BIBLIOGRAPHY

[1] S. Backus, C. Durfee, M. Murnane, and H. Kapteyn. High power ultrafast lasers. *Rev. Sci. Instrum.*, 69(3):1207–1223, 1998.

[2] G. A. Somorjai. *Intorduction to surface chemistry and catalysis*. John Wiley & Sons, 1994.

[3] Z. Chang, A. Rundquist, H. Wang, M. M. Murnane, and H. C. Kapteyn. Generation of coherent soft x-rays at 2.7 nm using high harmonics. *Phys. Rev. Lett.*, 79(16-20):2967–2970, 1997.

[4] C. Durfee, A. Rundquist, S. Backus, C. Herne, M. Murnane, and H. Kapteyn. Phase matching of high-order harmonics in hollow waveguides. *Phys. Rev. Lett.*, 83(11):2187–2190, 1999.

[5] A. Paul, R. A. Bartels, R. Tobey, H. Green, S. Weiman, I. P. Christov, M. M. Murnane, H. C. Kapteyn, and S. Backus. Quasi-phase-matched generation of coherence extreme-ultraviolet light. *Nature*, 421(6918):51–54, 2003.

[6] F. J. Kao, D. G. Busch, D. Cohen, D. Gomes da Costa, and W. Ho. Femtosecond laser desorption of molecular adsorbed oxygen from Pt(111). *Phys. Rev. Lett.*, 71(13):2094–2097, 1993.

[7] J. A. Prybyla, T. F. Heinz, J. A. Misewich, M. M. T. Loy, and J. H. Glownia. Desorption induced by femtosecond laser pulses. *Phys. Rev. Lett.*, 64(13):1537–1540, 1990.

[8] L. M. Struck, L. J. Richter, S. A. Buntin, R. R. Cavanagh, and J. C. Stephenson. Femtosecond laser-induced desorption of CO from $\mathrm{Cu}(100)$: Comparison of theory and experiment. *Phys. Rev. Lett.*, 77(22):4576–4579, 1993.

[9] G. Eichorn, M. Richter, K. Al-Shamery, and H. Zacharias. Time-correlated laser desorption of NO from NiO(100)/Ni(100). *Chem. Phys. Lett.*, 289(3-4):367–372, 1998.

[10] F. Budde, T. F. Heinz, M. M. T. Loy, J. A. Misewich, F. de Rougemont, and H. Zacharias. Femtosecond time-resolved measurement of desorption. *Phys. Rev. Lett.*, 66(23):3024–3027, 1991.

[11] J. A. Misewich, A. Kalamarides, T. F. Heinz, U Höfer, and M. M. T. Loy. Vibrationally assisted electronic desorption: Femtosecond surface chemistry of $O_2/Pd(111)$. *J. Chem. Phys.*, 100(1):736–739, 1994.

[12] S. Deliwala, R. Finlay, J. Goldman, T. Her, W. Mieher, and E. Mazur. Surface femtochemistry of O_2 and CO on $Pt(111)$. *Chem. Phys. Lett.*, 242(6):617–622, 1995.

[13] W. D. Mieher and W. Ho. Bimolecular surface photochemistry: Mechanisms of co oxidation on $Pt(111)$ at 85 K. *J. Chem. Phys.*, 99(11):9279–9295, 1993.

[14] F. J. Kao, D. G. Busch, D. Gomes da Costa, and W. Ho. Femtosecond versus nanosecond surface photochemistry – O_2+CO on $Pt(111)$ at $80K$. *Phys. Rev. Lett.*, 70(26):4098–4101, 1993.

[15] T. Her, R. J. Finlay, C. Wu, and E. Mazur. Surface femtochemistry of $CO/O_2/Pt(111)$: The importance of nonthermalized substrate electrons. *J. Chem. Phys.*, 108(20):8595–8598, 1998.

[16] M. Bonn, S. Funk, C. Hess, D. Denzler, C. Stampfl, M. Scheffler, M. Wolf, and G. Ertl. Phonon- versus electron-mediated desorption and oxidation of CO on $Ru(0001)$. *Science*, 285(5430):1042–1045, 1999.

[17] W. Steinmann and Th. Fauster. Two-photon photoelectron spectroscopy of electronic states at metal surfaces. In H. L. Dai and W. Ho, editors, *Laser spectroscopy and photochemistry on metal surfaces*, Advanced series in physical chemistry, chapter 5. World Scientific Publishing, 1995.

[18] S. Schuppler, N. Fischer, Th. Fauster, and W. Steinmann. Lifetime of image-potential states on metal surfaces. *Phys. Rev. B*, 46(20):13539–13547, 1992.

[19] R. W. Schoenlein, J. G. Fujimoto, G. L. Eesley, and T. W. Capehart. Femtosecond studies of image-potential dynamics in metals. *Phys. Rev. Lett.*, 61(22):2596–2599, 1988.

[20] R. W. Schoenlein, J. G. Fujimoto, G. L. Eesley, and T. W. Capehart. Femtosecond relaxation dynamics of image-potential states. *Phys. Rev. B*, 43(6):4688–4698, 1991.

[21] R. W. Schoenlein, J. G. Fujimoto, G. L. Eesley, and T. W. Capehart. Femtosecond dynamics of the n=2 image-potential state on $Ag(100)$. *Phys. Rev. B*, 41(8):5436–5439, 1990.

[22] M. Bauer, S. Pawlik, and M. Aeschlimann. Decay dynamics of photoexcited alkali chemisorbates: Real-time investigations in the femtosecond regime. *Phys. Rev. B*, 60(7):5016–5028, 1999.

[23] M.Bauer, S. Pawlik, and M. Aeschlimann. Resonance lifetime and energy of an excited Cs state on $Cu(111)$. *Phys. Rev. B*, 55(15):10040–10043, 1997.

[24] M. Bauer, S. Pawlik, R. Burgermeister, and M. Aeschlimann. Symmetry properties of an electron alkali excitation at a noble metal surface as investigated by two-photon photoemission. *Surf. Sci.*, 402-404:62–65, 1998.

[25] M. Bauer, S. Pawlik, and M. Aeschlimann. Femtosecond lifetime investigations of excited adsorbate states: atomic oxygen on $\mathrm{Cu}(111)$. *Surf. Sci.*, 377-379:350–354, 1997.

[26] Th. Fauster and W. Steinmann. *Photonic probes of Surface*, page 347. North-Holland, Amsterdam, 1995.

[27] H. Petek, M. Weida, H. Nagano, and S. Ogawa. Real-time observation of adsorbate atom motion above a metal surface. *Science*, 288(5470):1402–1404, 2000.

[28] S. Ogawa, H. Nagano, and H. Petek. Phase and energy relaxation in an antibonding surface state: $\mathrm{Cs/Cu}(111)$. *Phys. Rev. Lett.*, 82(9):1931, 1999.

[29] A. G. Borisov, A. K. Kazansky, and J. P. Gauyacq. Stabilisation of alkai-adsorbate-induced states on $\mathrm{Cu}(111)$ surfaces. *Surf. Sci.*, 430(1-3):165–175, 1999.

[30] W. S. Fann, R. Storz, H. W. K. Tom, and J. Bokor. Electron thermalizaton in gold. *Phys. Rev. B*, 46(20):13592–13595, 1992.

[31] P. B. Allen. Theory of thermal relaxation of electrons in metals. *Phys. Rev. Lett.*, 59(13):1460–1463, 1987.

[32] W. S. Fann, R. Storz, H. W. K. Tom, and J. Bokor. Direct measurement of nonequilibrium electron-energy distributions in subpicsecond laser-heated gold films. *Phys. Rev. Lett.*, 68(18):2834–2837, 1992.

[33] J. Bokor and W. S. Fann. Ultrafast hot electron relaxation in metals. In H. L. Dai and W. Ho, editors, *Laser spectroscopy and photochemistry on metal surfaces*, Advanced series in physical chemistry, chapter 8. World Scientific Publishing, 1995.

[34] J. A. Prybyla, H. W. K. Tom, and G. D. Aumiller. Femtosecond time-resolved surface reaction: Desorption of CO from $\mathrm{Cu}(111)$ in < 325 fs. *Phys. Rev. Lett.*, 68(4):503–506, 1992.

[35] M. Bonn, C. Hess, S. Funk, J. Miners, B. Persson, M. Wolf, and G. Ertl. Femtosecond surface vibrational spectroscopy of CO adsorbed on $\mathrm{Ru}(001)$ during desorption. *Phys. Rev. Lett.*, 84(20):4653–4656, 2000.

[36] Ch. Hess, M. Wolf, S. Roke, and M. Bonn. Femtosecond time-resolved vibrational sfg spectroscopy of $\mathrm{CO/Ru}(001)$. *Surf. Sci.*, 502-503:304–312, 2002.

[37] Y. R. Shen. Surface nonlinear optics: a historical prospective. *IEEE J. Sel. Top. Quant.*, 6(6):1375, 2000.

[38] Y. R. Shen. Surface-properities probed by 2nd-harmonic and sum-frequency generation. *Nature*, 337(6027):519–525, 1989.

[39] B. N. J. Persson, F. M. Hoffmann, and R. Ryberg. Influence of exciton motion on the shape of optical absorption lines: Applications to vibrations at surfaces. *Phys. Rev. B*, 34:2266–2283, 1989.

[40] R. W. Schoenlein, W. P. Leemans, A. H. Chin, P. Volfbeyn, T. E. Glover, P. Balling, M.S Zolotorev, K.-J. Kim, S. Chattopadhyay, and C. V. Shank. Femtosecond x-ray pulses at 0.4 Å generated by 90^o thomson scattering: A tool for probing the structural dynamics of materials. *Science*, 274(11):236–238, 1996.

[41] W. P. Leemans, R. W. Schoenlein, P. Volfbeyn, A. H. Chin, T. E. Glover, P. Balling, M.S Zolotorev, K.-J. Kim, S. Chattopadhyay, and C. V. Shank. Interaction of relativistic electrons with ultrashort laser pulses: generation of femtosecond x-rays and microprobing of electronbeams. *IEEE J. Quant. Electr.*, 33(11):1925–1934, 1997.

[42] K.-J. Kim, S. Chattopadhyay, and C. V. Shank. Generation of femtosecond x-rays by 90^o thomson scattering. *Nucl. Instrum. Meth. A*, 341(1-3):351–354, 1994.

[43] C. Pellegrini, J. Rosenzweig, G. Travish, K. Bane, R. Boyce, G. Loew, P. Morton, H.-D. Nuhn, J. Paterson, P. Pianetta, T. Raubenheimer, J. Seeman, R. Tatchyn, V. Vylet, H. Winick, K. Halbach, K.-J. Kim, M. Xie, D. Prosnitz, E. T. Scharlemann, R. Bonifacio, L. De Salvo, and P. Pierini. The SLAC soft x-ray high power FEL. *Nucl. Instru. Meth. A*, 341(1-3):326–330, 1994.

[44] G. N. Kulipanov, A. N. Skrinsky, and N. A. Vinokurov. Sychrotron light sources and recent developments of accelerator technology. *J. Synchr. Rad.*, 5(3):176–178, 1998.

[45] K.-J. Kim. Advanced capabilities for future light sources. *J. Synchr. Rad.*, 5(3):202–207, 1998.

[46] D. Attwood, editor. *Soft X-rays and extreme ultraviolet radiation*. Cambridge University Press, 1999.

[47] P. A. Franken, A. E. Hill, C. W. Peters, and G. Weinreich. Generation of optical harmonics. *Phys. Rev. Lett.*, 7(4):118–119, 1961.

[48] A. L'Huillier, M. Lewenstein, and P. Balcou. *Harmonic generation in strong laser fields*. Cambridge University Press, 2004.

[49] J. Diels and W. Rudolph, editors. *Ultrashort Laser Pulse Phenomena*. Academic Press, 1996.

[50] A. L'Huillier and Ph. Balcou. High-order harmonic generation in rare gases with a 1-ps 1053-nm laser. *Phys. Rev. Lett.*, 70(6):774–777, 1993.

[51] P. B. Corkum. Plasma perspective on strong-field multiphoton ionization. *Phys. Rev. Lett.*, 71(13):1994–1997, 1993.

[52] J. L. Krause, K. J. Schafer, and K. C. Kulander. High harmoinc generation from atoms and ions in the high intensity regime. *Phys. Rev. Lett.*, 68(24):3535–3538, 1992.

[53] K. J. Schafer and K. C. Kulander. High harmoinc generation from ultrafast pump lasers. *Phys. Rev. Lett.*, 78(4):638–641, 1997.

[54] R. Trebino, editor. *Frequency-Resolved Optical Gating: The measurement of Ultrashort Laser Pulses*. Kluwer Academic Publishers, 2002.

[55] L. Nugent-Glandorf, M. Scheer, D. A. Samuels, V. Bierbaum, and S. R. Leone. A laser-based instrument for the study of ultrafast chemical dynamics by soft x-ray-probe photoelectron spectroscopy. *Rev. Sci. Instrum.*, 73(4):1875–1886, 2002.

[56] L. Nugent-Glandorf, M. Scheer, D. A. Samuels, V. Bierbaum, and S. R. Leone. Ultrafast photodissociation of Br_2: Laser-generated high-harmonic soft x-ray probing of the transient photoelectron spectra and ionization cross sections. *J. Chem. Phys.*, 117(13):6108–6116, 2002.

[57] Website of the center of x-ray optics, Lawrence Berkely National Laboratory. http://cindy.lbl.gov.

[58] A. Stolow. Gigahertz bandwidth ultrahigh vacuum 50 Ω coaxial high-voltage coupling capacitor for photoelectron spectroscopy. *Rev. Sci. Instrum.*, 67(5):1777–1780, 1996.

[59] J. A. R. Samson. *Techniques of vacuum ultraviolet spectroscopy*. John Wiley & Sons, 1967.

[60] R. B. Cairns and J. A. R. Samson. Metal photocathodes as secondary standards for absolute intensity measurements in the vacuum ultraviolet. *J. Opt. Soc. Am.*, 56(11):1568–1573, 1966.

[61] J. L. Wiza. Microchannel plate detectors. *Nucl. Instrum. Meth.*, 162(1-3):587–601, 1979.

[62] M. Drescher, M. Hentschel, R. Kienberger, G. Tempea, C. Spielmann, G. A. Reider, P. B. Corkum, and F. Krausz. X-ray pulses approaching the attosecond frontier. *Science*, 291(5510):1923–1927, 2001.

[63] C. Puglia, A. Nilsson, B. Hernnas, O. Karis, P. Bennich, and N. Martensson. Physisorbed, chemisorbed and dissociated O_2 on $\mathrm{Pt}(111)$: Studied by different core-level spectroscopy methods. *Surf. Sci.*, 342(1-3):119–133, 1995.

[64] W. Wurth, J. Stöhr, P. Feulner, X. Pan, K. R. Bauchspiess, Y. Baba, E. Hudel, G. Rocker, and D. Menzel. Bonding, structure, and magnetism of physisorbed and chemisorbed O_2 on Pt(111). *Phys. Rev. Lett.*, 65(19):2426–2429, 1990.

[65] J. Gland, B. Sexton, and G. Fisher. Oxygen interactions with the $\mathrm{Pt}(111)$ surface. *Surf. Sci.*, 95(2-3):587–602, 1980.

[66] W. Eberhardt, T. Upton, S. Cramm, and L. Incoccia. Inner valence levels as a structural probe for chemisorbed molecules: O_2 on $\mathrm{Pt}(111)$. *Chem. Phys. Lett.*, 146(6):561–565, 1988.

[67] S. Lehwald, H. Ibach, and H. Steininger. Overtones and multiphoton processes in vibration spectra of adsorbed molecules. *Surf. Sci.*, 117(1-3):342–351, 1982.

[68] A. Eichler and J. Hafner. Reaction channels for the catalytic oxidation of CO on $\mathrm{Pt}(111)$. *Surf. Sci.*, 433-435:58–62, 1999.

[69] A. Eichler and J. Hafner. Molecular precursors in the dissociative adsorption of O_2 on $\mathrm{Pt}(111)$. *Phys. Rev. Lett.*, 79(22):4481–4484, 1997.

[70] A. Eichler, F. Mittendorfer, and J. Hafner. Precursor-mediated adsorption of oxygen on the (111) surfaces of platinum-group metals. *Phys. Rev. B*, 62(7):4744–4755, 2000.

[71] B. Stipe, M. Rezaei, and W. Ho. Atomistic studies of O_2 dissociation on $\mathrm{Pt}(111)$ induced by photons, electrons, and by heating. *J. Chem. Phys.*, 107(16):6443–6447, 1997.

[72] B. Stipe, M. Rezaei, W. Ho, S. Gao, M. Persson, and B. Lundqvist. Single-molecule dissociation by tunneling electrons. *Phys. Rev. Lett.*, 78(23):4410–4413, 1997.

[73] N. R. Avery. An EELS and TDS study of molecular oxygen desorption and decomposition on $\mathrm{Pt}(111)$. *Chem. Phys. Lett.*, 96(3):371–373, 1983.

[74] T. Matsushima. The mechanism of the CO_2 formation on $\mathrm{Pt}(111)$ and polycyrstalline surfaces at low temperatures. *Surf. Sci.*, 127(3):403–423, 1983.

[75] H. Steininger, S. Lehwald, and H. Ibach. Adsorption of oxygen on $\mathrm{Pt}(111)$. *Surf. Sci.*, 123(1):1–17, 1982.

[76] M. L. Bocquet, J. Cerdà, and P. Sautet. Transformation of molecular oxygen on a platinum surface: A theoretical calculation of STM images. *Phys. Rev. B*, 59(23):15437–15445, 1999.

[77] R. J. Finlay, T. H. Her, C. Wu, and E. Mazur. Reaction pathways in surface femtochemistry: routes to desorption and reaction in $\mathrm{CO}/\mathrm{O}_2/\mathrm{Pt}(111)$. *Chem. Phys. Lett.*, 274(5-6):499–504, 1997.

[78] J. W. Gadzuk. Hot-electron femtochemistry at surfaces: on the role of multiple electron processes in desorption. *Chem. Phys.*, 251:87–97, 2000.

[79] J. W. Gadzuk. *Laser Spectroscopy and Photochemistry on Metal Surfaces*, chapter 21, pages 897–942. World Scientific, Singapore, 1995.

[80] B. Rethfeld. private communication.

[81] P. Siffalovic, M. Drescher, M. Spieweck, T. Wiesenthal, Y. C. Lim, R. Weidner, A. Elizarov, and U. Heinzmann. Laser based apparatus for extended ultraviolet femtosecond time-resolved photoemission spectroscopy. *Rev. Sci. Instrum.*, 72:30–35, 2001.

[82] E. Zarate, P. Apell, and P. M. Echenique. Calculation of low-energy-electron lifetimes. *Phys. Rev. B*, 60:2326–2332, 1999.

[83] R. Knorren, K. H. Bennemann, R. Burgermeister, and M. Aeschlimann. Dynamics of excited electrons in copper and ferromagnetic transition metals: Theory and experiment. *Phys. Rev. B*, 61:9427–9440, 2000.

[84] S. I. Anisimov, B. L. Kapeliovich, and T. L. Perelman. Electron-emission from surface of metals induced by ultrashort laser pulses. *Sov. Phys. JEPTP*, 66:776, 1974.

[85] F. Budde, T. F. Heinz amd A. Kalamarides, M. M. T. Loy, and J. A. Misewich. Vibrational distributions in desorption induced by femtosecond laser pulses - coupling of adsorbate vibration to substrate electronic excitation. *Surf. Sci.*, 283:143–157, 1993.

[86] P. D. Nolan, B. R. Lutz, P. L. Tanaka, J. E. Davis, and C. B. Mullins. Molecularly chemisorbed intermediates to oxygen adsorption on $\mathrm{Pt}(111)$: A molecular beam and electron energy-loss spectroscopy study. *J. Chem. Phys.*, 111(8):3696–3704, 1999.

[87] I. Panas and P. Siegbahn. A theoretical study of the peroxo and superoxo forms of molecular oxygen on metal surfaces. *Chem. Phys. Lett.*, 153:458–464, 1988.

[88] J. Misewich, S. Nakabayashi, P. Weigand, M. Wolf, and T. Heinz. Anomalous branching ratio in the femtosecond surface chemistry of $\mathrm{O_2/Pd}(111)$. *Surf. Sci.*, 363(1-3):204–213, 1996.

[89] T. Germer, J. Stephenson, E. Heilweil, and R. Cavanagh. Hot-carrier excitation of adlayers – time-resolved measurement of adsorbate-lattice coupling. *Phys. Rev. Lett.*, 71(20):3327–3330, 1993.

[90] M. Bauer, C. Lei, K. Read, R. Tobey, J. Gland, M. M. Murnane, and H. C. Kapteyn. Direct observation of surface chemistry using ultrafast soft-x-ray pulses. *Phys. Rev. Lett.*, 87(2):25501–25504, 2001.

[91] C. Lei, M. Bauer, K. Read, R. Tobey, Y. Liu, T. Popmintchev, M. M. Murnane, and H. C. Kapteyn. Hot-electron-driven charge transfer processes on $\mathrm{O_2/Pt}$ surface probed by ultrafast extreme-ultraviolet pulses. *Phys. Rev. B*, 66(24):245420–245430, 2002.

[92] S. Hüfner. *Photoelectron spectroscopy*. Springer-Verlag, 1995.

[93] H. J. Freund and N. Neumann. Photoemission of molecular adsorbates. *Appl. Phys. A*, 47:3–23, 1988.

[94] D. C. Harris and M. D. Bertolucci, editors. *Symmetry and spectroscopy: an introduction to vibrational and electronic spectroscopy*. Dover publications, New York, 1978.

[95] H. P. Steinrück. Angle-resolved photoemission studies of adsorbed hydrocarbons. *J. Phys.: Condens. Matter*, 8:6465–6509, 1996.

[96] G. Blyholder. CNDO model and interpretation of the photoelectron spectrum of CO chemisorbed on Ni. *J. Vac. Sci. Technol.*, 11(5):865–868, 1974.

[97] J. E. Demuth, D. Schmeisser, and Ph. Avouris. Resonance scattering of electrons from $\mathrm{N_2}$, CO, $\mathrm{O_2}$ and $\mathrm{H_2}$ adsorbed on a silver surface. *Phys. Rev. Lett.*, 47(16):1166–1169, 1981.

[98] C. L. Allyn, T. Gustafsson, and E. W. Plummer. The orientation of CO adsorbed on $\mathrm{Ni}(100)$. *Chem. Phys. Lett.*, 1:127–132, 47.

[99] K. H. Frank, H. J. Sagner, E. E. Koch, and W. Eberhardt. $2\pi^*$ level of chemisorbed CO on Ni(111): Nearest-neighbor interactions versus bonding to the substrate. *Phys. Rev. B*, 38(12):8501, 1988.

[100] N. V. Richardson and A. M. Bradshaw. The frequencies and amplitudes of CO vibrations at a metal surface from model cluster calculations. *Surf. Sci.*, 88(1):225–268, 1979.

[101] A. M. Lahee, J. P. Toennies, and Ch. Wöll. Low energy adsorbate vibrational modes observed with inelastic helium atom scattering: CO on Pt(111). *Surf. Sci.*, 117(1-3):371–388, 1986.

[102] H. Ibach and D. L. Mills, editors. *Electron Energy Loss Spectroscopy and Surface Vibrations*. Academic Press, New York, 1982.

[103] A. Alavi, P. Hu, T. Deutsch, P. Silvestrelli, and J. Hutter. CO oxidation on $\mathrm{Pt}(111)$: An $ab\ initio$ density functional theory study. *Phys. Rev. Lett.*, 80(16):3650–3683, 1998.

[104] B. Poelsema, L. K. Verheij, and G. Comsa. He-scattering investigation of CO migration on Pt(111). *Phys. Rev. Lett.*, 49(23):1731–1735, 1982.

[105] B. N. J. Persson and R. Rydberg. Vibrational phase relaxation at surface: CO on Ni(111). *Phys. Rev. Lett.*, 54(19):2119–2122, 1985.

[106] B. E. Hayden and A. M. Bradshaw. The adsorption of CO on Pt(111) studied by infrared reflection-adsorption spectroscopy. *Surf. Sci.*, 125(3):787–802, 1983.

[107] E. Schweizer, B. N. J. Persson, M. Tushaus, D. Hoge, and A. M. Bradshaw. The potential energy surface, vibrational phase relaxation and the order-disorder transition in the adsorption system $\mathrm{Pt}(111)$-CO. *Surf. Sci.*, 213(1):49–89, 1989.

[108] Ch. Hess, S. Funk, M. Bonn, D. N. Denzler, M. Wolf, and G. Ertl. Femtosecond dynamics of chemical reactions at surfaces. *Appl. Phys. A*, 71(5):477–483, 2000.

[109] P. Jakob and B. N. J. Perrson. Infrared spectroscopy of overtones and combination bands. *J. Chem. Phys.*, 109(19):8641–8651, 1998.

[110] C. Zhang, P. Hu, and A. Alavi. A density functional theory study of CO oxidation on $\mathrm{Ru}(0001)$. *J. Chem. Phys.*, 112(23):10564–10570, 2000.

[111] *X-ray data booklet*. Lawrence Berkeley National Laboratory, 2001.

[112] SES-100 and SES-200 electron spectrometer from Gammadata-Scienta, Sweden.

[113] J. Ullrich, R. Moshammer, R. Dörner, O. Jagutzki, V. Mergel, H. Schmidt-Böcking, and L. Spielberger. Recoil-ion momentum spectroscopy. *J. Phys. B: At. Mol. Opt. Phys.*, 30:2917–2974, 1997.

[114] 3-dimensional Multihit-MCP-Detector from RoentDek GmbH, Germany.

[115] R. Moshammer, M. Unverzagt, W. Schmitt, J. Ullrich, and H. Schmidt-Böcking. A 4π recoil-ion electron momentum analyzer: a high-resolution "microscope" for the investigation of the dynamics of atomic molecular and nuclear reactions. *Nucl. Instr. and Meth. in Phys. Res. B*, 108:425–445, 1996.

[116] M. A. Abdallah, A. Landers, M. Singh, W. Wolff, H. E. Wolf, E. Y. Kamber, M. Stöckli, and C. L. Cocke. Capture and ionization processes studied with $\mathrm{COLTRIMS}$. *Nucl. Instr. and Meth. in Phys. Res. B*, 154:73–82, 1999.

[117] G. J. Schulz. Resonances in electron-impact on diatomic-molecules. *Rev. Mod. Phys.*, 45(3):423–486, 1973.

[118] N. F. Lane. Theory of electron-molecule collisions. *Rev. Mod. Phys.*, 52(1):29–119, 1980.

[119] M. Allan. Study of triple-states and short-lived negative-ions by means of electron-impact spectroscopy. *J Elec. Spect. Relat. Phenom.*, 48(3-4):219–315, 1989.

[120] W. Domcke and L. S. Cederbaum. Simple formula for vibrational structure of resonances in electron-molecule scattering. *J. Phys. B*, 10(2):L47–L52, 1977.

[121] W. Domcke and L. S. Cederbaum. Vibration-induced narrowing of electron-scattering resonances near threshold. *J. Phys. B*, 13(14):2829–2838, 1980.

[122] P. W. Atkins, editor. *Physical Chemistry*. W. H. Freeman Company, 2001.

[123] A. Groß, editor. *Theoretical Surface Science: A Microscopic Perspective*. Springer-Verlog, Berlin, 2003.

[124] D. Menzel and R. Gomer. Desorption from metal surfaces by low-energy electrons. *J. Chem. Phys.*, 41(11):3311–3328, 1964.

[125] P. A. Redhead. Interaction of slow electrons with chemisorbed oxygen. *Can. J. Phys.*, 42:886–905, 1964.

[126] J. W. Gadzuk, L. J. Richter, S. A. Buntin, D. S. King, and R. R. Cavanagh. Laser-excited hot-electron induced desorption: A theorectical model applied to $\mathrm{NO/Pt(111)}$. *Surf. Sci.*, 235(2-3):317–333, 1990.

[127] J. A. Misewich, T. F. Heinz, and D. M. Newns. Desorption induced by multiple electronic transitions. *Phys. Rev. Lett.*, 68(25):3737–3740, 1992.