Bibliography

[1] E. Becquerel. Mémoire sur les effets électriques produits sous l'influence des rayons solaires. *Comptes Rendus de l'Academie de Science*, 9:561, 1839.

[2] D. M. Chapin, C. S. Fuller, and G. L. Pearson. A new silicon p-n junction photocell for converting solar radiation into electrical power. *Journal of Applied Physics*, 25:645, 1954.

[3] M.A. Green, K. Emery, D.L. King, S. Igari, and W. Warta. Solar cell efficiency tables (version 19). *Prog. Photovolt., Res. Appl*, 10(1):55–61, 2002.

[4] B. Rech and H. Wagner. Potential of amorphous silicon for solar cells. *Appl. Phys. A*, A69(2):155–167, 1999.

[5] W. Hoffmann. Pv solar electricity: One among the new millennium industries. *Proceedings of the 17th EPVSEC, Munich,*, 395:851, 2001.

[6] A. Kreutzmann. *Photon*, 2:55, 2002.

[7] D.L. Staebler and C.R. Wronski. Reversible conductivity charge in discharge-produced amorphous si. *Appl. Phys. Lett.*, 31(4):292, 1977.

[8] S. Vepřek and V. Mareček. The preparation of thin layers of ge and si by chemical hydrogen plasma transport. *Solid-State Electronics*, 11:683, 1968.

[9] S. Usui and M. Kikuchi. Properties of heavily doped gd-si with low resistivity. *J. Non-Cryst. Solids*, 34(1):1–11, 1979.

[10] L. Houben, M. Luysberg, P. Hapke, R. Carius, F. Finger, and H. Wagner. Structural properties of microcrystalline silicon in the transition from highly crystalline to amorphous growth. *Phil. Mag. A*, 77:1447, 1998.

[11] M. Tzolov, F. Finger, R. Carius, and P. Hapke. Optical and transport studies on thin microcrystalline silicon films prepared by very high frequency glow discharge for solar cell applications. *J. Appl. Phys.*, 81:7376, 1997.

[12] O. Vetterl. *On the Physics of Microcrystalline Silicon Thin Film Solar Cells*. PhD thesis, Heinrich-Heine Universität Düsseldorf, 2001.

[13] S. Klein. *Microcrystalline Silicon Prepared by Hot Wire CVD: Preparation and Characterisation of Material and Solar Cells*. PhD thesis, Technische Universität München, 2003.

[14] M . M. Goerlitzer, N. Beck, P. Torres, U. Kroll, H. Keppner, J. Meier, J. Koehler, N. Wyrsch, and A. Shah. Electronic transport and structure of microcrystalline silicon deposited by the vhf-gd technique. *Mater. Res. Soc. Proc.*, 467:301, 1997.

[15] N. Wyrsch, C. Droz, L. Feitknecht, M. Goerlitzer, U. Kroll, J. Meier, P. Torres, E. Vallat-Sauvain, A. Shah, and M. Vanecek. Hydrogenated microcrystalline silicon: from material to solar cells. *Mater. Res. Soc. Proc.*, 609:A15.1.1, 2000.

[16] O. Vetterl, A. Gross, T. Jana, S. Ray, A. Lambertz, and F. Carius, R. Finger. Changes in electric and optical properties of intrinsic microcrystalline silicon upon variation of the structural composition. *Journal of Non-Crystalline Solids*, 299-302:772, 2002.

[17] A.L. Baia Neto, A. Lambertz, R. Carius, and F. Finger. Spin density and conductivity in thin silicon films upon transition from microcrystalline to amorphous growth. *Phys. Stat. Sol. A*, 186(1):R4, 2001.

[18] A.L. Baia Neto, A. Lambertz, R. Carius, and F. Finger. Relationships between structure, spin density and electronic transport in 'solar-grade' microcrystalline silicon films. *J. Non-Cryst. Solids*, 299-302(A):274, 2002.

[19] J. Meier, R. Flückiger, H. Keppner, and A. Shah. Complete microcrystalline p-i-n solar cell-crystalline or amorphous cell behavior? *Appl. Phys. Lett.*, 65(7):860, 1994.

[20] S. Veprek, Z. Iqbal, R.O. Kuhne, P. Capezzuto, F.-A. Sarott, and J.K. Gimzewski. Properties of microcrystalline silicon. iv. electrical conductivity, electron spin resonance and the effect of gas adsorption. *Journal of Physics C*, 16(32):6241, 1983.

[21] D. Will, C. Lerner, W. Fuhs, and K. Lips. Transport and recombination channels in undoped microcrystalline silicon studied by esr and edmr. *Mater. Res. Soc. Proc.*, 467:361, 1997.

[22] A. Mück, U. Zastrow, O. Vetterl, and B. Rech. *SIMS Depth Profile Analysis of Oxygen Contermination in Hydrogenated Amorphous and Microcrystalline Silicon*, page 689. Elsevier Science B.V., Amsterdam, 2000.

[23] R. Brüggemann, A. Hierzenberger, H.N. Wanka, and M.B. Schubert. Electronic properties of hot-wire deposited nanocrystalline silicon. *Mater. Res. Soc.*, 507:921, 1998.

[24] M. Stutzmann and D. Biegelsen. The microscopic structure of defects in a-si:h and related materials. In *Amoprhous Silicon and Related Materials*, pages 557–594. World Scientific, Singapore, 1988.

[25] M. Stutzmann. On the structure of dangling bond defects in silicon. *Z. Phys. Chem. Neue Folge*, 151(1-2):211, 1987.

[26] S. Yamasaki, Jung-Kyu Lee, T. Umeda, J. Isoya, and K. Tanaka. Spatial distribution of phosphorus atoms surrounding spin centers of p-doped hydrogenated amorphous silicon elucidated by pulsed esr. *J. Non-Cryst. Solids*, 198-200(1):330–333, 1996.

[27] S. Hasegawa, S. Narikawa, and Y. Kurata. Esr and electrical properties of p-doped microcrystalline si. *Philos. Mag. B*, 48(5):431–447, 1983.

[28] S. Hasegawa, S. Narikawa, and Y. Kurata. Dependences of esr and electrical properties on p doping ratio for microcrystalline si. *Physica B & C*, 117-118B+C(2):914–916, 1983.

[29] F. Finger, C. Malten, P. Hapke, R. Carius, R. Fluckiger, and H. Wagner. Free electrons and defects in microcrystalline silicon studied by electron spin resonance. *Philos. Mag. Lett*, 70(4):247–254, 1994.

[30] J. Müller. *Electron Spin Resonance Studies on Microcrystalline Semiconductors*. Berichte des Forschungszentrum Jülichs 3615, ISSN 0944-2952, 1998.

[31] M. Kondo, S. Yamasaki, and A. Matsuda. Microscopic structure of defects in microcrystalline silicon. *J. Non-Cryst. Solid*, 266-269:544, 2000.

[32] K. Lips, P. Kanschat, and W. Fuhs. Defects and recombination in microcrystalline silicon. *Solar Energy Materials and Solar Cells*, 78:513, 2003.

[33] F. Finger, J. Müller, C. Malten, and H. Wagner. Electronic states in hydrogenated microcrystalline silicon. *Philos. Mag. B*, 77:805, 1998.

[34] P. Kanschat, K. Lips, R. Brüggemann, A. Hierzenberger, I. Sieber, and W. Fuhs. Paramagnetic defects in undoped microcrystalline silicon deposited by the hot-wire technique. *Mater. Res. Soc.*, 507:793, 1998.

[35] J. Müller, F. Finger, R. Carius, and H. Wagner. Electron spin resonance investigation of electronic states in hydrogenated microcrystalline silicon. *Phys. Rev. B*, 60:11666, 1999.

[36] P. Kanschat, H. Mell, K. Lips, and W. Fuhs. Defect and tail states in microcrystalline silicon investigated by pulsed esr. *Mater. Res. Soc. Proc.*, 609:A27.3, 2000.

[37] M. Kondo, T. Ohe, K. Saito, T. Nishimiya, and A. Matsuda. Morphological study of kinetic roughening on amorphous and microcrystalline silicon surface. *J. Non-Cryst. Solids*, 227-230(B):890–895, 1998.

[38] P. Kanschat, K. Lips, and W. Fuhs. Identification of non-radiative recombination paths in microcrystalline silicon (μc-si:h). *J. Non-Cryst. Solids*, 266-269:524–528, 2000.

[39] F. Finger, J. Müller, C. Malten, R. Carius, and H. Wagner. Electronic properties of microcrystalline silicon investigated by electron spin resonance and transport measurements. *Journal of Non-Crystalline Solids*, 226-269:511, 2000.

[40] P. Kanschat. *ESR und spinabhängige Rekombination in mikrokristallinem Silizium*. PhD thesis, Philipps-Universität Marburg, 2000.

[41] J.W. Seto. The electrical properties of polycrystalline silicon films. *Journal of Applied Physics*, 46:5247, 1975.

[42] T. Weis, R. Lipperheide, U. Wille, and S. Brehme. Barrier-controlled carrier transport in microcrystalline semiconducting materials: Description within a unified model. *J. Appl. Phys.*, 92(3):1411, 2002.

[43] S. Brehme, P. Kanschat, T. Weis, K. Lips, and W. Fuhs. Barrier-controlled transport in highly doped microcrystalline silicon: role of interface states. *Diffus. Defect Data B, Solid State Phenom.*, 80-81:225, 2001.

[44] R. Carius, F. Finger, U. Backhausen, M. Luysberg, P. Hapke, L. Houben, M. Otte, and H. Overhof. Electronic properties of microcrystalline silicon. *Mater. Res. Soc. Proc.*, 467:283, 1997.

[45] H. Overhof and M. Otto. Theoretical investigations of models for the electronic transport in microcrystalline silicon films. In J.M. Marshall, N. Kirov, A. Vavrek, and J.M. Maud, editors, *Thin Film Materials and Devices - Developments in Science and Technology*, page 23. World Scientific, Singapore, 1997.

[46] R. Carius, J. Müller, F. Finger, N. Harder, and P. Hapke. Photo- and dark conductivity of μc-si:h thin films. In J.M. Marshall, N. Kirov, A. Vavrek, and J.M. Maud, editors, *Thin Film Materials and Devices - Developments in Science and Technology*, page 157. World Scientific, Singapore, 1999.

[47] W. Fuhs, P. Kanschat, and K. Lips. Bandtails and defects in microcrystalline silicon (μc-si:h). *Journal of Vacuum Science & Technology B*, 18(3):1792–1795, 2000.

[48] N. Harder. Elektrischer transport in dotierten und undotierten mikrokristallinen siliziumschichten. Master's thesis, Universität Leipzig, 1998.

[49] M. Serin, N. Harder, and R. Carius. Investigation of the transport properties of microcrystalline silicon by time-of-flight (tof). *Journal of Material Science: Material in Electronics*, 14(10-12):733, 2003.

[50] M. Luysberg, P. Hapke, R. Carius, and F. Finger. Structure and growth of hydrogenated microcrystalline silicon: investigation by transmission electron microscopy and raman spectroscopy of films grown at different plasma excitation frequencies. *Phil. Mag. A*, 75:31, 1997.

[51] F. Finger, R. Carius, P. Hapke, L. Houben, M. Luysberg, and M. Tzolov. Growth and structure of microcrystalline silicon prepared with glow discharge at various plasma excitation frequencies. *Mat. Res. Soc. Symp. Proc.*, 452:725, 1997.

[52] L. Houben. *Plasmaabscheidung von mikrocrystallinem Silizium: Merkmale der Mikrostruktur und deren Deutung im Sinne von Wachstumsvorgängen*. PhD thesis, Heinrich-Heine-Universität Düsseldorf, 1998.

[53] T. Roschek. *Microcrystalline Silicon Solar Cells prepared by 13.56 MHz PECVD*. PhD thesis, Heinrich-Heine-Universität Düsseldorf, 2003.

[54] R.W. Collins and B.Y. Yang. In situ ellipsometry of thin-film deposition: Implications for amorphous and microcrystalline si growth. *J. Vac. Sci. Technol. B*, 7(5):1155, 1989.

[55] C.C. Tsai, G.B. Anderson, and R. Thompson. Low temperature growth of epitaxial and amorphous silicon in a hydrogen-diluted silane plasma. *J. Non-Cryst. Solids*, 137-138(2):673, 1991.

[56] E. Vallat-Sauvain, U. Kroll, J. Meier, N. Wyrsch, and A. Shah. Microstructure and surface roughness of microcrystalline silicon prepared by very high frequency-glow discharge using hydrogen dilution. *Journal of Non-Crystalline Solids*, 266-269:125, 2000.

[57] I. Sieber, N. Wanderka, Kaiser, I., and Fuhs. Electron microscopic characterization of microcrystalline silicon thin films deposited by ecr-cvd. *Thin Solid Films*, 403-404:543, 2002.

[58] L. Houben, M. Luysberg, and R. Carius. Microtwinning in microcrystalline silicon and its effects on grain size measurements. *Physical Review B*, 67:045312, 2003.

[59] W. Beyer and A. Ghazala. Absorption strengths of si-h vibrational modes in hydrogenated silicon. *Mat. Res. Soc. Symp. Proc.*, 507:601, 1998.

[60] W. Beyer. private communication, 2002.

[61] P.M. Voyles, M.M.J. Treacy, H.C. Jin, J.R. Abelson, J.M. Gibson, J. Yang, S. Guha, and R.S. Crandall. Comparative fluctuation microscopy study of medium-range order in hydrogenated amorphous silicon deposited by various methods. *Mater. Res. Soc. Proc.*, 664:A2.4.1, 2001.

[62] C. Longeaud, J.P. Kleider, P. Roca i Cabarrocas, S. Hamma, R. Meaudre, and M. Meaudre. Properties of a new a-si:h-like material: hydrogenated polymorphous silicon. *Journal of Non-Crystalline Solids*, 227-230(A):96, 1998.

[63] R. Koval, Xinwei Niu, J. Pearce, Lihong Jiao, G. Ganguly, J. Yang, S. Guha, R.W. Collins, and C.R. Wronski. Kinetics of light induced changes in protocrystalline thin film materials and solar cells. *Mater. Res. Soc. Proc.*, 609:A15.5.1, 2001.

[64] H. Stiebig. *Entwicklung und Beschreibung von optoelektronischen Bauelementen auf der Basis von amorphen Silizium*. Berichte des Forschungszentrum Jülichs 3464, ISSN 0944-2952, 1997.

[65] R.A. Street. *Hydrogenated Amorphous Silicon*. Cambridge University Press, Cambridge, 1991.

[66] P.W. Anderson. Absence of diffusion in certain random lattices. *Phys. Rev.*, 109:1492, 1958.

[67] N.F. Mott. Electrons in disordered structures. *Adv. Phys.*, 16(61):49, 1967.

[68] N.F. Mott and E.A. Davis. *Electronic Processes in Non-crystalline Materials*. Oxford University Press, Oxford, 2nd edition, 1979.

[69] J. Werner and M. Peisl. Exponential band tails in polycrystalline semiconductor films. *Phys. Rev. B*, 31(10):6881, 1985.

[70] J. Werner and M. Peisl. Exponential band tails at silicon grain boundaries. *Mater. Res. Soc*, 46:575, 1985.

[71] J. Werner. *Band tailing in polycrystalline and disordered silicon*, volume 35 of *Procceedings of Physics*, pages 345–351. Springer, Berlin, 1989.

[72] K. Lips, P. Kanschat, S. Brehme, and W. Fuhs. Band tail states and free electrons in phosphorus doped microcrystalline silicon studied by esr. *Thin Solid Films*, 403-404:47, 2002.

[73] S. Reynolds, V. Smirnov, C. Main, R. Carius, and F. Finger. Localised states in microcrystalline silicon photovoltaic structures studied by post-transit time-of-flight spectroscopy. *Mater. Res. Soc. Proc.*, 762:327, 2003.

[74] R. Carius, T. Merdzhanova, and F. Finger. Electronic properties of microcrystalline silicon investigated by photoluminescence spectroscopy on films and devices. *Mater. Res. Soc. Proc.*, 762:321, 2003.

[75] T.R. Merdzhanova. *Microcrystalline Silicon Films and Solar Cells Investigated vy Photoluminescence Spectroscopy*. PhD thesis, Bulgarian Academy of Science, Sofia, 2004.

[76] T. Tiedje. Information about band tail states from time-of-flight experiments. *Semiconductors and Semimetals*, 21(Part C):207, 1984.

[77] T. Dylla, E.A. Schiff, and F. Finger. Hole drift-mobility measurements and multiple-trapping in microcrystalline silicon. *Mater. Res. Soc. Proc.*, 2004 in press.

[78] B.I. Halperin and M. Lax. Impurity-band tails in the high-density limit. i. minimum counting methods. *Phys. Rev.*, 148:722, 1966.

[79] C.M. Soukoulis, M.H. Cohen, and E.N. Economou. Exponential band tails in random systems. *Phys. Rev. Lett.*, 53:616, 1984.

[80] C.M. Soukoulis, M.H. Cohen, E.N. Economou, and A.D. Zdetsis. Electronic structure at band edges. *Journal of Non-Crystalline Solids*, 77-78:47, 1985.

[81] E.N. Economou and N. Bacalis. Exponential tails in the density of states. *Journal of Non-Crystalline Solids*, 97-98:101, 1987.

[82] E.N. Economou, C.M. Soukoulis, M.H. Cohen, and S. John. page 681. Plenum Press, New York, 1987.

[83] R.A. Street and N.F. Mott. States in the gap in glassy semiconductors. *Phys. Rev. Lett.*, 35(19):1293, 1975.

[84] M.M. de Lima, P.C. Taylor, S. Morrison, A. LeGeune, and F.C. Marques. Esr observations of paramagnetic centers in intrinsic hydrogenated microcrystalline silicon. *Phys. Rev, B*, 65(23):235324/1, 2002.

[85] M. Stutzmann, M.S. Brandt, and M.W. Bayerl. Spin-dependent processes in amorphous and microcrystalline silicon: a survey. *J. Non-Cryst. Solids*, 266-269:1, 2000.

[86] M. Stutzmann. Weak bond-dangling bond conversion in amorphous silicon. *Philos. Mag. B*, 56(1):63, 1987.

[87] S. Klein, F. Finger, R. Carius, T. Dylla, B. Rech, M. Grimm, L. Houben, and M. Stutzmann. Intrinsic microcrystalline silicon prepared by hot-wire chemical vapour deposition for thin film solar cells. *Thin Solid Films*, 430(1-2):202, 2003.

[88] M. Kondo, T. Nishimiya, K. Saito, and A. Matsuda. Light induced phenomena in microcrystalline silicon. *J. Non-Cryst. Solids*, 227-230(B):1031, 1998.

[89] R.A. Street and D.K. Biegelsen. Distribution of recombination lifetimes in amorphous silicon. *Solid State Communications*, 44(4):501, 1982.

[90] W.B. Jackson and N.M. Amer. Direct measurement of gap-state absorption in hydrogenated amorphous silicon by photothermal deflection spectroscopy. *Physical Review B*, 25(8):5559, 1982.

[91] S.M. Sze. *Physics of Semiconductor Devices*. John Wiley & Sons, New York, 2nd edition, 1981.

[92] G. Baccarani, B. Riccó, and G. Spadini. Transport properties of polycrystalline silicon films. *Journal of Applied Physics*, 49(11):5565, 1978.

[93] J.W. Orton and M.J. Powell. The hall effect in polycrystalline and powdered semiconductors. *Rep. Prog. Phys.*, 43(11):1263, 1980.

[94] W.E. Spear, A.C. Hourd, and D.L. Melville. Electronic properties of amorphous and microcrystalline silicon prepared in a microwave plasma from sif_4. *Phil. Mag. B*, 64(5):533, 1991.

[95] G. Willeke. *Physics and Electronic Properties of Microcrystalline Semiconductors*. Artech House, London, 1992.

[96] D. Ruff. *Elektrischer Transport in mikrokristallinem Silizium*. PhD thesis, Philipps-Universität Marburg, 1999.

[97] T. Tiedje. *Physics of hydrogenated amorphous silicon II. Electronic and vibrational properties*, chapter Time-resolved charged transport in hydrogenated amorphous silicon, pages 261–300. Springer-Verlag, 1984.

[98] F.W. Schmidlin. Theory of trap-controlled transient photoconduction. *Phys. Rev. B*, 16(6):2362, 1977.

[99] H. Scher and E.W. Montroll. Anomalous transit-time dispersion in amorphous solids. *Physical Review B*, 12(6):2455, 1975.

[100] J.M. Marshall. A trap-limited model for dispersive transport in semiconductors. *Philos. Mag.*, 36(4):959, 1977.

[101] M. Silver and L. Cohen. Monte carlo simulation of anomalous transit-time dispersion of amorphous solids. *Phys. Rev. B*, 15(6):3276, 1977.

[102] J. Noolandi. Multiple-trapping model of anomalous transit-time dispersion in alpha-se. *Phys. Rev. B*, 16(10):4466, 1977.

[103] J. Noolandi. Equivalence of multiple-trapping model and time-dependent random walk. *Phys. Rev. B*, 16(10):4474, 1977.

[104] C.H. Henry and D.V. Lang. Nonradiative capture and recombination by multiphonon emission in gaas and gap. *Phys. Rev. B*, 15(2):989, 1977.

[105] D.A. Long. *Raman Spectroscopy*. McGraw-Hill Interantional Book Company, 1977.

[106] M. Cardona. *Light Scattering in Solids*. Springer, Berlin, 1982.

[107] H. Richter. *Elektronen und Phononen in mikrokristallinem Silizium*. PhD thesis, Universität Stuttgart, 1983.

[108] P. Hapke. *VHF-Plasmaabscheidung von mikrokristalinem Silizium (μc-Si): Einfluss der Plasmaanregungsfrequenz auf die strukturellen und elektrischen Eigenschaften*. PhD thesis, Rheinisch-Westfälische Technische Hochschule Aachen, 1995.

[109] L. Houben. *Strukturelle Eigenschaften von mikrokristallinen Silizium im Übergangsbereich zwischen mikrokristallinem und amorphem Wachstum*. Diploma thesis, Heinrich-Heine-Universität Düsseldorf, 1995.

[110] H. Richter, Z.P. Wang, and L. Ley. The one phonon raman spectrum in microcrystalline silicon. *Solid State Communications*, 39:625, 1981.

[111] R. Kobliska and S. Solin. Raman spectrum of wurzit silicon. *Physical Review B*, 8(8):3799, 1973.

[112] R. Tsu, J. Gonzalez-Hernandez, S. Chao, S. Lee, and K. Tanaka. Critical volume fraction of crystallinity for conductivity percolation in phosphorus-doped si:f:h alloys. *Applied Physics Letters*, 40(534), 1982.

[113] S. Vepřek, F. Sarrot, and Z. Iqbal. Effect of grain boundaries on the raman spectra, opical absorption and the elastic scattering in nanometersized crystalline silicon. *Physical Review B*, 36(6):3344, 1987.

[114] C. Ossadnik, S. Veprek, and I. Gregora. Applicability of raman scattering for the characterization of nanocrystalline silicon. *Thin Solid Films*, 337:148, 1999.

[115] L. Houben. Morphological and crystallographic defect properties of microcrystalline silicon: a comparison between different growth modes. *Journal of Non-Crystalline Solids*, 227-230:896, 1998.

[116] R. Carius and S. Klein. unpublished results.

[117] E. Zavoisky. Spin-magnetic resonance in paramagnetics. *J. Phys. USSR*, 9:211, 1945.

[118] P.W. Atherton. *Principles of electron spin resonance*. Ellis Horword, PTR Prentice Hall, Chichester, 1993.

[119] C.P. Poole. *Electron Spin Resonance*. Wiley-Intersience, New York, 1982.

[120] J. Malten. *Pulsed Electron Spin Resonance of Amorphous and Microcrystalline Semiconductors*. Berichte des Forschungszentrum Jülichs 3273, ISSN 0944-2952, 1996.

[121] J.R. Haynes and W. Shockley. The mobility and life of injected holes and electrons in germanium. *Physical Review*, 81(5):835, 1951.

[122] R. Lawrance and A.F. Gibson. The measurement of drift mobility in semiconductors. *Proc. Phys. Soc*, 65B:994, 1952.

[123] W.E. Spear. Transit time measurements of charge carriers in amorphous selenium films. *Proc. Phys. Soc.*, 77:1157, 1957.

[124] W.E. Spear. The hole mobility in selenium. *Proc. Phys. Soc.*, 76:826, 1960.

[125] W.E. Spear. Drift mobility techniques for the study of electrical transport properties in insulating solids. *Journal of Non-crystalline Solids*, 1(3):197, 1969.

[126] W.E. Spear and H.L. Steemers. The interpretation of drift mobility experiments on amorphous silicon. *Philosophical Magazine B*, 47(5):L77, 1983.

[127] M.A. Lampert and P. Mark. *Current Injection in Solids*. Academic Press, New York, 1970.

[128] T. Tiedje, T.D. Moustakas, and J.M. Cebulka. Temperature dependence of the electron drift mobility in hydrogenated a-si prepared by sputtering. *Journal de Physique Colloque*, 42(C-4):155, 1981.

[129] T. Tiedje, C.R. Wronski, B. Abeles, and J.M. Cebulka. Electron transport in hydrogenated amorphous silicon: drift mobility and junction capacitance. *Solar Cells*, 2(3):301, 1980.

[130] W.E. Spear and H.L. Steemers. The reversal of drifting excess carriers in an amorphous silicon junction. *Philosophical Magazine B*, 47(6):L107, 1983.

[131] Q. Wang, H. Antoniadis, E.A. Schiff, and S. Guha. Electron drift mobility measurements and conduction bandtails in hydrogenated amorphous silicon-germanium alloys. *Physical Review B*, 47(15):9435, 1993.

[132] M.E. Scharfe. Transient photoconductivity in vitreous as_2se_3. *Physical Review B*, 2(12):5025, 1970.

[133] D.M. Pai and M.E. Scharfe. Charge transport in films of amorphous arsenic triselenide. (dc dark current and transient photoconductivity studies). *Journal of Non-Crystalline Solids*, 8-10:752, 1972.

[134] J.M. Marshall, R.A. Street, and M.J. Thompson. Electron drift mobility in amorphous si:h. *Philos. Mag. B*, 54(1):51, 1986.

[135] C.E. Nebel, H.C. Weller, and G.H Bauer. Extended state mobility and tail state distribution of a-si$_{1-x}$ge$_x$:h alloys. *Mater. Res. Soc. Proc.*, 118:507, 1988.

[136] C.E. Nebel. *Ladungsträgertransport und Rekombination in a-SiGe:H*. PhD thesis, Universität Stuttgart, 1990.

[137] N. Kopidakis, E.A. Schiff, N.-G. Park, J. Van De Lagemaat, and A.J. Frank. Ambipolar diffusion of photocarriers in electrolyte-filled, nanoporous tio$_2$. *J. Phys. Chem. B*, 104(16):3930, 2000.

[138] P.N. Rao, E.A. Schiff, L. Tsybeskov, and P. Fauchet. Photocarrier drift-mobility measurements and electron localization in nanoporous silicon. *Chemical Physics*, 284(1-2):129, 2002.

[139] D. Han, D.C. Melcher, E.A. Schiff, and M. Silver. Optical-bias effects in electron-drift measurements and defect relaxation in a-si:h. *Physical Review B*, 48(12):8658, 1993.

[140] Q. Gu, Q. Wang, E.A. Schiff, Y.M. Li, and C.T. Malone. Hole drift mobility measurements in amorphous silicon carbon alloys. *J. Appl. Phys.*, 76(4):2310, 1994.

[141] P. Rao, E.A. Schiff, L. Tsybeskov, and P.M. Fauchet. Electron time-of-flight measurements in porous silicon. *Mater. Res. Soc. Proc.*, 452:613, 1997.

[142] S. Dinca, G. Ganguly, Z. Lu, E.A. Schiff, V. V. Vlahos, C.R. Wronski, and Q. Yuan. Hole drift-mobility measurements in contemporary amorphous silicon. *Mater. Res. Soc. Proc.*, 762:345, 2003.

[143] N. Wyrsch, M. Goerlitzer, N. Beck, J. Meier, and A. Shah. Transport properties of compensated μc-si:h. *Mater. Res. Soc. Proc.*, 420:801, 1996.

[144] A. Fejfar, N. Beck, H. Stuchlikova, N. Wyrsch, P. Torres, J. Meier, A. Shah, and J. Kocka. On the transport properties of microcrystalline silicon. *Journal of Non-Crystalline Solids*, 227-230:1006, 1998.

[145] B. Chapman. *Glow Discharge Processes*. John Wiley & Sons, 1980.

[146] R.A. Haefer. *Oberflächen- und Dünnschicht-Technologie Teil I, Beschichtungen von Oberflächen*. Springer Verlag, Berlin, 1987.

[147] H. Frey and G. Kienel. *Dünnschichttechnologie*. VDI-Verlag, 1987.

[148] W. Luft and Y.S. Tsuo. *Hydrogenated Amorphous Silicon Alloy Depostion*. Marcel Dekker Inc., New York, Basel, Hong Kong, 1993.

[149] J. Perrin, O. Leroy, and M.C. Bordage. Cross-section, rate constants and transport coefficients in silane plasma. *Contributions to Plasma Physics*, 36:3, 1996.

[150] A. Matsuda. Formation kinetics and control of microcrystallite in μc-si:h from glw discharge plasma. *Journal of non-crystalline Solids*, 59-60:767, 1983.

[151] H. Matsumura. Catalytic chemical vapor deposition (ctl-cvd) method producing high quality hydrogenated amorphous silicon. *Jpn. J. Appl. Phys. 2, Lett.*, 25(12):L949, 1986.

[152] R.E.I. Schropp, K.F. Feenstra, E.C. Molenbroek, H. Meiling, and J.K. Rath. Device-quality polycrystalline and amorphous silicon films by hot-wire chemical vapour deposition. *Philos. Mag. B*, 76(3):309, 1997.

[153] A.H. Mahan, J. Carapella, B.P. Nelson, R.S. Crandall, and I. Balberg. Deposition of device quality, low h content amorphous silicon. *J. Appl. Phys.*, 69(9):6728, 1991.

[154] J. Cifre, J. Bertomeu, J. Puigdollers, M.C. Polo, J. Andreu, and A. Lloret. Polycrystalline silicon films obtained by hot-wire chemical vapour deposition. *Appl. Phys. A*, A59(6):645, 1994.

[155] R.E.I. Schropp, Y. Xu, E. Iwaniczko, G.A. Zaharias, and A.H. Mahan. Microcrystalline silicon for solar cells at high deposition rates by hot wire cvd. *Mater. Res. Soc. Proc.*, 715:623, 2002.

[156] A. Ledermann, U. Weber, C. Mukherjee, and B Schroeder. Influence of gas supply and filament geometry on the large-area deposition of amorphous silicon by hot-wire cvd. *Thin Solid Films*, 395:61, 2001.

[157] S. Tange, K Inoue, K. Tonokura, and M. Koshi. Catalytic decomposition of sih_4 on a hot filament. *Thin Solid Films*, 395:42, 2001.

[158] O. Kluth. *Texturierte Zinkoxidschichten für Silizium-Dünnschichtsolarzellen.* PhD thesis, Rheinisch-Westfählische Technische Hochschule Aachen, 2001.

[159] O. Vetterl, R. Carius, L. Houben, C. Scholten, M. Luysberg, A. Lambertz, F. Finger, P. Hapke, and H. Wagner. Effects of structural properties of

μc-si:h absorber layers on solar cell performance. *Mater. Res. Soc. Proc.*, 609:A15.2.1, 2000.

[160] A.L.B. Neto, T. Dylla, S. Klein, T. Repmann, A. Lambertz, R. Carius, and F. Finger. Defects and structure of hydrogenated microcrystalline silicon films deposited by different techniques. *J. Non-Cryst. Solids*, 338-340:168, 2004.

[161] F. Finger, S. Klein, T. Dylla, A.L. Baia Neto, O. Vetterl, and R. Carius. Defects in microcrystalline silicon prepared with hot wire cvd. *Mater. Res. Soc. Proc.*, 715:123, 2002.

[162] S. Klein, J. Wolff, F. Finger, R. Carius, H. Wagner, and M. Stutzmann. Microcrystalline silicon prepared by hot-wire chemical vapour deposition for thin film solar cell applications. *Jpn. J. Appl. Phys. Part II: Letters*, 41:L10, 2002.

[163] R.J. Koval, Chi Chen, G.M. Ferreira, A.S. Ferlauto, J.M. Pearce, P.I. Rovira, C.R. Wronski, and R.W. Collins. Maximization of the open circuit voltage for hydrogenated amorphous silicon n-i-p solar cells by incorporation of protocrystalline silicon p-type layers. *Appl. Phys. Lett.*, 81(7):1258, 2002.

[164] H. Overhof and P. Thomas. *Electronic Transport in Hydrogenated Amorphous Silicon*. Springer, New York, 1989.

[165] Jiang-Huai Zhou, S. Yamasaki, J. Isoya, K. Ikuta, M. Kondo, A. Matsuda, and K. Tanaka. Pulsed esr study of the conduction electron spin center in μc-si:h. *Mater. Res. Soc. Proc.*, 452:821, 1997.

[166] F. Finger, R. Carius, T. Dylla, S. Klein, S. Okur, and M. Gunes. Stability of microcrystalline silicon for thin film solar cell applications. *IEE Proceedings-Circuits, Devices and Systems*, 150(4):300, 2003.

[167] M. Stutzmann. The defect density in amorphous silicon. *Philos. Mag. B*, 60(4):531, 1989.

[168] D.H. Lee and J.D. Joannopoulos. Renormalization scheme for the transfer-matrix method and the surfaces of wurtzite zno. *Phys. Rev. B*, 24(12):6899, 1981.

[169] H. Eicker. Method and apparatus for determining the concentration of one gaseous component in a mixture of gases. *U.S. patent 4012692*, 1977.

[170] G.N. Advani, R. Beard, and L. Nanis. Gas measurement method. *U.S. patent 4399684*, 1977.

[171] H.D. Le Vine. Method and apparatus for operating a gas sensor. *U.S. patent 3906473*, 1975.

[172] Y.M. Cross and D.R. Pyke. An x-ray photoelectron spectroscopy study of the surface composition of tin and antimony mixed metal oxide catalysts. *Advances in Catalysts*, 30:97, 1981.

[173] S.R. Morrison. Semiconductor gas sensors. *Sensors and Actuators*, 2:329, 1982.

[174] S. Green and P. Kathirgamanathan. Effect of oxygen on the surface conductance of porous silicon: towards room temperature sensor applications. *Mater. Lett.*, 52(1-2):106, 2002.

[175] R. Carius. private communication, 2004.

[176] N. Wyrsch, N. Beck, J. Meier, P. Torres, and S. Shah. Electric field profile in μc-si:h p-i-n devices. *Mater. Res. Soc. Proc.*, 420:181, 1998.

[177] H. Antoniadis and E.A. Schiff. Isotropy of drift mobilities in hydrogen amorphous silicon. *Phys. Rev. B*, 44(8):3627, 1981.

[178] G. Juska, K. Arlauskas, K. Genevicius, and J. Kocka. Charge carrier transport in μc-si:h. *Mater. Sci. Forum*, 297-298:327, 1999.

[179] G. Juška, M. Viliūnas, K. Arlauskas, N. Nekrasas, N. Wyrsch, and L. Feitknecht. Hole drift mobility in μc-si:h. *Journal of Applied Physics*, 89(9):4971, 2001.

[180] R. Atta-Fynn, P. Biswas, P. Ordejn, and D.A. Drabold. Systematic study of electron localization in an amorphous semiconductor. *Phys. Rev. B*, 69:085207, 2004.

[181] A. Yelon, B. Movaghar, and H.M. Branz. Origin and consequences of the compensation (meyer-neldel) law. *Phys. Rev. B*, 46:12244, 1992.

[182] A. Yelon and B. Movaghar. Reply to "comment on 'origin and consequences of the compensation (meyer-neldel) law'". *Phys. Rev. B*, 65:077202, 2002.

[183] L.C. Chen, L.A. Hamel, and A. Yelon. Monte carlo simulations of meyer-neldel effect on carrier time-of-flight in a-si:h. *J. Non-Cryst. Solids*, 220:254, 1997.

[184] Q. Gu, E.A. Schiff, J.B. Chevrier, and B. Equer. High-field electron-drift measurements and the mobility edge in hydrogenated amorphous silicon. *Phys. Rev. B*, 52:5695, 1995.

[185] J.M. Marshall. Carrier diffusion in amorphous semiconductors. *Reports on Progress in Physics*, 46(10):1235, 1983.

[186] E.A. Schiff. Trap-controlled dispersive transport and exponential band tails in amorphous silicon. *Phys. Rev. B*, 24(10):6189, 1981.

[187] T. Tiedje and A. Rose. A physical interpretation of dispersive transport in disordered semiconductors. *Solid State Communications*, 37(1):49, 1981.

[188] J. Orenstein and M. Kastner. Photocurrent transient spectroscopy: measurement of the density of localized states in a-as_2se_3. *Phys. Rev. Lett.*, 46(21):1421, 1981.

[189] J. Orenstein, M.A. Kastner, and V. Vaninov. Transient photoconductivity and photo-induced optical absorption in amorphous semiconductors. *Philos. Mag. B*, 46(1):23, 1982.

List of Publications

1. T. Dylla, R. Carius, and F. Finger. Electron spin resonance and electronic conductivity in moderately doped n-type microcrystalline silicon as a probe for the density of gap states. *Mater. Res. Soc. Proc.*, 715:333, 2002.

2. F. Finger, S. Klein, T. Dylla, A.L. Baia Neto, O. Vetterl, and R. Carius. Defects in microcrystalline silicon prepared with hot wire cvd. *Mater. Res. Soc. Proc.*, 715:123, 2002.

3. F. Finger, R. Carius, T. Dylla, S. Klein, S. Okur, and M. Gunes. Stability of microcrystalline silicon for thin film solar cell applications. *IEE Proceedings-Circuits, Devices and Systems*, 150(4):300, 2003.

4. S. Klein, F. Finger, R. Carius, T. Dylla, B. Rech, M. Grimm, L. Houben, and M. Stutzmann. Intrinsic microcrystalline silicon prepared by hot-wire chemical vapour deposition for thin film solar cells. *Thin Solid Films*, 430(1-2):202, 2003.

5. T. Dylla, F. Finger, and R. Carius. Adsorption and oxidation effects in microcrystalline silicon. *Mater. Res. Soc. Proc.*, 762:81, 2003.

6. F. Finger, S. Klein, R. Carius, T. Dylla, O. Vetterl, and A.L.B. Neto. Microcrystalline silicon prepared with hot-wire cvd. *J. Mater. Sci., Mater. Electron.*, 14(10-12):621, 2003.

7. F. Finger, L. Baia Neto, R. Carius, T. Dylla, and S. Klein. Paramagnetic defects in undoped microcrystalline silicon. *Phys. Stat. Sol.*, 1(5):1248, 2004.

8. T. Dylla, E.A. Schiff, and F. Finger. Hole drift-mobility measurements and multiple-trapping in microcrystalline silicon. *Mater. Res. Soc. Proc.*, 2004 in press.