

Literaturverzeichnis

- [Ash76] N.W. Ashcroft und N.D. Mermin. *Solid States Physics*. Saunders College Publishing, USA, 1976.
- [Ass98] A. Assion, T. Baumert, M. Bergt, T. Brixner, B. Kiefer, V. Seyfried, M. Strehle und G. Gerber. Control of Chemical Reaktionen by Feedback-Optimized Phase-Shaped Femtosecond Laser Pulses. *Science* **282**, (1998) 919.
- [Ass99] M. Assel, R. Laenen und A. Laubereau. Retrapping and solvation dynamics after femtosecond UV excitation of the solvated electron in water. *Journal of Chemical Physics* **111**, 15, (1999) 6869.
- [Ayo97] P. Ayotte und M. A. Johnson. Electronic absorption spectra of size-selected hydrated electron clusters: $(\text{H}_2\text{O})_n^-$, $n=6-50$. *Journal of Chemical Physics* **106**, 2.
- [Azr99] R. Azria, Y. Le Coat, M. Lachgar, M. Tronc, L. Parenteau und L. Sanche. Effects of morphology in electron-stimulated desorption: O^- from O_2 condensed on D_2O films grown at 15–150 K on Pt. *Surface Science* **436**, (1999) L671.
- [Bal97] A. Baltuška, Z. Wei, M. S. Pshenichnikov, D. A. Wiersma und R. Szipöcs. All-solid-state cavity-dumped sub-5-fs laser. *Applied Physics B* **65**, (1997) 175.
- [Bal99] A. Baltuška, M. F. Emde, M. S. Pshenichnikov und D. A. Wiersma. Early-time dynamics of the photoexcited hydrated electron. *Journal of Physical Chemistry A* **103**, (1999) 10065.
- [Bar78] B. Baron, D. Hoover und F. Williams. Vacuum ultraviolet photoelectric emission from amorphous ice. *Journal of Chemical Physics* **68**, (1978) 1997.
- [Bar88] R. N. Barnett, U. Landman und C. L. Cleveland. Electron localization in water clusters. II. Surface and internal states. *Journal of Chemical Physics* **88**, 7, (1988) 4429.
- [Bar89] R. N. Barnett, U. Landman und A. Nitzan. Dynamics of excess electron migration, solvation, and spectra in polar molecular clusters. *Journal of Chemical Physics* **91**, 9, (1989) 5567.
- [Bar01] D. M. Bartels. Moment analysis of hydrated electron cluster spectra: Surface or internal states? *Journal of Chemical Physics* **115**, 9, (2001) 4404.

- [Bau99] M. Bauer, S. Pawlik und M. Aeschlimann. Decay dynamics of photoexcited alkali chemisorbats: real-time investigations in the femtosecond regime. *Physical Review B* **60**, 7, (1999) 5016.
- [Ben56] W.S. Benedict, N. Gailar und E.K. Plyler. Rotation–vibration spectra of deuterated water vapor. *Journal of Chemical Physics* **24**, (1956) 1139.
- [Ber33] J. D. Bernal und R. H. Fowler. A theory of water and ionic solutions, with particular reference to hydrogen and hydroxyl ions. *Journal of Chemical Physics* **1**, (1933) 515.
- [Ber97] A. Bernas, C. Ferradini und J.-P. Jay-Gerin. On the electronic structure of liquid water: Facts and reflections. *Chemical Physics* **222**, (1997) 151.
- [Ber00a] R. Bergman und J. Swenson. Dynamics of supercooled water in confined geometry. *Nature* **403**, (2000) 283.
- [Ber00b] W. Berthold, U. Höfer, P. Feulner und D. Menzel. Influence of Xe adlayer morphology and electronic structure on image-potential state lifetimes of Ru(0001). *Chemical Physics* **251**, (2000) 123.
- [Ber01] Wolfram Berthold. Zeitaufgelöste Zweiphotonen-Photoemission an den Bildpotentialzuständen der sauberen und edelgasbedeckten Cu(100)- und Ru(0001)-Oberfläche. Dissertation, Fakultät für Physik der Technischen Universität München (2001).
- [Ber04] W. Berthold, F. Rebenrost, P. Feulner und U. Höfer. Influence of Ar, Kr, and Xe layers on the energies and lifetimes of image-potential states on Cu(100). *Applied Physics A* **78**, 2, (2004) 131.
- [Bez04] I. Bezel, K. J. Gaffney, S. Garrett-Roe, S. H. Liu, A. D. Miller, P. Szymanski und C. B. Harris. Measurement and dynamics of the spatial distribution of an electron localized at a metal–dielectric interface. *Journal of Chemical Physics* **120**, 2, (2004) 845.
- [Bje52] N. Bjerrum. Structure and properties of ice. *Science* **115**, (1952) 385.
- [Boa63] J. W. Boag und E. J. Hart. *Nature* **197**, (1963) 45.
- [Bog02] K. Boger, M. Roth, M. Weinelt, Th. Fauster und P.-G. Reinhard. Linewidths in energy-resolved two-photon photoemission spectroscopy. *Physical Review B* **65**, (2002) 075104.
- [Bon99] M. Bonn, S. Funk, Chr. Hess, D. N. Denzler, C. Stampfl, M. Scheffler, M. Wolf und G. Ertl. Phonon- versus electron-mediated desorption and oxidation of CO on Ru(0001). *Science* **285**, (1999) 1042.
- [Bon00] M. Bonn, D. N. Denzler, S. Funk, M. Wolf, S. Wellershoff und J. Hohlfeld. Ultrafast electron dynamics at metal surfaces: Competition between electron-phonon coupling and hot electron transport. *Physical Review B* **61**, (2000) 1101.

- [Boy92] Robert W. Boyd. *Nonlinear Optics*. Academic Press, London, 1992, 1. Aufl.
- [Bür99] L. Bürgi, O. Jeandupeux, H. Brune und K. Kern. Probing hot-electron dynamics at surfaces with a cold scanning tunneling microscope. *Physical Review Letters* **82**, 22, (1999) 4516.
- [Bür00] L. Bürgi, H. Brune, O. Jeandupeux und K. Kern. Quantum coherence and lifetimes of surface-state electrons. *Journal of Electron Spectroscopy and Related Phenomena* **109**, (2000) 33.
- [Bur93] A. R. Burns, E. B. Stechel und D. R. Jennison (Hg.). *Desorption induced by electronic transitions*, Bd. 31 von *Springer Series in Surface Science*. Springer, Berlin, 1993.
- [Cha98] D. Chakarov und B. Kasemo. Photoinduced crystallization of amorphous ice films on graphite. *Physical Review Letters* **81**, 23.
- [Chu98] E. V. Chulkov, I. Sarría, V. M. Silkin, J. M. Pitarke und P. M. Echenique. Lifetimes of image-potential states on copper surfaces. *Physical Review Letters* **80**, 22, (1998) 4947.
- [Coe97] J.V. Coe, A. D. Earhart, M. H. Cohen, G. J. Hoffman, H. W. Sarkas und K. H. Bowen. Using cluster studies to approach the electronic structure of bulk water: Reassessing the vacuum level, conduction band edge, and band gap of water. *Journal of Chemical Physics* **107**, 16, (1997) 6023.
- [Coe01] J. C. Coe. Fundamental properties of bulk water from cluster ion data. *International Reviews in Physical Chemistry* **20**, 1, (2001) 33.
- [Coe04] J. V. Coe, S. Williams und K. H. Bowen. Private Diskussion. Die Daten wurden freundlicher Weise vor der Veröffentlichung (voraussichtlich 2004) zur Verfügung gestellt. .
- [Coh96] Coherent Laser Group, Santa Clara. *Operator's Manual, The Coherent Mira Seed Laser* (1996).
- [Coh97] Coherent Laser Group, Santa Clara. *Operator's Manual, RegA 9050 System*, vorläufige version 2.1 Aufl. (1997).
- [Coh98] Coherent Laser Group, Santa Clara. *Operator's Manual, The Coherent Model 9400 Optical Parametric Amplifier (OPA)* (1998).
- [Coh99] Coherent Laser Group, Santa Clara. *Operator's Manual, Verdi V-8/v-10 Diode-Pumped Lasers* (1999).
- [Cro96] R. A. Crowell und D. M. Bartels. Multiphoton ionization of liquid water with 3.0-5.0 eV photons. *Journal of Physical Chemistry* **100**, (1996) 17940.
- [Deb03] P. G. Debenedetti und H. E. Stanley. Supercooled and glassy water. *Physics Today* **6**, (2003) 40.

- [deH83] M. P. deHaas, M. Kunst, J. M. Warman und J. B. Verberne. Nanosecond time-resolved conductivity studies of pulse-ionized ice. 1. The mobility and trapping of conduction-band electrons in H₂O and D₂O ice. *Journal of Physical Chemistry* **87**, (1983) 4089.
- [Dem03] W. Demtröder. *Laser spectroscopy*. Springer Berlin, Heidelberg, 2003, 3. Aufl.
- [Den03a] D. N. Denzler, C. Frischkorn, C. Hess, M. Wolf und G. Ertl. Electronic excitation and dynamic promotion of a surface reaction. *Physical Review Letters* **91**, (2003) 226102.
- [Den03b] D. N. Denzler, Chr. Hess, R. Dudek, S. Wagner, Chr. Frischkorn, M. Wolf und G. Ertl. The interfacial structure of water on Ru(001) investigated by vibrational spectroscopy. *Chemical Physics Letters* **376**, (2003) 618.
- [Den03c] D. N. Denzler, S. Wagner, M. Wolf und G. Ertl. Isotope effects in the thermal desorption of water from Ru(001). *Surface Science* **532-535**, (2003) 108.
- [Den03d] Daniel N. Denzler. Zur ultraschnellen Reaktionsdynamik von Wasserstoff und Grenzflächenstruktur von Wasser auf der Ru(001-Oberfläche. Dissertation, Fachbereich Physik, Freie Universität Berlin (2003).
- [Dev00] J. P. Devlin, C. Joyce und V. Buch. Infrared spectra and structures of large water clusters. *Journal of Physical Chemistry A* **104**, (2000) 1974.
- [DF00] N. Del Fatti, C. Voisin, M. Achermann, S. Tzortzakis, D. Christofilos und F. Valleé. Nonequilibrium electron dynamics in noble metals. *Physical Review B* **61**, (2000) 16956.
- [Doh99] Z. Dohnálek, R. L. Ciolli, G. A. Kimmel, K. P. Stevenson, R. S. Smith und B. D. Kay. Substrate induced crystallization of amorphous solid water at low temperatures. *Journal of Chemical Physics* **110**, 12, (1999) 5489.
- [Doh00] Z. Dohnálek, G. A. Kimmel, R. L. Ciolli, K. P. Stevenson, R. S. Smith und B. D. Kay. The effect of the underlying substrate on the crystallization kinetics of dense amorphous solid water films. *Journal of Chemical Physics* **112**, 13, (2000) 5932.
- [Ech00a] P. M. Echenique, J. Osma, V. M. Silkin, E. V. Chulkov und J. M. Pitarke. Self-energy and inelastic lifetimes of surface-state electrons and holes in metals. *Applied Physics A* **71**, (2000) 503.
- [Ech00b] P. M. Echenique, J. M. Pitarke, E. V. Chulkov und A. Rubio. Theory of inelastic lifetimes of low-energy electrons in metals. *Chemical Physics* **251**, 1-3, (2000) 1.
- [Ech04] P. M. Echenique, R. Berndt, E. V. Chulkov, Th. Fauster, A. Goldmann und U. Höfer. Decay of electronic excitations at metal surfaces. *Surface Science Reports* **im Druck**.

- [Eis69] D. Eisenberg und W. Kauzmann. *The structure and properties of water*. Oxford University Press, New York, 1969.
- [Eld76] M. Eldrup. Vacancy migration and void formation in γ -irradiated ice. *Journal of Chemical Physics* **64**, (1976) 5283.
- [Emd98] M. F. Emde, A. Baltuška, A. Kummrow, M. S. Pshenichnikov und D. A. Wiersma. Ultrafast librational dynamics of the hydrated electron. *Physical Review Letters* **80**, 21, (1998) 4645.
- [Fan92] W. S. Fann, R. Storz, H. W. K. Tom und J. Bokor. Direct measurement of nonequilibrium electron-energy distributions in subpicosecond laser-heated gold films. *Physical Review Letters* **68**, 18, (1992) 2834.
- [Fau95] Th. Fauster und W. Steinmann. Two-photon photoemission spectroscopy of image states. in: *Electromagnetic Waves: Recent Developments in Research*, P. Halevi, Ed., Elsevier, Amsterdam **2**, (1995) 347.
- [Fei02] P. J. Feibelman. Partial dissociation of water on Ru(001). *Science* **295**, (2002) 99.
- [Fei03] P. J. Feibelman. Vibrations of a water adlayer on Ru(0001). *Physical Review B* **67**, (2003) 035420.
- [Fei04] P. J. Feibelman. What the stretch frequency spectrum of D₂O/Ru(0001) does and does not mean. *Chemical Physics Letters* **389**, (2004) 92.
- [Fin02] J. L. Finney, A. Hallbrucker, I. Kohl, A. K. Soper und D. T. Bowron. Structures of high and low density amorphous ice by neutron diffraction. *Physical Review Letters* **88**, 22, (2002) 225503.
- [Fis95] M. Fisher und J. P. Devlin. Defect activity in amorphous ice from isotopic exchange data: Insight into the glass transition. *Journal of Physical Chemistry* **99**, (1995) 11584.
- [Flo87] M.A. Floriano, D.D. Klug, E. Whalley, E.C. Svensson, V.F. Sears und E.D. Hallmann. Direct determination of the intramolecular O–D distance in ice I_{rmh} by neutron diffraction. *Nature* **329**, (1987) 821.
- [Fra82] F. Franks (Hg.). *Water — a comprehensive treatise, Vol. 1–7*. Plenum, New York, 1972–1982.
- [Fri92] L. E. Fried, N. Bernstein und S. Mukamel. Simulation of the femtosecond optical response of a solute in water. *Physical Review Letters* **68**, 12, (1992) 1842.
- [Fur97] Y. Furukawa und H. Nada. Anisotropic surface melting of an ice crystal and its relationship to growth forms. *Surface Science* **101**, (1997) 6167.

- [Gaf00] K.J. Gaffney, C.M. Wong, S.H. Liu, A.D. Miller, J.D. McNeill und C.B. Harris. Femtosecond Electron Dynamics at the Benzene/Ag(111) Interface. *Chemical Physics* **251**, (2000) 99.
- [Gah00a] C. Gahl, K. Ishioka, Q. Zhong, A. Hotzel und M. Wolf. Structure and dynamics of excited electronic states at the adsorbate/metal interface: C₆F₆/Cu(111). *Faraday Discussions* **117**, (2000) 191.
- [Gah00b] Cornelius Gahl. Ultrakurzzeitdynamik elektronischer Anregungen im Adsorbatsystem C₆F₆/Cu(111). Diplomarbeit, Freie Universität Berlin (2000).
- [Gau89] Y. Gauduel, S. Pommeret, A. Migus und A. Antonetti. Femtosecond dynamics of geminate pair recombination in pure liquid water. *Journal of Physical Chemistry* **93**, (1989) 3880.
- [Ge98] N.-H. Ge, C.M. Wong, R.L. Lingle, J.D. McNeill, K.J. Gaffney und C.B. Harris. Femtosecond dynamics of electron localization at interfaces. *Science* **279**, (1998) 202.
- [Gil01] H. A. Gillis und T. I. Quickenden. Excess electrons in aqueous glasses and crystalline ice. *Canadian Journal of Chemistry* **79**, (2001) 80.
- [Gou90] T. Goulet, A. Bernas, C. Ferradini und J.-P. Jay-Gerin. On the electronic structure of liquid water: conduction-band tail revealed by photoionization data. *Chemical Physics Letters* **170**, 5–6, (1990) 492.
- [Gra79] D. Grand, A. Bernas und E. Amouyal. Photoionization of aqueous indole; conduction band edge and energy gap in liquid water. *Chemical Physics* **44**, (1979) 73.
- [Gre93] W. Greiner, L. Neise und H. Stöcker. *Thermodynamik und Statistische Mechanik*, Bd. 9 von *Theoretische Physik*. Verlag Harri Deutsch, Thun, Frankfurt am Main, 1993.
- [Han90] P. Han und D. M. Bartels. H/D isotope effects in water radiolysis. 2. Dissociation of electronically excited water. *Journal of Physical Chemistry* **94**, (1990) 5824.
- [Har62] E. J. Hart und J. W. Boag. *Journal of the American Chemical Society* **84**, (1962) 4090.
- [Hel94] G. Held und D. Menzel. The structure of the p($\sqrt{3} \times \sqrt{3}$)R30° bilayer of D₂O on Ru(001). *Surface Science* **316**, (1994) 92.
- [Hel95a] G. Held und D. Menzel. Isotope effects in structure and kinetics of water adsorbates on Ru(001). *Surface Science* **327**, (1995) 301.
- [Hel95b] G. Held und D. Menzel. Structural isotope effect on water bilayers adsorbed on Ru(001). *Physical Review Letters* **74**, (1995) 4221.

- [Hen72] B. Henderson. *Defects in Crystalline Solids*. The Structure and Properties of Solids, Bd. 1. Edward Arnold, London, 1972.
- [Hen02] M. A. Henderson. The interaction of water with solid surfaces: Fundamental aspects revisited. *Surface Science Reports* **46**, (2002) 1.
- [Her96] T. Hertel, E. Knoesel, M. Wolf und G. Ertl. Ultrafast electron dynamics at Cu(111): Response of an electron gas to optical excitation. *Physical Review Letters* **76**, 3, (1996) 535.
- [Her99] A. Hertwig, H. Hippler und A.-N. Unterreiner. Transient spectra, formation, and geminate recombination of solvated electrons in pure water UV-photolysis: an alternative view. *Physical Chemistry and Chemical Physics* **1**, (1999) 5633.
- [Her02] A. Hertwig, H. Hippler und A.-N. Unterreiner. Temperature-dependent studies of solvated electrons in liquid water with two and three femtosecond pulse sequences. *Physical Chemistry and Chemical Physics* **4**, (2002) 4412.
- [Hüf95] St. Hüfner. *Photoelectron Spectroscopy: Principles and Applications*. Springer-Verlag Berlin Heidelberg, 1995.
- [Höf97] U. Höfer, I.L. Shumay, Reuß.Ch., U. Thomann, W. Wallauer und Th. Fauster. Time-resolved coherent photoelectron spectroscopy of quantized electronic states on metal surfaces. *Science* **277**, (1997) 1480.
- [Hin92] B. J. Hinch und L. H. Dubois. Stable and metastable phases of water adsorbed on Cu(111). *Journal of Chemical Physics* **96**, 4, (1992) 3262.
- [Hof97] W. Hoffmann und C. Benndorf. Investigations on the influence of substrate geometry of flat and stepped ruthenium surfaces Ru(0001) and Ru(1018) on the adsorption kinetics of H₂O and D₂O. *Surface Science* **377-379**, (1997) 681.
- [Hot99a] A. Hotzel, G. Moos, K. Ishioka, M. Wolf und G. Ertl. Femtosecond elektron dynamics at adsorbate-metal interfaces and the dielectric continuum model. *Applied Physics B* **68**, (1999) 615.
- [Hot99b] Arthur Hotzel. Elektronendynamik der adsorbatbedeckten Cu(111)-Oberfläche. Dissertation, Fachbereich Physik, Freie Universität Berlin (1999).
- [Hot00] A. Hotzel, M. Wolf und J. P. Gauyacq. Phonon-mediated intraband relaxation of image-state electrons in adsorbate overlayers: N₂/Xe/Cu(111). *Journal of Physical Chemistry B* **104**, (2000) 8438.
- [Ied98] M. J. Iedema, D. L. Dresser, J. B. Rowland, W. P. Hess, A. A. Tsekouras und J. P. Cowin. Ferroelectricity in water ice. *Journal of Physical Chemistry B* **102**, (1998) 9203.
- [Jac97] S. M. Jackson, V. M. Nield, R. W. Whitworth, M. Oguro und C. C. Wilson. Single-crystal neutron diffraction studies of the structure of ice XI. *Journal of Physical Chemistry B* **101**, (1997) 6142.

- [Jen88] P.J. Jennings, R.O. Jones und M. Weinert. Surface barrier for electrons in metals. *Physical Review B* **37**, 11, (1988) 6113.
- [Jen94] P. Jenniskens und D. F. Blake. Structural transitions in amorphous water ice and astrophysical implications. *Science* **265**, (1994) 753.
- [Jen97] P. Jenniskens, S. F. Banham, D. F. Blake und McCoustra. M. R. S. Liquid water in the domain of cubic crystalline ice I_c. *Journal of Chemical Physics* **107**, (1997) 1232.
- [Jo91] S.K. Jo und J. M. White. Low energy (<1 eV) electron transmission through condensed layers of water. *Journal of Chemical Physics* **94**, (1991) 5761.
- [Joh98] G. P. Johari. An interpretation for the thermodynamic features of ice Ih↔ice XI transformation. *Journal of Chemical Physics* **109**, 21, (1998) 9543.
- [Joh02] G. P. Johari. Does water need a new T_g? *Journal of Chemical Physics* **116**, 18, (2002) 8067.
- [Jor71] J. Jortner. *Berichte der Bunsengesellschaft Physikalische Chemie* **75**, (1971) 696.
- [Jor73] W. L. Jorgensen und L. Salem. *The Organic Chemist's Book of Orbitals*. Academic Press, New York, 1973.
- [Jou79] F.-J. Jou und G. R. Freeman. Temperature and isotope effects on the shape of the optical absorption spectrum of solvated electrons in water. *Journal of Physical Chemistry* **83**, 18, (1979) 2383.
- [Kam02] P. Kamphampati, D.H. Son, T. W. Kee und P. F. Barbara. Solvation dynamics of the hydrated electron depends on its initial degree of electron delocalization. *Journal of Physical Chemistry A* **106**, (2002) 2374.
- [Kaw78] S. Kawada. Dielectric anisotropy in ice Ih. *Journal of the Physical Society of Japan* **44**, (1978) 1881.
- [Kee01] T. W. Kee, D. H. Son, P. Kambhampati und P. F. Barbara. A unified electron transfer model for the different precursors and excited states of the hydrated electron. *Journal of Physical Chemistry A* **105**, (2001) 8434.
- [Kev81] L. Kevan. Solvated electron structure in glassy matrices. *Acc. Chem. Res.* **14**, (1981) 138.
- [Kim94] Y. Kimura, J. C. Alfano, P. K. Walhout und P. F. Barbara. Ultrafast transient absorption spectroscopy of the solvated electron in water. *Journal of Physical Chemistry* **98**, (1994) 3450.
- [Kit96] Ch. Kittel. *Einführung in die Festkörperphysik*. R. Oldenbourg Verlag, München, 1996, 11. Aufl.

- [Kli00] J. Kliewer, R. Berndt, E. V. Chulkov, V. M. Silkin, P. M. Echenique und S. Crampin. Dimensionality effects in the lifetime of surface states. *Science* **288**, (2000) 1399.
- [Kno97a] E. Knoesel, A. Hotzel und M. Wolf. Temperature Dependence of Surface State Lifetimes, Dephasing Rates and Binding Energies on Cu(111) Studied with Time-Resolved Photemission. *Journal of Electronic Spectroscopie and Related Phenomena* **88–91**, (1997) 577.
- [Kno97b] Ernst Knoesel. Ultrakurzzeit-Dynamik elektronischer Anregungen auf Metalloberflächen. Dissertation, Fachbereich Chemie, Freie Universität Berlin (1997).
- [Kno98] E. Knoesel, A. Hotzel und M. Wolf. Ultrafast Dynamics of Hot Electrons and Holes in Copper: Excitation, energy Relaxation, and Transport Effects. *Physical Review B* **57**, 20, (1998) 1.
- [Kob83] K. Kobayashi. Optical spectra and electronic structure of ice. *Journal of Physical Chemistry* **87**, (1983) 4317.
- [Koh00] I. Kohl, E. Mayer und A. Hallbrucker. The glassy water–cubic ice system: a comparative study by X-ray diffraction and differential scanning calorimetry. *Physical Chemistry and Chemical Physics* **2**, (2000) 1579.
- [Kuh86] W.F. Kuhs und M.S. Lehmann. The structure of ice-Ih. *Water Science Reviews* **2**, (1986) 1.
- [Kum98] A. Kummrow, M. F. Emde, A. Baltuška, M. S. Pshenichnikov und D. A. Wiersma. Wave packet dynamics in ultrafast spectroscopy of the hydrated electron. *Journal of Physical Chemistry A* **102**, (1998) 4172.
- [Kun83] M. Kunst, J. M. Warman, M. P. deHaas und J. B. Verberne. Nanosecond time-resolved conductivity studies of pulsed-ionized ice. 3. The electron as a probe for defects in doped ice. *Journal of Physical Chemistry* **87**, (1983) 4096.
- [Lae00] R. Laenen, T. Roth und A. Laubereau. Novel precursors of solvated electrons in water: Evidence for a charge transfer process. *Physical Review Letters* **85**, 1.
- [Lae01] R. Laenen und T. Roth. Generation of solvated electrons in neat water: New results from femtosecond spectroscopy. *Journal of Molecular Structure* **598**, (2001) 37.
- [Lee97] S. Lee, J. Kim, S. J. Lee und K. S. Kim. Novel structures for the excess electron state of the water hexamer and the interaction forces governing the structures. *Physical Review Letters* **79**, (1997) 2038.
- [Leh99] L. Lehr, M. T. Zanni, C. Frischkorn, R. Weinkauff und D. M. Neumark. Electron solvation in finite systems: Femtosecond dynamics of iodide(water)_n anion clusters. *Science* **284**, (1999) 635.

- [Löf96] P. Löfgren, P. Ahlström, D. V. Chakarov, J. Lausmaa und B. Kasemo. Substrate dependent sublimation kinetics of mesoscopic ice films. *Surface Science* **367**, (1996) L19.
- [Lis04] M. Lisowski, P. A. Loukakos, U. Bovensiepen, J. Stähler, C. Gahl und M. Wolf. Ultra-fast dynamics of electron thermalization, cooling and transport effects in Ru(001). *Applied Physics A* **78**, (2004) 165.
- [Liu02] S. H. Liu, A. D. Miller, K. J. Gaffney, P. Szymanski, S. Garrett-Roe, I. Bezel und C.B. Harris. Direct observation of two-dimensional electron solvation at alcohol/Ag(111) interfaces. *Journal of Physical Chemistry B* **106**, (2002) 12908.
- [Liv02] F. E. Livingston, J. A. Smith und S. M. George. General trends for bulk diffusion in ice and surface diffusion on ice. *Journal of Physical Chemistry A* **106**, (2002) 6309.
- [Lon90] F. H. Long, H. Lu und K. B. Eisenthal. Femtosecond studies of the presolvated electron: an excited state of the solvated electron? *Physical Review Letters* **64**, (1990) 1469.
- [Lou83] R. Loudon. *Quantum Theorie of Light*. Oxford University Press, New York, 1983.
- [Lu99] Q.-B. Lu und T. E. Madey. Giant enhancement of electron-induced dissociation of chlorofluorocarbons coadsorbed with water or ammonia ices: Implications for atmospheric ozone depletion. *Journal of Chemical Physics* **111**, 7, (1999) 2861.
- [Lu01] Q.-B. Lu und L. Sanche. Enhanced dissociative electron attachment to CF₂Cl₂ by transfer of electrons in precursors to the solvated state in water and ammonia ice. *Physical Review B* **63**, (2001) 153403.
- [Lud01] R. Ludwig. Water: From clusters to bulk. *Angewandte Chemie International Edition* **40**, (2001) 1808.
- [Mad00] D. Madsen, C. L. Thomsen, J. Thøgersen und S. R. Keiding. Temperature dependent relaxation and recombination dynamics of the hydrated electron. *Journal of Chemical Physics* **113**, 3, (2000) 1126.
- [Mar99] W. Marbach, A. N. Asaad und P. Krebs. Optical absorption of solvated electrons in water and tetrahydrofuran/water mixtures. *Journal of Physical Chemistry A* **103**, (1999) 28.
- [Mar04] D. Marx. Wasser, Eis und Protonen. *Physik Journal* **3**, 5, (2004) 33.
- [McN96] J.D. McNeill, R.L. Lingle, Jr., R.E. Jordan, D.F. Padowitz und C.B. Harris. Interfacial Quantum Well States of Xe and Kr Adsorbed on Ag(111). *Journal of Chemical Physics* **105**, 9, (1996) 3883.

- [McN97] J.D. McNeill, R.L. Lingle, Jr., N.-H. Ge, C.M. Wong, R.E. Jordan und C.B. Harris. Dynamics and Spatial Distribution of Electrons in Quantum Wells at Interfaces Determined by Femtosecond Photoemission Spectroskopie. *Physical Review Letters* **79**, 23, (1997) 4645.
- [Meh04] M. Mehlhorn, K. Morgenstern und K.-H. Rieder. Zusammenarbeit im Rahmen der Doktorarbeit von M. Mehlhorn .
- [Men64] D. Menzel und R. Gomer. Desorption from metal surfaces by low-energy electrons. *Journal of Chemical Physics* **11**, (1964) 3311.
- [Men02] S. Meng, L. F. Xu, E. g. Wang und S. Gao. Vibrational recognition of hydrogen-bonded water networks on an metal surface. *Physical Review Letters* **89**, 17, (2002) 176104.
- [Mic03] A. Michaelides, A. Alavi und D. A. King. Different surface chemistries of water on Ru(0001): From monomer adsorption to partially dissociated bilayers. *Journal of the American Chemical Society* **125**, (2003) 2746.
- [Mig87] A. Migus, Y. Gauduel, J. L. Martin und A. Antonetti. Excess electrons in liquid water: First evidence for a prehydrated state with femtosecond lifetime. *Physical Review Letters* **58**, 15, (1987) 1559.
- [Mil02] A. D. Miller, I. Bezel, K. J. Gaffney, S. Garrett-Roe, S. H. Liu, P. Szymanski und C. B. Harris. Electron solvation in two dimensions. *Science* **297**, (2002) 1163.
- [Mis98] O. Mishima und H. E. Stanley. The relationship between liquid, supercooled and glassy water. *Nature* **396**, (1998) 329.
- [Mog78] O.E. Mogensen und M. Eldrup. Vacancies in pure ice studied by positron annihilation techniques. *Journal of Glaciology* **21**, (1978) 85.
- [Moo99] Gunnar Moos. Relaxationsdynamik photoangeregter Elektronen in Graphit (HOPG) und Kohlenstoff-Nanotubes. Diplomarbeit, Freie Universität Berlin (1999).
- [Moo01] G. Moos, C. Gahl, R. Fasel, M. Wolf und T. Hertel. Anisotropy of quasiparticle lifetimes and the role of disorder in graphite from ultrafast photoemission spectroscopy. *Physical Review Letters* **87**, (2001) 267402.
- [Moo02] Gunnar Moos. Zur Dynamik niederenergetischer Elektronen in metallischen Festkörpern. Dissertation, Fachbereich Physik, Freie Universität Berlin (2002).
- [Mug96] F. F. Muguet, H. Gelabert und Y. Gauduel. MCSCF-RPA study of the electronic excitation spectrum of the hydrated hydronium radical. *Journal de Chimie Physique* **93**, (1996) 1808.
- [Ngu78] T. Q. Nguyen, D. C. Walker und H. A. Gillis. Evolution of the spectrum of the solvated electron in BeF₂ aqueous glasses at 76 K. *Journal of Chemical Physics* **69**, 3, (1978) 1038.

- [NIS03] NIST. National Institute of Standards. Type K Reference Tables; revised to ITS-90. Monograph 175 (2003).
- [Nov74] A. Novak. Hydrogen bonding in solids. Correlation of spectroscopic and crystallographic data. *Structure and Bonding* **18**, (1974) 177.
- [Oga02] H. Ogasawara, B. Brena, D. Nordlund, M. Nyberg, A. Pelmenschikov, L. G. M. Pettersson und A. Nilsson. Structure and bonding of water on Pt(111). *Physical Review Letters* **89**, (2002) 276102.
- [Osm99] J. Osma, I. Sarría, E.V. Chulkov, J.M. Pitarke und P.M. Echenique. Role of the intrinsic surface state in the decay of image states at a metal surface. *Physical Review B* **59**, 16, (1999) 10591.
- [Pal98] E. D. Palik (Hg.). *Handbook of optical constants of solids*, Bd. III. Academic Press, London, 1998.
- [Pau35] L. Pauling. The structure and entropy of ice and other crystals with some randomness of atomic arrangements. *Journal of the American Chemical Society* **57**, (1935) 2680.
- [Pel00] T. Pelzer, G. Ceballos, F. Zbikowski, B. Willerding, K. Wandelt, U. Thomann, Ch. Reuß, Th. Fauster und J. Braun. Electronic structure of the Ru(0001) surface. *Journal of Physics: Condensed Matter* **12**, (2000) 2193.
- [Pep97] C. Pepin, T. Goulet, D. Houde und J.-P. Jay-Gerin. Observation of a continuous spectral shift in the solvation kinetics of electrons in neat liquid deuterated water. *Journal of Physical Chemistry A* **101**, (1997) 4351.
- [Pet83] V. F. Petrenko und R. W. Whitworth. Electric currents associated with dislocation motion in ice. *Journal of Physical Chemistry* **87**, (1983) 4022.
- [Pet94] V.F. Petrenko und N. N. Khusnatdinov. On the nature of photo charge carriers in ice. *Journal of Chemical Physics* **100**, 12.
- [Pet98] H. Petek und S. Ogawa. Femtosecond Time-Resolved Two-Photon Photoemission Studies of Elektron Dynamics in Metals. *Progress in Surface Science* **56**, 4, (1998) 239.
- [Pet99] V. F. Petrenko und R. W. Whitworth. *Physics of ice*. Oxford University Press, New York, 1999.
- [Pet00] H. Petek, M. J. Weida, H. Nagano und S. Ogawa. Real-time observation of adsorbate atom motion above a metal surface. *Science* **288**, (2000) 1402.
- [Pre96] O. V. Prezhdo und P. J. Rossky. Solvent mode participation in the nonradiative relaxation of the hydrated electron. *Journal of Physical Chemistry* **100**, (1996) 17094.

-
- [Pui03] S. R. Puisto, T. J. Lerotholi, G. Held und D. Menzel. A refined LEED analysis of water on Ru(0001): An experimental test of the partial dissociation model. *Surface Review and Letters* **10**, 2–3, (2003) 487.
- [Red64] P. A. Redhead. Interaction of slow electrons with chemisorbed Oxygen. *Canadian Journal of Physics* **42**, (1964) 886.
- [Rei01] F. Reinert, G. Nicolay, S. Schmidt, D. Ehm und S. Hüfner. Direct measurements of the L-gap surface states on the (111) face of noble metals by photoelectron spectroscopy. *Physical Review B* **63**, (2001) 115415.
- [Res77] L. Resca und R. Resta. Energy bands in cubic ice. *Physica Status Solidi b* **81**, (1977) 129.
- [Reu99] Ch. Reuß, I.L. Shumay, U. Thomann, M. Kutschera, M. Weinelt und Th. Fauster. Control of Dephasing of Image-Potential States by CO-Adsorption on Cu(100). *Physical Review Letters* **82**, 1, (1999) 153.
- [Röt94] K. Röttger, A. Endriss, J. Ihringer, L. Doyle und W. F. Kuhs. Lattice constants and thermal expansion of H₂O and D₂O ice Ih between 10 and 265 K. *Acta Crystallographica B* **50**, (1994) 644.
- [Sce82] M. G. Sceats und S. A. Rice. *Amorphous solid water and its relationship to liquid water: a random network model for water*, Bd. 7: Water and aqueous solutions at subzero temperatures von *Water, a comprehensive treatise*. Plenum Press, New York, 1982 .
- [Sch90] H. Schlichting. Methoden und Mechanismen der thermischen Desorption: Adsorptions-, Desorptions-Kinetik, Epitaxie und Ordnung von Edeltgasschichten auf Ru(001). Dissertation, Technische Universität München (1990).
- [Sch92] F. Schwabl. *Quantum mechanics*. Springer-Verlag, Berlin Heidelberg, 1992.
- [Sch93] H. Schlichting und D. Menzel. Techniques for Attainment, Control, and Calibration of Cryogenic Temperatures at Small Single-Crystal Samples under Ultrahigh Vacuum. *Rev. Sci. Instrum.* **64**, 7, (1993) 2013.
- [Sch94] B. J. Schwartz und P. J. Rossky. Aqueous solvation dynamics with a quantum mechanical solute: Computer simulation studies of the photoexcited hydrated electron. *Journal of Chemical Physics* **101**, 8, (1994) 6902.
- [Sch96] B. J. Schwartz und P. J. Rossky. The isotope effect in solvation dynamics and nonadiabatic relaxation: A quantum simulation study of the photoexcited solvated electron in D₂O. *Journal of Chemical Physics* **105**, 16, (1996) 6997.
- [Sei02] Ari Paavo Seitsonen. Theoretical investigations into adsorption and co-adsorption on transition-metal surfaces as models to heterogeneous catalysis. Dissertation, Fachbereich Physik, Technische Universität Berlin (2002).

- [Shi77] T. Shibaguchi, H. Onuki und R. Onaka. Electronic structures of water and ice. *Journal of the Physical Society of Japan* **42**, 1, (1977) 152.
- [Shl93] A. L. Shluger und A. M. Stoneham. Small polarons in real crystals: concepts and problems. *Journal of Physics: Condensed Matter* **5**, (1993) 3049.
- [Shu66] V. N. Shubin, V. A. Zhigunov und V. I. Zdotarevsky. Pulse radiolysis of crystalline ice and frozen crystalline aqueous solutions. *Nature* **212**, (1966) 1002.
- [Smi85] N. V. Smith. Phase Analysis of Image States and Surface States associated with Nearly-Free-Electron Band Gaps. *Physical Review B* **32**, 6, (1985) 3549.
- [Smi89] N. V. Smith und C. T. Chen. Distance of the Image Plan from Metal Surfaces. *Physical Review B* **40**, 11, (1989) 7565.
- [Smi96] R. S. Smith, C. Huang, E. K. L. Wong und B. D. Kay. Desorption and crystallization kinetics in nanoscale thin films of amorphous water ice. *Surface Science* **367**, (1996) L13.
- [Smi97] R. S. Smith und B.D. Kay. Molecular beam studies of kinetic processes in nanoscale water films. *Surface Review and Letters* **4**, 4, (1997) 781.
- [Smi99] R. S. Smith und B.D. Kay. The existence of supercooled liquid water at 150 K. *Nature* **398**, (1999) 788.
- [Smi00] R. S. Smith, Z. Dohnálek, G. A. Kimmel, K. P. Stevenson und B.D. Kay. The self-diffusivity of amorphous solid water near 150 K. *Chemical Physics* **258**, (2000) 291.
- [Sob02a] A. L. Sobolewski und W. Domcke. Ab initio investigation of the structure and spectroscopy of hydronium–water clusters. *Journal of Physical Chemistry A* **106**, (2002) 4158.
- [Sob02b] A. L. Sobolewski und W. Domcke. Hydrated hydronium: a cluster model of the solvated electron. *Physical Chemistry and Chemical Physics* **4**, (2002) 4.
- [Son01a] D. H. Son, P. Kambhampati, T. W. Kee und P. F. Barbara. Delocalizing electrons in water with light. *Journal of Physical Chemistry A* **105**, 36, (2001) 8269.
- [Son01b] D. H. Son, P. Kambhampati, T. W. Kee und P. F. Barbara. One-photon UV detrapping of the hydrated electron. *Chemical Physics Letters* **342**, (2001) 571.
- [Ste99] K. P. Stevenson, G. A. Kimmel, Z. Dohnálek, R. S. Smith und B. D. Kay. Controlling the morphology of amorphous solid water. *Science* **283**, (1999) 1505.
- [Tak97] I. Takei und N. Maeno. Dielectric low-frequency dispersion and crossover phenomena of HCl-doped ice. *Journal of Physical Chemistry B* **101**, (1997) 6234.
- [Thi87] P. A. Thiel und T. E. Madey. The interaction of water with solid surfaces: fundamental aspects. *Surface Science Reports* **7**, (1987) 211.

- [Tho99] C. L. Thomsen, D. Madsen, S. R. Keiding und J. Thøgersen. Two-photon dissociation and ionization of liquid water studied by femtosecond transient absorption spectroscopy. *Journal of Chemical Physics* **110**, 7, (1999) 3453.
- [Tut91] T. R. Tuttle und S. Golden. Solvated electrons: What is solvated? *Journal of Physical Chemistry* **95**, (1991) 5725.
- [Vel98] D. Velic, A. Hotzel, M. Wolf und G. Ertl. Electronic States of the C₆H₆/Cu(111) System: Energetics, Femtosecond Dynamics and Adsorption Morphology. *Journal of Chemical Physics* **109**, 20, (1998) 1.
- [Vel99] D. Velic, E. Knoesel und M. Wolf. Observation of a Direct Transition in the *sp*-Band of Cu(111) and ($\sqrt{3} \times \sqrt{3}$)R30°-CO/Cu(111) in One- and Two-Photon-Photoemission. *Surface Science* **424**, (1999) 1.
- [Vil01] V. H. Vilchiz, J. A. Kloepfer, A. C. Germaine, V. A. Lenchenkov und S. E. Bradforth. Map for the relaxation dynamics of hot photoelectrons injected into liquid water via anion threshold photodetachment and above threshold solvent ionization. *Journal of Physical Chemistry A* **105**, (2001) 1711.
- [Wag04] St. Wagner, D. Denzler, Chr. Frischkorn und M. Wolf. private Mitteilung .
- [Wal80] D. C. Walker. Dynamics of electron localization. *Journal of Physical Chemistry* **84**, (1980) 1140.
- [Wei02] M. Weinelt. Time-resolved two-photon photoemission from metal surfaces. *Journal of Physics: Condensed Matter* **14**, (2002) R1099.
- [Wha76] E. Whalley. The hydrogen bond in ice. In *The hydrogen bond*. Noth-Holland, Amsterdam, (1976) 1425.
- [Wil97] T. Wilhelm, Piel. J. und E. Riedle. Sub-20-fs pulses tunable across the visible from a blue-pumped single-pass noncollinear parametric converter. *Optics Letters* **22**, 19, (1997) 1494.
- [Wit99] H. Witek und V. Buch. Structure of ice multilayers on metals. *Journal of Chemical Physics* **110**, 6, (1999) 3168.
- [Wol97] M. Wolf. Femtosecond dynamics of electronic excitations at metal surfaces. *Surface Science* **377-379**, (1997) 343.
- [Wol99] M. Wolf, A. Hotzel, E. Knoesel und D. Velic. Direct and indirect excitation mechanisms in two-photon photoemission spectroscopy of Cu(111) and CO/Cu(111). *Physical Review B* **59**, 8, (1999) 5926.
- [Yan01] C.-Y. Yang, K. F. Wong, Skaf. M. S. und P. J. Rossky. Instantaneous normal mode analysis of hydrated electron solvation dynamics. *Journal of Chemical Physics* **114**, 8, (2001) 3598.

- [Zal83] R. Zallen. *The physics of amorphous solids*. John Wiley & Sons, New York, 1983.
- [Zew94] A.H. Zewail. *Femtochemistry: Ultrafast Dynamics of the Chemical Bond*. World Scientific, Singapore, 1994.
- [Zho91] X.-L. Zhou, X.-Y. Zhu und J. M. White. Photochemistry at adsorbate/metal interfaces. *Surface Science Reports* **13**, (1991) 73.
- [Zho02] Q. Zhong, C. Gahl und M. Wolf. Two-photon photoemission spectroscopy of Pyridine adsorbed on Cu(111). *SS* **496**, (2002) 21.
- [Zhu94] X.-Y. Zhu. Surface photochemistry. *Annual Reviews of Physical Chemistry* **45**, (1994) 113.
- [Zim01] C. Zimmermann, F. Willig, S. Ramakrishna, B. Burfeindt, B. Pettinger, R. Eichberger und W. Storck. Experimental fingerprints of vibrational wave-packet motion during ultrafast heterogeneous electron transfer. *Journal of Physical Chemistry B* **105**, 38, (2001) 9245.