröschl und U. Schröder. *Theory of excitons bound to neutral impurities in polar semiconductors.* Phys. Rev. B 19 (1979) (6), S. 3118 – 3129.
- [Bar85] H. J. v. Bardeleben. *The chemistry of structural defects in CuInSe₂.* Sol. Cells 16 (1985) (86), S. 381–90.
- [Bau98] A. Bauknecht, U. Blieske, T. Kampschulte, J. Bruns, K. Diesner, Y. Tomm, S. Chichibu und M. C. Lux-Steiner. *Characterization of High Quality CuGaSe₂ Heteroepitaxial Layers Grown by MOVPE.* IOP Conf.Ser. 152 (1998), S. 269. PL.
- [Bau99] A. Bauknecht. *CuGaSe₂ für die Anwendung in der Photovoltaik Metallorganische Gasphasenepitaxie und optische Charakterisierung.* Dissertation, FU Berlin (1999).
- [Bau00] A. Bauknecht, S. Siebentritt, J. Albert, Y. Tomm und M. C. Lux-Steiner. *Excitonic Photoluminescence from CuGaSe₂ Single Crystals and Epitaxial Layers: Temperature dependence of the Band Gap Energy.* Jpn. J. App. Phys. 39 (2000), S. 322.
- [Bau01] A. Bauknecht, S. Siebentritt, J. Albert und M. C. Lux-Steiner. *Radiativ Recombination Via Intrinsic Defects in Cu_xGa_ySe₂.* J. Appl. Phys. 89 (2001), S. 4391.
- [Bow98] D. K. Bowen und B. L. Tanner. *High Resolution X-ray Diffractometry and Topography.* Taylot and Francis Inc., Bristol (1998).
- [Brü80] H. G. Brühl und H. Neumann. *Thermal expansion of CuGaSe₂.* Solid State Communications 34 (1980) (4), S. 225–227.
- [Brü81] H. G. Brühl und H. Neumann. *Anisotropic Thermal expansion of Cu-III-VI₂ Compounds.* phys. stat. sol. a 66 (1981), S. 597 – 600.
- [Cha98] S. Chatraphorn, K. Yoodee, P. Songpongs, C. Chityuttakan, K. Sayavong, S. Wongmanerod und P. O. Holtz. *Photoluminescence of a High Quality CuInSe₂ Single Crystal.* Jpn. J. Appl. Phys. 37 (1998) (3a), S. L269 – L271.
- [Chi97] S. Chichibu. *Room-Temperature Near-Band-Edge Photoluminescence from CuInSe₂ Heteroepitaxial Layers Grown by Metalorganic Vapour Phase Epitaxy.* Appl. Phys. Lett. 70 (1997), S. 1840–1842.
- [Cho99] I.-H. Choi und P. Yu. *Pressure Dependence of Band Gaps in the Quaternary Semiconductors Cu(In,Ga)Se₂.* phys. stat. sol. b 211 (1999) (1), S. 51 – 55.
- [Dag90] G. Dagan, F. Abou-Elfotouh, D. J. Dunlavy, R. J. Matson und D. Cahen. *Defect Level Identification in CuInSe₂ from Photoluminescence Studies.* Chem. Mater. 2 (1990), S. 286–293.
- [Dea69] P. J. Dean und J. L. Merz. *Pair Spectra and 'Edge Emission' in Zinc Selenide.* Physical Review 178 (1969) (3), S. 1310.
- [Din69] R. Dingle. *Radiative Lifetimes of Donor-Acceptor Pairs in p-Type Gallium Arsenide.* Physical Review 184 (1969) (3), S. 788.

- [Dir98] I. Dirnstorfer, M. Wagner, D. Hofmann, M. D. Lampert, F. Karg und B. Meyer. *Characterization of CuIn(Ga)Se₂ Thin Films: III. In-Rich Layers.* phys. stat. sol. a 168 (1998), S. 163 – 175.
- [Dir99] I. Dirnstorfer, D. M. Hofmann, D. Meister, B. K. Meyer, D. Braunger, W. Riedl und F. Karg. *Post-growth thermal treatment of CuIn(Ga)Se₂: Characterization of doping in In-rich thin films.* J. Appl. Phys. 85 (1999) (3), S. 1423 – 1428.
- [Dir00] I. Dirnstorfer, W. Burkhardt, W. Kriegseis, I. Österreicher, H. Alves, D. Hofmann, O. Ka, A. Polity, B. Meyer und D. Braunger. *Annealing studies on CuIn(Ga)Se₂: The influence of Gallium.* Thin Solid Films 361–362 (2000).
- [DR01] C. A. Durante Rincon, E. Hernandez, M. I. Alonso, M. Garriga, S. M. Wasim, C. Rincon und M. Leon. *Optical transitions near the band edge in bulk CuIn_xGa_{1-x}Se₂ from ellipsometric measurements.* Mat. Chem. Phys. 70 (2001) (3), S. 300–304.
- [Duf97] S. Duffy, P. F. Nolan, S. A. Rushworth, A. B. Leese und A. C. Jones. *Thermal Stability of Group 13 Metalorganic MOVPE and CBE Precursors.* Adv. Mat for Optics and Optoelectronics 7 (1997), S. 240.
- [Dun91] D. J. Dunstan, S. Young und R. H. Dixon. *Geometrical theory of critical thickness and relaxation in strained-layer growth.* J. Appl. Phys. 70 (1991) (6), S. 3038 – 3045.
- [Eag60] D. M. Eagles. *Optical Absorption and Recombination Radiation in Semiconductors due to Transitions between Hydrogen-Like Acceptor Impurity Levels and the Conduction Band.* J. Phys. Chem. Sol. 16 (1960), S. 76.
- [Fea86] M. L. Fearheiley. *The phase relations in the Cu, In, Se system and the growth of CuInSe₂ single crystals.* Sol. Cells 16 (1986), S. 91.
- [Fou93] R. Fouret, B. Hennion, J. Gonzales und S. Wasim. *Elastic stiffness constants of copper indium diselenide determined by neutron scattering.* Phys. Rev. B 47 (1993) (13), S. 8269 – 8272.
- [Gre01] M. Green, J. Zhao, A. Wang und S. Wenham. *Progress and Outlook for High Efficiency Crystalline Silicon Solar Cells.* Sol. Energy Mat. & Sol. Cells 65 (2001), S. 9.
- [Har01] Y. Harada, H. Nakanishi und S. F. Chichibu. *Structural studies of Cu – III – VI₂ chalcopyrite semiconductor heteroepitaxial films grown by low-pressure metalorganic vapor phase epitaxy.* J. Appl. Phys. 89 (2001) (10), S. 5406 – 5413.
- [Hay60] J. R. Haynes. *Experimental Proof of the Existence of a new Electronic Complex in Silicon.* Phys. Rev. Lett. 4 (1960) (7), S. 361 – 363.
- [Hop60] J. J. Hopfield. *Fine Structure in the Optical Absorption Edge of Anisotropic Crystals.* J. Phys. Chem. Solids 15 (1960), S. 97.
- [Jaf83] J. E. Jaffe und A. Zunger. *Electronic Structure of the Ternary Chalcopyrite Semiconductors CuAlS₂, CuGaS₂, CuInS₂, CuAlSe₂, CuGaSe₂, and CuInSe₂.* Phys. Rev. B 28 (1983), S. 5822.
- [Jaf01] J. E. Jaffe und A. Zunger. *Defect-induced nonpolar-to-polar transition at the surface of chalcopyrite semiconductors.* Phys. Rev. B. 64 (2001), S. 241304(R).
- [Jaf03] J. E. Jaffe und A. Zunger. *Defect-induced nonpolar-to-polar transition at the surface of CuInSe₂.* J. Phys. Chem. Solids 64 (2003), S. 1547 – 1552.
- [Joy82] D. C. Joy, D. E. Newbury und D. L. Davidson. *Electron channeling patterns in the scanning electron microscope.* J. Appl. Phys. 53 (1982) (8), S. R81 – R122.
- [Ka00] O. Ka, H. Alves, I. Dirnstorfer, T. Christmann und B. Meyer. *Investigation of post-growth Cu-diffusion in In-rich CuInSe₂ films.* Thin Solid Films 361–362 (2000), S. 263 – 267.
- [Kam98] T. Kampschulte. *MOCVD von ZnSe für Sperrkontakte in Heterosolarzellen auf der Basis von Chalcopyrit.* Dissertation, FU Berlin (1998).
- [Key02] B. M. Keyes, P. Dippo, W. Metzger, J. Abushama und R. Noufi. *Cu(In, Ga)Se₂ thin-film evolution during growth - a photoluminescence study.* In IE-EE Photovoltaic Specialist Conference, S. 511–14. New Orleans (2002).
- [Kim01] R. Kimura, T. Nakada, P. Fons, A. Yamada, S. Niki, T. Matsuzawa, K. Takahashi und A. Kunioka. *Photoluminescence properties of sodium incorporation in CuInSe₂ and CuIn₃Se₅ thin films.* Sol. Energy Mat. & Sol. Cells 67 (2001), S. 289 – 295.
- [Kis81] P. Kistaiah, Y. C. Venudhar, K. Sathyaranayana Murthy, L. Iyengar und K. V. Krishna Rao. *Temperature dependence of tetragonal distortion and thermal expansion of copper indium selenide.* J. Phys. D: Appl. Phys. 14 (1981), S. 1311 – 1316.
- [Kle99] M. Klenk, O. Schenker, U. Probst und E. Bucher. *X-ray fluorescence measurements of thin film chalcopyrite solar cells.* Sol. Energy Mat. & Sol. Cells 58 (1999), S. 299 – 319.
- [Kru99] J. Krustok, H. Collan, M. Yakushev und K. Hjelt. *The Role of Spatial Potential Fluctuations in the Shape of the PL Bands of Multinary Semiconductor Compounds.* Physica Scripta T79 (1999), S. 179 – 182.
- [Lam58] M. A. Lampert. *Mobile and Immobile Effective-Mass-Particle Complexes in nonmetallic Solids.* Phys. Rev. Lett. 1 (1958) (12), S. 450 – 453.
- [Lan86] L. D. Landau und E. M. Lifschitz. *Theory of Elasticity, Bd. 7 von Course of Theoretical Physics.* Butterworth-Heinemann, Oxford, dritte Aufl. (1986).
- [Laz03] J. Lazewski, H. Neumann, P. T. Jochym und K. Parliński. *Ab initio elasticity of chalcopyrites.* J. Appl. Phys. 93 (2003) (7), S. 3789 – 3795.
- [Lev81] A. P. Levanyuk und V. V. Osipov. *Edge luminescence of direct-gap semiconductors.* Sov. Phys. Usp. 24 (1981) (3), S. 197 – 215.

- [Li79] P. W. Li, R. A. Anderson und R. H. Plovnick. *Dielectric constant of CuInSe₂ by capacitance measurements.* J. Phys. Chem. Solids 40 (1979) (4), S. 333–334.
- [Lia02a] D. Liao und A. Rockett. *Effect of surface orientation on the growth and properties of Cu(In, Ga)Se₂.* In IEEE, S. 515 – 518 (2002).
- [Lia02b] D. Liao und A. Rockett. *Epitaxial growth of Cu(In, Ga)Se₂ on GaAs(110).* J. Appl. Phys. 91 (2002) (4), S. 1978 – 1983.
- [Lia03] D. Liao und A. Rockett. *Cu depletion at the CuInSe₂ surface.* Appl. Phys. Lett. 82 (2003) (17), S. 1 – 3.
- [LP79] Y. Le Page und E. Gabe. *Correction of single-crystal intensities for average values of multiple reflection..* Acta Crystallographica, Section A 31 (1979) (1), S. 73–78.
- [Mas84] G. Massé und E. Redjai. *Radiative recombination and shallow centers in CuInSe₂.* J. Appl. Phys. 56 (1984) (4), S. 1154–1159.
- [Mas90] G. Massé. *Concerning lattice defects and defect levels in CuInSe₂ and the I-III-VI₂ compounds.* J. Appl. Phys. 68 (1990) (5), S. 2206 – 2210.
- [Mas91] G. Massé und K. Djessas. *Study of CuGa_xIn_{1-x}Se₂ and CuGa_xIn_{1-x}Te₂ compounds.* J. Phys. Chem. Solids 52 (1991) (8), S. 999 – 1004.
- [Mas97] G. Massé, K. Guenoun, K. Djessas und F. Guastavino. *p- and n-type CuInSe₂ thin films grown by close-spaced vapour transport.* Thin Solid Films 293 (1997) (1-2), S. 45–51.
- [Mat95] H. Matsushita, T. Suzuki, S. Endo und T. Irie. *Electrical and Optical Properties of CuInSe₂ Single Crystals Prepared by Three-Temperature-Horizontal Bridgman Method.* Jpn. J. Appl. Phys. 34 (1995) (7a), S. 3774.
- [Mat96] H. Matsushita, H. Jitsukawa und T. Takizawa. *Thermal analysis of the chemical-reaction process for CuGa_{1-x}In_xSe₂ crystals.* J. Cryst. Growth 166 (1996), S. 712 – 717.
- [Mee03] A. Meeder, A. Jäger-Waldau, V. Tezlevan, E. Arushanov, T. Schedel-Niedrig und M. C. Lux-Steiner. *Temperature dependence of the exciton gap in monocrystalline CuGaSe₂.* Journal of Physics: Condensed Matter 15 (2003), S. 6219–6227.
- [Mik81] J. C. Mikkelsen. *Ternary Phase Relations of the Chalcopyrite Compound CuGaSe₂.* J. Electr. Mat. 10 (1981), S. 541.
- [Miy97] H. Miyake, T. Haginoya und K. Sugiyama. *Phase Relations in the CuGa_xIn_{1-x}Se₂ – In Pseudobinary System.* Jpn. J. Appl. Phys. 36 (1997) (2), S. 785 – 786.
- [Miy98] H. Miyake, T. Haginoya und K. Sugiyama. *THM growth and characterization of CuGa_xIn_{1-x}Se₂ solid solutions.* Sol. Energy Mat. & Sol. Cells 50 (1998) (1-4), S. 51–56.
- [Möl91] H. J. Möller. *Structure and defect chemistry of grain boundaries in CuInSe₂.* Sol. Cells 31 (1991), S. 77 – 100.
- [Moo97] R. L. Moon. *MOVPE: Is there any other technology for optoelectronics?.* J. Cryst. Growth 170 (1997), S. 1 – 10.
- [Mud98] A. Mudriy, I. Bodnar, V. Gremenok, I. Viktorov, A. I. Patuk und I. A. Shakin. *Free and bound exciton emission in CuInSe₂ and CuGaSe₂ single crystals.* Sol. Energy Mat. & Sol. Cells 53 (1998), S. 247 – 253.
- [Neu83] H. Neumann. *Vacancy Formation Enthalpies in A^IB^{III}C^VI₂ Chalcopyrite Semiconductors.* Cryst. Res. Technol. 18 (1983), S. 901.
- [Neu86] H. Neumann. *Optical properties and electronic band structure of CuInSe₂.* Sol. Cells 16 (1986), S. 317–333.
- [Nik94] S. Niki, Y. Makita, A. Yamada, A. Obara, S. Misawa, O. Igarashi, K. Aoki und N. Kutsuwada. *Sharp Optical Emission from CuInSe₂ Thin Films Grown by Molecular Beam Epitaxy.* Jpn. J. App. Phys. 33 (1994) (4A), S. L500 – L502.
- [Nik95a] S. Niki, Y. Makita, A. Yamada, O. Hellman, P. J. Fons, A. Obara, Y. Okada, R. Shioda, H. Oyanagi, T. Kurafuji, S. Chichibu und N. Nakanishi. *Heteroepitaxy and characterization of CuInSe₂ on GaAs(001).* J. Cryst. Growth 150 (1995), S. 1201 – 1205.
- [Nik95b] S. Niki, H. Shibata, P. Fons, A. Yamada, A. Obara, Y. Makita, T. Kurafuji, S. Chichibu und H. Nakanishi. *Excitonic Emission from CuInSe₂ on GaAs(001) Grown by Molecular Beam Epitaxy.* Appl. Phys. Lett. 67 (1995), S. 1289.
- [Nik96] S. Niki, P. Fons, A. Yamada, T. Kurafuji, S. Chichibu, H. Nakanishi, W. G. Bi und C. W. Tu. *High quality CuInSe₂ films grown on pseudo-lattice-matched substrates by molecular beam epitaxy.* Appl. Phys. Lett. 69 (1996) (5), S. 647 – 649.
- [Nik97] S. Niki, I. Kim, P. Fons, H. Shibata, A. Yamada, H. Oyanagi, T. Kurafuji, S. Chichibu und H. Nakanishi. *Effects of Annealing on CuInSe₂ Films Grown by Molecular Beam Epitaxy.* Sol. Energy Mat. & Sol. Cells 49 (1997), S. 319.
- [Nik99a] S. Niki, P. J. Fons, Y. Lacriox, K. Iwata, A. Yamada, H. Oyanagi, M. Uchino, Y. Suzuki, R. Suzuki, S. Ishibashi, T. Ohdaira, N. Sakai und H. Yokokawa. *Control of intrinsic defects in molecular beam epitaxy grown CuInSe₂.* J. Cryst. Growth 201/202 (1999), S. 1061 – 1064.
- [Nik99b] S. Niki, P. J. Fons, A. Yamada, Y. Lacriox, H. Shibata, H. Oyanagi, M. Nishitani, T. Negami und T. Wada. *Effects of the Surface Cu_{2-x}Se Phase on the Growth and Properties of CuInSe₂ Films.* Jpn. J. Appl. Phys. 74 (1999), S. 1630.
- [Nik01] S. Niki, R. Suzuki, S. Ishibashi, T. Ohdaira, P. Fons, A. Yamada, H. Oyanagi, T. Wada, R. Kimura und T. Nakda. *Anion vacancies in CuInSe₂.* Thin Solid Films 387 (2001), S. 129–134.

- [Nik02] S. Niki, A. Yamada, R. Hunger, P. J. Fons, K. Iwata, K. Matsubara, A. Nishio und H. Nakanishi. *Molecular beam epitaxial growth and characterization of CuInSe₂ and CuGaSe₂ for device applications.* J. Cryst. Growth 237-239 (2002), S. 1993 – 1999.
- [Pan76] J. I. Pankove. *Optical Processes in Semiconductors.* Dover Pubns, zweite Aufl. (1976).
- [Pot87] P. Potts. *A Handbook of Silicate Rock Analysis.* Blackie Academic and Professional, Glasgow (1987).
- [Qui89] M. Quintero, C. Rincón und P. Grima. *Temperature variation of energy gaps and deformation potentials in CuGa(S_zSe_{1-z})₂ semiconductor alloys.* J. Appl. Phys. 65 (1989) (7), S. 2739–2743.
- [Ram03] K. Ramanathan, M. Contreras, C. L. Perkins, S. Asher, F. S. Hasoon, J. Keane, D. Young, M. Romero, W. Metzger, R. Noufi, J. Ward und A. Duda. *Properties of 19.2% Efficiency ZnO/CdS/CuInGaSe₂ Thin-Film Sol. Cells.* Prog. in PV 11 (2003), S. 225–230.
- [Rei85] L. Reimer. *Scanning Electron Microscopy.* Springer Verlag, Berlin, Heidelberg, New York, Tokyo (1985).
- [RH73] R. E. Reed-Hill. *Physical Metallurgy Principles.* University Series in Basic Engineering. D. Van Nostrand Company, New York, second Aufl. (1973).
- [Ric86] W. Richter. *Physics of Metal Organic Vapour Deposition.* In H. P. Grosse (Hg.), *Festkörperprobleme XXVI*, S. 313. Vieweg, Braunschweig (1986).
- [Rin86] C. Rincón, C. Bellabarba, J. Gonzalez und G. Sanchez Perez. *Optical properties and characterization of CuInSe₂.* Sol. Cells 16 (1986), S. 335–349.
- [Rin87] C. Rincón und S. M. Wasim. *Defect Chemistry of A^IB^{III}C^{VI} Chalcopyrite Semiconducting Compounds.* In *7th International Conference on Ternary and Multinary Compounds*, S. 443 – 451. MRS, Pittsburgh (1987).
- [Rin96] C. Rincón, M. A. Arsene, S. M. Wasim, F. Voillot, J. P. Peyrade, P. Bocaranda und A. Albacete. *Analysis of the donor-acceptor recombination band in the photoluminescence spectra of CuInSe₂.* Mat. Lett. 29 (1996), S. 87 – 90.
- [Rin98] C. Rincón, E. Hernandez, S. M. Wasim und I. Molina. *Temperature dependence of the fundamental absorption edge in p-type CuInSe₂.* Journal of Physics and Chemistry of Solids 59 (1998) (6-7), S. 1015–1019.
- [Rin99] C. Rincón und R. Marquez. *Defect physics of the CuInSe₂ chalcopyrite semiconductor.* Journal of Physics and Chemistry of Solids 60 (1999) (11), S. 1865–1873.
- [Roc91] A. A. Rockett und R. W. Birkmire. *CuInSe₂ for photovoltaic applications.* J. Appl. Phys. 70 (1991) (7), S. R81 – R97.
- [Roc03] A. Rockett, D. Liao, J. T. Heath, J. D. Cohen, Y. M. Strzhermechny, L. J. Brillson, K. Ramanathan und W. N. Shafarman. *Near-Surface Defect Distribution in Cu(In, Ga)Se₂.* In *MRS. San Francisco* (2003).
- [Rom03] M. Romero, K. Ramanathan, M. Contreras, M. Al-Jassim, J. Abushama und R. Noufi. *Mesoscopic fluctuations in the distribution of electronic defects near the surface layer of Cu(In, Ga)Se₂.* Prog. in PV submitted (2003).
- [Ros95] E. Rossmanith und K. Bengel. *Heights and widths of Umweganregung profiles in comparison with Bragg reflection profiles.* Acta Crystallographica, Section A A51 (1995) (2), S. 134–43.
- [Rus03a] S. A. Rushworth. *mündl. Mitteilung.* Epichem Ltd. (2003).
- [Rus03b] S. A. Rushworth. *Precursor Data Booklet.* Epichem Ltd. (2003).
- [Saa96] M. Saad, H. Riazi, E. Bucher und M. C. Lux-Steiner. *CuGaSe₂ Sol. Cells with 9.7% Power Conversion Efficiency.* Appl. Phys. A 62 (1996), S. 181.
- [Sch92] T. Schmidt, K. Lischka und W. Zulehner. *Excitation-power dependence of the near-band-edge photoluminescence of semiconductors.* Phys. Rev. B 45 (1992) (16), S. 8989 – 8994.
- [Sch96a] J. H. Schön, V. Alberts und E. Bucher. *Sharp optical emissions from Cu-rich, polycrystalline CuInSe₂ thin films.* J. Appl. Phys. 81 (1996) (6), S. 2799 – 2802.
- [Sch96b] D. Schroeder, G. D. Berry und A. A. Rockett. *Gallium diffusion and diffusivity in CuInSe₂ epitaxial layers.* Appl. Phys. Lett. 69 (1996) (26), S. 4068–4070.
- [Sch99] J. Schön und E. Bucher. *Comparision of Point Defects in CuInSe₂ and CuGaSe₂ Single Crystals.* Sol. Energy Mat. & Sol. Cells 57 (1999), S. 229–237.
- [Sch03] T. Schulmeyer, R. Kniese, R. Hunger, W. Jaegermann, M. Powalla und A. Klein. *Influence of Cu(In, Ga)Se₂ band gap on the valence band offset with CdS.* Thin Solid Films (2003).
- [Sch04] S. Schuler, S. Siebentritt, S. Nishiwaki, N. Rega, J. Beckmann, S. Brehme und M. C. Lux-Steiner. *Self-compensation of intrinsic defects in the ternary semiconductor CuGaSe₂.* Phys. Rev. B (2004), S. to be published.
- [Sha67] R. R. Sharma und S. Rodriguez. *Theory of Excitons Bound to Ionized Impurities in Semiconductors.* Phys. Rev. 153 (1967) (3), S. 823 – 827.
- [Sha75] J. L. Shay und J. H. Wernick. *Ternary Chalcopyrite Semiconductors: Growth, Electronic Properties, and Applications.* Pergamon Press, Oxford (1975).
- [She96] W. Z. Shen, S. C. Shen, Y. Chang, W. G. Tang, L. S. Yip, W. W. Lam und I. Shih. *Photoluminescence studies of CuInSe₂.* Infrared Physics and Technology 37 (1996), S. 509 – 512.

- [Shi96] S. Shirakata, S. Isomura und S. Chichibu. *Photoreflectance Characterization of Lattice Strain in Wide-Gap Cu-III-VI₂ Epitaxial Layers*. Trans. MRS-J 20 (1996), S. 782 – 785.
- [Shi98a] H. Shibata. *Negative Thermal Quenching Curves in Photoluminescence of Solids*. Jpn. J. Appl. Phys. 37 (1998) (2), S. 550 – 553.
- [Shi98b] N. Shibata, A. Ohki, S. Zembutsu und A. Katsui. *Thermoelastic Strain in ZnSe Films Grown on GaAs by Metalorganic Vapor Phase Epitaxy*. Jpn. J. Appl. Phys. 27 (1998) (4), S. L487 – L489.
- [Shi98c] S. Shirakata, S. Yaudate, T. Terasako und S. Isomura. *Metalorganic Molecular Beam Epitaxy of CuInSe₂ on GaAs Substrate*. Jpn. J. App. Phys. 37 (1998) (9A/B), S. L1033 – L1035.
- [Shk84] B. I. Shklovskij und A. L. Efros. *Electronic Properties of Doped Semiconductors*. Electronic Properties of Doped Semiconductors. Springer-Verlag, Berlin (1984). Book.
- [Sie03] S. Siebentritt und S. Schuler. *Defects and transport in the wide gap chalcopyrite CuGaSe₂*. J. Phys. Chem. Solids 64 (2003) (9-10), S. 1621–1626.
- [Sta02] B. J. Stanbery, S. Kincal, S. Kim, C. H. Chang, S. P. Ahrenkiel, G. Lippold, H. Neumann, T. J. Anderson und O. D. Crisalle. *Epitaxial growth and characterization of CuInSe₂ crystallographic polytypes*. J. Appl. Phys. 91 (2002) (6), S. 3598 – 3604.
- [Tan92] H. Tanino, T. Maeda, H. Fujikake, H. Nakanishi, S. Endo und T. Irie. *Raman spectra of CuInSe₂*. Phys. Rev. B 45 (1992) (23), S. 13323–13330.
- [Tho62] D. G. Thomas und J. J. Hopfield. *Optical Properties of Bound Exciton Complexes in Cadmium Sulfide*. Phys. Rev. 128 (1962) (5), S. 2135 – 2148.
- [Tin91] T. Tinoco, M. Quintero und C. Rincón. *Variation of the energy gap with composition in A^IB^{III}C₂^V chalcopyrite-structure alloys*. Phys. Rev. B 44 (1991) (4), S. 1613 – 1615.
- [Tse95] B.-H. Tseng, S.-B. Lin, K.-C. Hsieh und H.-L. Hwang. *Stoichiometric control of CuInSe₂ thin films using a molecular beam epitaxy technique*. J. Cryst. Growth 150 (1995), S. 1206 – 1210.
- [Tse96] B.-H. Tseng, S.-B. Lin, G.-L. Gu und W. Chen. *Elimination of orientation domains and antiphase domains in the epitaxial films with chalcopyrite structure*. J. Appl. Phys. 79 (1996) (3), S. 1391 – 1396.
- [Tur02a] M. Turcu, I. Kötschau und U. Rau. *Composition dependence of defect energies and band alignments in the Cu(In_{1-x}Ga_x)Se_{1-y}S_y)₂ alloy system*. J. Appl. Phys. 91 (2002) (3), S. 1391 – 1399.
- [Tur02b] M. Turcu, K. Pakma und U. Rau. *Interdependence of absorber composition and recombination mechanism in Cu(In, Ga)(Se, S)₂ heterojunction solar cells*. Appl. Phys. Lett. 80 (2002), S. 2598–2600.
- [Veg21] L. Vegard. Zeitschrift für Physik 5 (1921), S. 17.
- [Wag98a] M. Wagner, I. Dirnstorfer, D. M. Hofmann, M. D. Lampert, F. Karg und B. K. Meyer. *Characterization of CuIn(Ga)Se₂ Thin Films: I. Cu-rich Layers*. phys. stat. sol. a 167 (1998), S. 131.
- [Wag98b] M. Wagner, D. M. Hofmann, I. Dirnstorfer, M. D. Lampert, F. Karg und B. K. Meyer. *Characterization of CuIn(Ga)Se₂ Thin Films: II. Magneto-Optical Properties od Cu- and In-Rich Layers*. phys. stat. sol. a 168 (1998), S. 153 – 161.
- [Was86] S. M. Wasim. *Transport properties of CuInSe₂*. Sol. Cells 16 (1986), S. 289–316.
- [Wei92] S.-H. Wei, L. G. Ferreira und A. Zunger. *First-principles calculation of the order-disorder transition in chalcopyrite semiconductors*. Phys. Rev. B 45 (1992) (5), S. 2533–36.
- [Wei94] S. Wei und A. Zunger. *Band offsets and optical bowing of chalcopyrites and Zn-based II-VI alloys*. J. Appl. Phys. 78 (1994) (6), S. 3846–56.
- [Wei98a] S. Wei und A. Zunger. *Calculated Natural Band Offsets of All II-IV and III-V Semiconductors: Chemical Trends and the Role of Cation D-Orbitals*. Appl. Phys. Lett. 72 (1998), S. 2011.
- [Wei98b] S.-H. Wei, S. B. Zhang und A. Zunger. *Effects of Ga addition to CuInSe₂ on its electronic, structural, and defect properties*. Appl. Phys. Lett. 72 (1998) (24), S. 3199 – 3201.
- [Wei99] S.-H. Wei, S. B. Zhang und A. Zunger. *Effects of Na on the electrical and structural properties of CuInSe₂*. J. Appl. Phys. 85 (1999), S. 7214–7218.
- [Wil87] K. L. Williams. *Introduction to X-Ray Spectrometry*. Unwin Hyman Ltd, London (1987).
- [Xia94] H. Z. Xiao, L.-C. Yang und A. A. Rockett. *Structural, optical and electrical properties of epitaxial chalcopyrite CuIn₃Se₅ films*. J. Appl. Phys. 76 (1994) (3), S. 1503 – 1510.
- [Yos00] K. Yoshino, H. Yokoyama, K. Maeda und T. Ikari. *Crystal growth and photoluminescence of CuIn_xGa_{1-x}Se₂ alloys*. J. Cryst. Growth 211 (2000), S. 476 – 479.
- [Zea01] K. Zeaiter, A. Yanuar und C. Llinarés. *Off-stoichiometry effect on the CuInSe₂ dielectric function*. Sol. Energy Mat. & Sol. Cells 70 (2001), S. 213–218.
- [Zha97] S. Zhang, S. Wei und A. Zunger. *Stabilization of Ternary Compounds via Ordered Arrays of Defect Pairs*. Phys. Rev. Lett. 78 (1997) (21), S. 4059 – 4062.
- [Zha98a] S. Zhang, S. Wei, A. Zunger und H. Katayama-Yoshida. *Defect Physics of the CuInSe₂ Chalcopyrite Semiconductor*. Phys. Rev. B 57 (1998), S. 9642.
- [Zha98b] S. B. Zhang, S. Wei und A. Zunger. *A Phenomenological Model for Systematisation and Prediction of Doping Limits in II-VI and I-III-IV Compounds*. J. Appl. Phys. 83 (1998), S. 3192–3185. CGS.
- [Zha02] S. B. Zhang und S.-H. Wei. *Reconstruction and energetics of the polar (112) and (11̄2) versus the nonpolar (220) surfaces of CuInSe₂*. Phys. Rev. B. 65 (2002), S. 81402(R).

- [Zot96a] S. Zott, K. Leo, M. Ruckh und H.-W. Schock.
Determination of minority carrier lifetimes in CuInSe₂ thin films. Appl. Phys. Lett. 69 (1996) (22), S. 3375 – 3377.
- [Zot96b] S. Zott, K. Leo, M. Ruckh und H.-W. Schock.
Photoluminescence of polycrystalline CuInSe₂ thin films. Appl. Phys. Lett. 68 (1996) (8), S. 1144 – 1146.
- [Zot97a] S. Zott. *Optische Charakterisierung von CuInSe₂-Dünnschichten mittels stationärer und zeitaufgelöster Photolumineszenz.* Dissertation, Technische Universität Dresden (1997).
- [Zot97b] S. Zott, K. Leo, M. Ruckh und H.-W. Schock. *Radiative recombination in CuInSe₂ thin films.* J. Appl. Phys. 82 (1997) (1), S. 356 – 362.