

---

## REFERENCES

---

- [1] E. Schrödinger, *What's Life? The Physical Aspect of the Living Cell.* 1944, Cambridge: Cambridge University Press.
- [2] I. Prigogine, I. Stengers, *A nova Aliança ('La Nouvelle alliance; métamorphose de la science')*. 1984, Brasília: Editora Universidade de Brasília.
- [3] P. Glansdorf, I. Prigogine, *Thermodynamic Theory of Structure, Stability and Fluctuations.* 1971, London: Wiley-Interscience.
- [4] G. Nicolis, I. Prigogine, *Self-Organization in Nonequilibrium Systems: From Dissipative Structures to Order Through Fluctuation.* 1977, New York: Wiley.
- [5] P. Ball, *The Self-Made Tapestry: Pattern Formation in Nature.* 2001, Oxford: Oxford University Press.
- [6] A. N. Zaikin, A. M. Zhabotinsky, Concentration Wave Propagation in 2-Dimensional Liquid-Phase Self-Oscillating System. *Nature* 225 (1970) 535.
- [7] A. T. Winfree, Spiral Waves of Chemical Activity. *Science* 175 (1972) 634.
- [8] A. M. Zhabotinsky, A history of chemical oscillations and waves. *Chaos* 1 (1991) 379.
- [9] I. R. Epstein, K. Showalter, Nonlinear chemical dynamics: Oscillations, patterns, and chaos. *J. Phys. Chem.* 100 (1996) 13132.
- [10] F. Sagues, I. R. Epstein, Nonlinear chemical dynamics, *J. Chem. Soc. - Dalton Trans.* (2003) 1201.
- [11] H. H. Rotermund, W. Engel, M. Kordesch, G. Ertl, Imaging of Spatiotemporal Pattern Evolution during Carbon- Monoxide Oxidation on Platinum. *Nature* 343 (1990) 355.
- [12] S. Jakubith, H. H. Rotermund, W. Engel, A. von Oertzen, G. Ertl. Spatiotemporal Concentration Patterns in a Surface Reaction - Propagating and Standing Waves, Rotating Spirals, and Turbulence. *Phys. Rev. Lett.* 65 (1990) 3013.
- [13] G. Ertl, Oscillatory Kinetics and Spatiotemporal Self-Organization in Reactions at Solid-Surfaces. *Science* 254 (1991) 1750.
- [14] G. Veser, F. Esch, R. Imbihl, Regular and Irregular Spatial Patterns in the Catalytic Reduction of NO with NH<sub>3</sub> on Pt(100). *Catal. Lett.* 13 (1992) 371.

- [15] S. L. Lane, D. Luss, Rotating Temperature Pulse During Hydrogen Oxidation on a Nickel Ring. *Phys. Rev. Lett.* 70 (1993) 830.
- [16] R. Imbihl, G. Ertl, Oscillatory Kinetics in Heterogeneous Catalysis. *Chem. Rev.* 95 (1995) 697.
- [17] M. Eiswirth, M. Bär, H. H. Rotermund. Spatiotemporal Selforganization on Isothermal Catalysts. *Physica D* 84 (1995) 40.
- [18] M. Eiswirth, G. Ertl, Pattern Formation on Catalytic Surfaces, in *Chemical Waves and Patterns*, R. Kapral and K. Showalter, Editors. 1995, Amsterdam: Kluver Academic Press. p. 447.
- [19] M. A. Liauw, J. Ning, D. Luss, Pattern formation on a non-uniformly active ring. *J. Chem. Phys.* 104 (1996) 5657.
- [20] A. S. Mikhailov, Nonlinear phenomena in heterogeneous catalysis. *Physica A* 263 (1999) 329.
- [21] G. Ertl, Dynamics of reactions at surfaces. *Adv. Catal.* 45 (2000) 1.
- [22] D. Luss, B. Marwaha, Hot zones evolution and dynamics in heterogeneous catalytic systems. *Chaos* 12 (2002) 172.
- [23] J. L. Hudson, T. T. Tsotsis, Electrochemical Reaction Dynamics - A Review. *Chem. Eng. Sci.* 49 (1994) 1493.
- [24] M. T. M. Koper, Oscillations and complex dynamical bifurcations in electrochemical systems, in *Advances in Chemical Physics*, I. Prigogine and S.A. Rice, Editors. 1996, New York: Wiley. Vol. 92, p.161.
- [25] K. Krischer, Principles of spatial and temporal pattern formation in electrochemical systems, in *Modern Aspects of Electrochemistry*, B.E. Conway, J.O.M. Bockris, and R. White, Editors. 1999, New York: Kluwer Academic/Plenum. Vol. 32, p. 1.
- [26] K. Krischer, N. Mazouz, P. Grauel, Fronts, waves, and stationary patterns in electrochemical systems. *Angew. Chem., Int. Ed.* 40 (2001) 851.
- [27] K. Krischer. New directions and challenges in electrochemistry - Spontaneous formation of spatiotemporal patterns at the electrode vertical bar electrolyte interface. *J. Electroanal. Chem.* 501 (2001) 1.
- [28] K. Krischer, Nonlinear dynamics in electrochemical systems, in *Advances in Electrochemical Science and Engineering*, R. C. Alkire and D. M. Kolb, Editors. 2003, Weinheim: Wiley-VCH. Vol. 8, p. 89.
- [29] P. Gray, S. K. Scott, *Chemical Waves and Instabilities. Nonlinear Chemical Kinetics*. 1994, Oxford: Clarendon.

- [30] I. R. Epstein, J. A. Pojman, *An Introduction to Nonlinear Chemical Dynamics*. 1998, New York: Oxford University Press.
- [31] G. T. Fechner, Ueber Umkehrungen der Polarität in der einfachen Kette. *Schweigg. J.* 53 (1828) 129.
- [32] H. L. Heathcote, Vorläufiger Bericht über Passivierung und Aktivierung des Eisens. *Z. Phys. Chem.* 37 (1901) 368.
- [33] H. L. Heathcote, The Passifying, Passivity and Activifying of Iron. *J. Soc. Chem. Ind.* 26 (1907) 899.
- [34] R. S. Lillie, Factors Affecting Transmission and Recovery in the Passive Iron Nerve Model. *J. Gen. Physiol.* 7 (1925) 473.
- [35] R. S. Lillie, The Passive Iron Wire Model of Protoplasmic and Nervous Transmission and Physiological Analogues. *Biol. Rev.* 16 (1936) 181.
- [36] G. Bredig, J. Weinmayr, Eine periodische Kontaktkatalyse. *Z. Phys. Chem.* 42 (1903) 601.
- [37] J. Keizer, P. A. Rock, S. W. Lin, Analysis of the Oscillations in Beating Mercury Heart Systems. *J. Am. Chem. Soc.* 101 (1979) 5637.
- [38] S. Smolin, R. Imbihl, Hydrodynamic modes of the "beating mercury heart" in varying geometries. *J. Phys. Chem.* 100 (1996) 19055.
- [39] N. Mazouz, G. Flätgen, K. Krischer, Tuning the range of spatial coupling in electrochemical systems: From local via nonlocal to global coupling. *Phys. Rev. E* 55 (1997) 2260.
- [40] P. Grauel, J. Christoph, G. Flätgen, K. Krischer, Stationary potential patterns during the reduction of peroxodisulfate at Ag ring electrodes. *J. Phys. Chem. B* 102 (1998) 10264.
- [41] P. Grauel, K. Krischer, Fronts and stationary domains during electrochemical H<sub>2</sub> oxidation on Pt: The impact of the position of the reference electrode on the spatiotemporal behaviour. *Phys. Chem. Chem. Phys.* 3 (2001) 2497.
- [42] P. Strasser, J. Christoph, W. F. Lin, M. Eiswirth, J. L. Hudson, Standing wave oscillations in an electrocatalytic reaction. *J. Phys. Chem. A* 104 (2000) 1854.
- [43] J. Lee, J. Christoph, P. Strasser, M. Eiswirth, G. Ertl, Spatio-temporal interfacial potential patterns during the electrocatalyzed oxidation of formic acid on Bi-modified Pt. *J. Chem. Phys.* 115 (2001) 1485.
- [44] J. Christoph, P. Strasser, M. Eiswirth, G. Ertl, Remote triggering of waves in an electrochemical system. *Science* 284 (1999) 291.

- [45] J. Christoph, R. D. Otterstedt, M. Eiswirth, N. I. Jaeger, J. L. Hudson, Negative coupling during oscillatory pattern formation on a ring electrode. *J. Chem. Phys.* 110 (1999) 8614.
- [46] J. Christoph, *Musterbildung auf Elektrodenoberflächen*. 1999, Ph. D. Thesis. Freie Universität Berlin: Berlin.
- [47] P. Grauel, H. Varela, K. Krischer, Spatial bifurcations of fixed points and limit cycles during the electrochemical oxidation of H<sub>2</sub> on Pt ring-electrodes. *Faraday Discuss.* 120 (2001) 165.
- [48] Y. Kuramoto, *Chemical oscillations, waves, and turbulence*. 1984, Berlin: Springer-Verlag.
- [49] M. C. Cross, P. C. Hohenberg, Pattern Formation outside of Equilibrium. *Rev. Mod. Phys.* 65 (1993) 851.
- [50] L. Kramer, F. Hynne, P. G. Sorenson, D. Walgraef, The Ginzburg-Landau approach to oscillatory media. *Chaos* 4 (1994) 443.
- [51] A. S. Mikhailov, *Foundations of Synergetics I*. 1994, Berlin: Springer Verlag.
- [52] I. S. Aranson, L. Kramer. The world of the complex Ginzburg-Landau equation. *Rev. Mod. Phys.* 74 (2002) 99.
- [53] F. Plenge, H. Varela, M. Lübke, K. Krischer, Quantitative modeling of the oscillatory electrooxidation of hydrogen on Pt in the presence of poisons. *Z. Phys. Chem.* 217 (2003) 365.
- [54] M. Eiswirth, A. Freund, J. Ross. Mechanistic Classification of Chemical Oscillators and the Role of Species. *Adv. Chem. Phys.* 80 (1991) 127.
- [55] R. Kapral, K. Showalter, Eds. *Chemical Waves and Patterns*. 1995, Dordrecht: Kluwer Academic Publishers.
- [56] P. Manneville, *Dissipative Structures and Weak Turbulence*. 1990, San Diego: Academic Press.
- [57] R. B. Bird, W. E. Stewart, E. N. Lightfoot, *Transport Phenomena*. 1960, New York: John Wiley and Sons.
- [58] C. Normand, Y. Pomeau, M. G. Velarde, Convective Instability - A Physicist's Approach. *Rev. Mod. Phys.* 49 (1977) 581.
- [59] K. R. Sreenivasan. Fluid turbulence. *Reviews of Modern Physics* 71 (1999) S383.
- [60] A. S. Mikhailov, A. Y. Loskutov, *Foundations of Synergetics II*. 1996, Berlin: Springer-Verlag.

- [61] G. Nicolis, *Introduction to Nonlinear Science*. 1995, Cambridge: Cambridge University Press.
- [62] T. B. Benjamin, J. E. Feir, Disintegration of Wave Trains on Deep Water. 1. Theory. *J. Fluid Mech.* 27 (1967) 417.
- [63] D. Battogtokh, A. Mikhailov, Controlling turbulence in the complex Ginzburg-Landau equation. *Physica D* 90 (1996) 84.
- [64] D. Battogtokh, A. Preusser, A. Mikhailov, Controlling turbulence in the complex Ginzburg-Landau equation, 2: Two-dimensional systems. *Physica D* 106 (1997) 327.
- [65] J. P. Gollub, Order and Disorder in Fluid Motion. *Proc. Natl. Acad. Sci. U.S.A.* 92 (1995) 6705.
- [66] J. O. M. Bockris, A. N. Reddy, *Modern Electrochemistry*. 1970, New York: Plenum.
- [67] A. J. Bard, L. R. Faulkner, *Electrochemical Methods: Fundamentals and Applications*. 1980, New York: Wiley.
- [68] R. Parsons, Electrical Double Layer: Recent Experimental and Theoretical Developments. *Chem. Rev.* 90 (1990) 813.
- [69] C. M. A. Brett, A. M. O. Brett, *Electrochemistry: Principles, Methods, and Applications*. 1993, Oxford: Oxford University Press.
- [70] C. H. Hamann, A. Hamnett, W. Vielstich, *Electrochemistry*. 1998, Weinheim: Wiley/VCH.
- [71] E. A. Ticianelli, E. R. Gonzalez, *Eletroquímica*. 1998, São Paulo: Edusp.
- [72] D. M. Kolb. Electrochemical Surface Science. *Angew. Chem Int. Ed.* 40 (2001) 1162.
- [73] J. O. M. Bockris, M. Devanathan, K. Müller, On Structure of Charged Interfaces. *Proc. R. Soc. Lon. Ser. A* 274 (1963) 55.
- [74] P. Strasser, M. Eiswirth, M. T. M. Koper, Mechanistic classification of electrochemical oscillators - operational experimental strategy. *J. Electroanal. Chem.* 478 (1999) 50.
- [75] M. T. M. Koper, The theory of electrochemical instabilities. *Electrochim. Acta* 37 (1992) 1771.
- [76] A. N. Frumkin, Adsorptionserscheinungen und elektrochemische Kinetik. *Z. Elektrochem.* 59 (1955) 807.
- [77] W. Wolf, J. Ye, M. Purgand, M. Eiswirth, K. Doblhofer, Modeling the oscillating electrochemical reduction of peroxodisulfate. *Ber. Bunsenges. Phys. Chem.* 96 (1992) 1797.

- [78] J. Christoph, M. Eiswirth, Theory of electrochemical pattern formation. *Chaos* 12 (2002) 215.
- [79] K. Krischer, H. Varela, A. Bîrzu, F. Plenge, A. Bonnefont, Stability of uniform electrode states in the presence of ohmic drop compensation. *Electrochim. Acta*, in press (2003).
- [80] G. Flätgen, K. Krischer, A General Model for Pattern Formation in Electrode Reactions. *J. Chem. Phys.* 103 (1995) 5428.
- [81] H. Angestein-Kozlowska, B. E. Conway, W. B. A. Sharp, Real Condition of Electrochemically Oxidized Platinum Surfaces. 1: Resolution of Component Processes. *J. Electroanal. Chem.* 43 (1973) 9.
- [82] B. E. Conway, H. Angestein-Kozlowska, Electrochemical Study of Multiple-State Adsorption in Monolayers. *Acc. Chem. Res.* 14 (1981) 49.
- [83] J. O. M. Bockris, Ed. *Chapter 4. Modern Aspects of Electrochemistry*, ed. J.O.M. Bockris and B.E. Conway. Vol. 1. 1954, London: Butterworths.
- [84] B. E. Conway, B. V. Tilak, Behavior and characterization of kinetically involved chemisorbed intermediates in electrocatalysis of gas evolution reactions. *Adv. Catal.* 38 (1992) 1.
- [85] B. E. Conway, B. V. Tilak, Interfacial processes involving electrocatalytic evolution and oxidation of H<sub>2</sub>, and the role of chemisorbed H. *Electrochim. Acta* 47 (2002) 3571.
- [86] G. Jerkiewicz, Hydrogen sorption at/in electrodes. *Prog. Surf. Sci.* 57 (1998) 137.
- [87] V. I. Birss, M. Chang, J. Segal, Platinum Oxide Film Formation Reduction - An In-Situ Mass Measurement Study. *J. Electroanal. Chem.* 355 (1993) 181.
- [88] A. Zolfaghari, B. E. Conway, G. Jerkiewicz, Elucidation of the effects of competitive adsorption of Cl<sup>-</sup> and Br<sup>-</sup> ions on the initial stages of Pt surface oxidation by means of electrochemical nanogravimetry. *Electrochim. Acta* 47 (2002) 1173.
- [89] B. E. Conway, Electrochemical Oxide Film Formation at Noble Metals as a Surface-Chemical Process. *Prog. Surf. Sci.* 49 (1995) 331.
- [90] H. A. Kozlowska, B. E. Conway, W. B. A. Sharp, Real Condition of Electrochemically Oxidized Platinum Surfaces. 1. Resolution of Component Processes. *J. Electroanal. Chem.* 43 (1973) 9.
- [91] D. A. Harrington, Simulation of anodic Pt oxide growth. *J. Electroanal. Chem.* 420 (1997) 101.

- [92] B. E. Conway, Reflections on directions of electrochemical surface science as a leading edge of surface chemistry. *J. Electroanal. Chem.* 524 (2002) 4.
- [93] V. S. Bagotzky, Y. B. Vassiliev, O. A. Khazova, Generalized Scheme of Chemisorption, Electrooxidation and Electrocatalysis of Simple Organic-Compounds on Platinum Group Metals. *J. Electroanal. Chem.* 81 (1977) 229.
- [94] B. E. Conway, B. V. Tilak, Behavior and Characterization of Kinetically Involved Chemisorbed Intermediates in Electrocatalysis of Gas Evolution Reactions. *Adv. Catal.* 38 (1992) 1.
- [95] M. A. H. Lanyon, B. M. W. Trapnell, The Interaction of Oxygen with clean Metal Surfaces. *Proc. R. Soc. Lon. Ser. A* 227 (1955) 387.
- [96] N. Sato, M. Cohen, The Kinetics of Anodic Oxidation of Iron in Neutral Solution. 1. Steady Growth Region. *J. Electrochem. Soc.* 111 (1964) 512.
- [97] N. Sato, M. Cohen, The Kinetics of Anodic Oxidation of Iron in Neutral Solution. 2. Initial Stages. *J. Electrochem. Soc.* 111 (1964) 519.
- [98] A. K. N. Reddy, M. A. Genshaw, J. O. M. Bockris, Ellipsometric Study of Oxygen-Containing Films on Platinum Anodes. *J. Chem. Phys.* 48 (1969) 671.
- [99] J. O. M. Bockris, M. A. Genshaw, Ellipsometric Study of Oxygen-Containing Films on Platinum Anodes. *J. Chem. Phys.* 51 (1969) 3149.
- [100] P. Stonehart, H. A. Kozlowska, B. E. Conway, Potentiodynamic Examination of Electrode Kinetics for Electroactive Adsorbed Species - Applications to Reduction of Noble Metal Surface Oxides. *Proc. R. Soc. Lon. Ser. A* 310 (1969) 541.
- [101] P. Schmuki, From Bacon to barriers: a review on the passivity of metals and alloys. *J. Solid State Electrochem.* 6 (2002) 145.
- [102] S. Gilman, Modification of Surface Area of Platinum Electrodes by Application of Single Pulses. *J. Electroanal. Chem.* 9 (1965) 276.
- [103] F. G. Will, Hydrogen Adsorption on Platinum Single Crystal Electrodes, I: Isotherms and Heats of Adsorption. *J. Electrochem. Soc.* 112 (1965) 451.
- [104] T. Biegler, Area Changes of a Smooth Platinum Electrode. *J. Electrochem. Soc.* 114 (1967) 1261.
- [105] V. S. Bagotzky, Y. B. Vassiliev, I. I. Pyshnograeva, Role of Structural Factors in Electrocatalysis, 1: Smooth Platinum Electrodes. *Electrochim. Acta* 16 (1971) 2141.
- [106] P. N. Ross, Structure Sensitivity in the Electrocatalytic Properties of Pt .1. Hydrogen Adsorption on Low Index Single-Crystals and the Role of Steps. *J. Electrochem. Soc.* 126 (1979) 67.

- [107] L. D. Burke, M. E. G. Lyons, Electrochemistry of Hydrous oxide films. In: Modern Aspects of Electrochemistry, Eds. R. E. White and J.O.M. Bockris. 1986, New York: Plenum Press. Vol. 18. p. 169.
- [108] L. D. Burke, J. K. Casey, J. A. Morrissey, An Investigation of Some of the Variables Involved in the Generation of an Unusually Reactive State of Platinum. *Electrochim. Acta* 38 (1993) 897.
- [109] L. D. Burke, D. T. Buckley, The complex nature of hydrous oxide film behaviour on platinum. *J. Electroanal. Chem.* 405 (1996) 101.
- [110] L. D. Burke, L. M. Hurley, The redox behaviour of thermally pretreated, highly disrupted, states of platinum surfaces in aqueous media. *Electrochim. Acta* 44 (1999) 3451.
- [111] L. D. Burke, L. M. Hurley, Generation of active surface states of gold and the role of such states in electrocatalysis. *J. Solid State Electrochem.* 4 (2000) 285.
- [112] F. T. Wagner, P. N. Ross, LEED Analysis of Electrode Surfaces - Structural Effects of Potentiodynamic Cycling on Pt Single Crystals. *J. Electroanal. Chem.* 150 (1983) 141.
- [113] B. E. Conway, Electrochemical Surface Science: The Study of Monolayers of Ad-Atoms and Solvent Molecules at Charged Metal Interfaces. *Prog. Surf. Sci.* 16 (1984) 1.
- [114] F. T. Wagner, P. N. Ross, LEED Spot Profile Analysis of the Structure of Electrochemically Treated Pt(100) and Pt(111) Surfaces. *Surf. Sci.* 160 (1985) 305.
- [115] D. Aberdam, R. Durand, R. Faure, F. El-Omar, Structural Changes of A Pt(111) Electrode Induced by Electrosorption of Oxygen in Acidic Solutions - A Coupled Voltammetry, LEED and AES Study. *Surf. Sci.* 171 (1986) 303.
- [116] A. Visintin, W. E. Triaca, A. J. Arvia. Changes in the Surface-Morphology of Platinum Electrodes Produced by the Application of Periodic Potential treatments in Alkaline Solution. *J. Electroanal. Chem.* 284 (1990) 465.
- [117] K. Itaya, K. Sugawara, K. Sashikata, N. Furuya, In situ Scanning Tunneling Microscopy of Platinum (111) Surface with the Observation of Monatomic Steps. *J. Vac. Sci. Technol. A* 8 (1990) 515.
- [118] G. Tremiliosi-Filho, G. Jerkiewicz, B. E. Conway, Characterization and Significance of the Sequence of Stages of Oxide Film Formation at Platinum Generated by Strong Anodic Polarization. *Langmuir* 8 (1992) 658.

- [119] J. P. Hoare, On the interaction of oxygen with platinum. *Electrochim. Acta* 27 (1982) 1751.
- [120] M. Thalinger, M. Volmer, Untersuchungen an der Platin-Wasserstoffelektrode. *Z. Phys. Chem.* 150 (1930) 401.
- [121] G. Armstrong, J. A. V. Butler, Electrochemical Periodicities in the Anodic Polarisation of Platinum Electrodes in the Presence of Hydrogen and their Significance. *Disc. Faraday Society* 1 (1947) 122.
- [122] D. T. Sawyer, E. T. Seo, Electrochemistry of dissolved gases III. Oxidation of hydrogen at platinum electrodes. *J. Electroanal. Chem.* 5 (1963) 23.
- [123] G. Horányi, C. Visy, Potential oscillations in the course of galvanostatic oxidation of hydrogen at platinum electrode in the presence of electrosorbing cations. *J. Electroanal. Chem.* 103 (1979) 353.
- [124] K. Krischer, M. Lübke, W. Wolf, M. Eiswirth, G. Ertl, Chaos and Interior Crisis in an Electrochemical Reaction. *Ber. Bunsen-Ges. Phys. Chem.* 95 (1991) 820.
- [125] K. Krischer, M. Lübke, M. Eiswirth, W. Wolf, J. L. Hudson, G. Ertl, A Hierarchy of Transitions to Mixed-Mode Oscillations in an Electrochemical System. *Physica D* 62 (1993) 123.
- [126] K. Krischer, M. Lübke, W. Wolf, M. Eiswirth, G. Ertl, Oscillatory Dynamics of the Electrochemical Oxidation of  $H_2$  in the Presence of  $Cu^{2+}$ : Structure Sensitivity and the Role of Anions. *Electrochim. Acta* 40 (1995) 69.
- [127] W. Wolf, K. Krischer, M. Lübke, M. Eiswirth, G. Ertl, Modeling Oscillations in Galvanostatic  $H_2$  Oxidation at Pt in the Presence of Metal Ions. *J. Electroanal. Chem.* 385 (1995) 85.
- [128] W. Wolf, M. Lübke, M. T. M. Koper, K. Krischer, M. Eiswirth, G. Ertl, Experimental and theoretical description of potentiostatic current oscillations during  $H_2$  oxidation. *J. Electroanal. Chem.* 399 (1995) 185.
- [129] F. Plenge, *Theory of Electrochemical Pattern Formation under Global Coupling*. 2003, Ph. D. Thesis. Technische Universität Berlin: Berlin.
- [130] M. C. Deibert, D. L. Williams, Voltage oscillations of the  $H_2$ -CO system. *J. Electrochem. Soc.* 116 (1969) 1290.
- [131] T. Yamazaki, T. Kodera, Potential oscillations of Pt Electrode in  $H_2SO_4$  solutions during the anodic oxidation of  $H_2$  and CO. *Electrochim. Acta* 36 (1991) 639.
- [132] K. Krischer, H. Varela, Chapter 46: Oscillations and other dynamic instabilities, in Handbook of Fuel Cells Fundamentals, Technology, Applications, W. Vielstich, A.

- Lamm and H.A. Gasteiger, , Eds. 2003. Chichester: John Wiley & Sons. Vol. 2, p. 679.
- [133] M. D. Graham, S. L. Lane, D. Luss, Proper Orthogonal Decomposition Analysis of Spatiotemporal Temperature Patterns. *J. Phys. Chem.* 97 (1993) 889.
- [134] C. C. Chen, E. E. Wolf, H. C. Chang, Low-Dimensional Spatiotemporal Thermal Dynamics on Nonuniform Catalytic Surfaces. *J. Phys. Chem.* 97 (1993) 1055.
- [135] K. Krischer, R. Rico-Martinez, I. G. Kevrekidis, H. H. Rotermund, J. L. Hudson, G. Ertl, Model Identification of a Spatiotemporally Varying Catalytic Reaction. *AICHE J.* 39 (1993) 89.
- [136] Z. Fei, B. J. Green, J. L. Hudson, Spatiotemporal patterns on a ring array of electrodes. *J. Phys. Chem. B* 103 (1999) 2178.
- [137] P. J. Holmes, J. L. Lumley, G. Berkooz, J. C. Mattingly, R. W. Wittenberg. Low-dimensional models of coherent structures in turbulence. *Phys. Rep.* 287 (1997) 337.
- [138] R. Greef, R. Peat, L. M. Peter, D. Pletcher, J. Robinson, *Instrumental Methods in Electrochemistry(Southampton Electrochemistry Group)*. 1985, Chichester: Ellis Horwood.
- [139] D. K. Roe, *Potentiostat System FHI-G050-1: Manual*. 1984.
- [140] D. K. Roe, Overcoming Solution Resistance with Stability and Grace in Potentiostatic Circuits, in Laboratory Techniques in Electroanalytical Chemistry, P. Kissinger and W. Heinemann, Eds. 1984. New York: Marcel Dekker.
- [141] U. F. Franck, Über die Aktivierungsausbreitung auf passiven Eisenelektroden. *Z. Elektrochem.* 55 (1951) 154.
- [142] O. Lev, M. Sheintuch, L. M. Pismen, C. Yarnitsky, Standing and Propagating Wave Oscillations in the Anodic Dissolution of Nickel. *Nature* 336 (1988) 458.
- [143] O. Lev, M. Sheintuch, H. Yarnitsky, L. M. Pismen, Spatial Current Distribution during Nickel Anodic Dissolution in Sulfuric Acid. *Chem. Eng. Sci.* 45 (1990) 839.
- [144] R. D. Otterstedt, P. J. Plath, N. I. Jaeger, J. L. Hudson, Rotating waves on disk and ring electrodes. *J. Chem. Soc.-Faraday Trans.* 92 (1996) 2933.
- [145] R. D. Otterstedt, P. J. Plath, N. L. Jaeger, J. L. Hudson, Modulated electrochemical waves. *Phys. Rev. E* 54 (1996) 3744.
- [146] R. D. Otterstedt, N. I. Jaeger, P. J. Plath, J. L. Hudson, Wave instabilities in an excitable electrochemical system. *Phys. Rev. E* 58 (1998) 6810.
- [147] R. D. Otterstedt, N. I. Jaeger, P. J. Plath, J. L. Hudson, Global coupling effects on spatiotemporal patterns on a ring electrode. *Chem. Eng. Sci.* 54 (1999) 1221.

- [148] J. Lee, J. Christoph, P. Strasser, M. Eiswirth, G. Ertl, Existence regions of spatiotemporal patterns in the electro-oxidation of formic acid. *Phys. Chem. Chem. Phys.* 5 (2003) 935.
- [149] J. Lee, J. Christoph, M. Eiswirth, G. Ertl, Spatiotemporal mixed-mode oscillations on a ring electrode. *Z. Phys. Chem.* 216 (2002) 479.
- [150] J. Lee, J. Christoph, M. Eiswirth, G. Ertl, Controlled pulse reversal on a ring electrode. *Chem. Phys. Lett.* 346 (2001) 246.
- [151] N. I. Jaeger, R. D. Otterstedt, A. Birzu, B. J. Green, J. L. Hudson, Evolution of spatiotemporal patterns during the electrodissolution of metals: Experiments and simulations. *Chaos* 12 (2002) 231.
- [152] G. R. Parida, M. Schell, Coexisting Cyclic Voltammograms. *J. Phys. Chem.* 95 (1991) 2356.
- [153] M. Schell, X. R. Cai, High-Order Periodic Voltammograms, Period Doubling and Chaotic Cyclic Voltammetric Behavior. *J. Chem. Soc.-Faraday Trans.* 87 (1991) 2255.
- [154] X. R. Cai, M. Schell, Observation of Bistability in Cyclic Voltammetric Experiments on Ethanol, Propanol, Butanol and Formic-Acid Formate. *Electrochim. Acta* 37 (1992) 673.
- [155] M. Schell, X. R. Cai, Chaotic and Periodic Switching in Cyclic Voltammetric Responses of Methanol and Primary Alcohols in Alkaline Solutions. *Electrochim. Acta* 38 (1993) 519.
- [156] M. Schell, Y. H. Xu, A. Amini, An Electrochemical Mechanism for the Voltammetric Oxidation of Methanol and its Relationship with Period-Doubling Bifurcations. *J. Phys. Chem.* 98 (1994) 12768.
- [157] Y. H. Xu, A. Amini, M. Schell, A Forward and Reverse U-Sequence of Cyclic Voltammograms. *J. Phys. Chem.* 98 (1994) 12759.
- [158] Y. H. Xu, A. Amini, M. Schell, Mechanistic Explanation for a Subharmonic Bifurcation and Variations in Behavior in the Voltammetric Oxidations of Ethanol, 1-Propanol and 1-Butanol. *J. Electroanal. Chem.* 398 (1995) 95.
- [159] Z. Zdravetski, Y. H. Xu, A. Amini, M. Schell, Mechanistic signatures in the oxidation of butan-1-ol at a rotating Pd disk in alkaline media from combining cyclic voltammetry with instabilities. *J. Chem. Soc. Faraday Trans.* 92 (1996) 395.
- [160] M. Dolata, A. L. Kawczynski, Multi-periodic and chaotic cyclic voltammograms at anodic dissolution of copper. *Polish J. Chem.* 74 (2000) 1625.

- [161] H. Varela, K. Krischer, Nonlinear phenomena during electrochemical oxidation of hydrogen on platinum electrodes. *Catal. Today* 70 (2001) 411.
- [162] H. Varela, K. Krischer, Deciphering the origin of high-order periodic and aperiodic cyclic voltammetric responses during oxidation processes on Pt. *J. Phys Chem. B* 106 (2002) 12258.
- [163] H. Angestein-Kozlowska, B. E. Conway, J. Klinger, Computer-Simulation of Kinetic-Behavior of Surface Reactions Driven by a Linear Potential Sweep, 2: Sequential Reactions of Adsorbed Species. *J. Electroanal. Chem.* 75 (1977) 61.
- [164] A. C. Hindmarsh, LSODE and SODI: Two new initial value ordinary differential equation solvers. *ACM-SIGNUM Newslet.* 15 (1980) 10.
- [165] J. Ringland, N. Issa, M. Schell. From U Sequence to Farey Sequence - A Unification of One-Parameter Scenarios. *Phys. Rev. A* 41 (1990) 4223.
- [166] F. N. Albahadily, J. Ringland, M. Schell. Mixed-Mode Oscillations in an Electrochemical System. *J. Chem. Phys.* 90 (1989) 813.
- [167] P. Berge, Y. Pomeau, C. Vidal, *Order within chaos: towards a deterministic approach to turbulence*. 1986, New York: Wiley.
- [168] H. G. Schuster, *Deterministic Chaos: an Introduction*. 1988, Weinheim: VCH.
- [169] R. C. Hilborn, *Chaos and Nonlinear Dynamics*. 2000, Oxford: Oxford University Press.
- [170] D. M. Kolb, Reconstruction phenomena at metal-electrolyte interfaces. *Prog. Surf. Sci.* 51 (1996) 109.
- [171] A. Cuesta, D. M. Kolb, The structure of bromide and chloride adlayers on Au(100) electrodes: an in situ STM study. *Surf. Sci.* 465 (2000) 310.
- [172] M. Giesen, D. M. Kolb, Influence of anion adsorption on the step dynamics on Au(111) electrodes. *Surf. Sci.* 468 (2000) 149.
- [173] Q. Ouyang, V. Castets, J. Boissonade, J. C. Roux, P. Dekepper, H. L. Swinney, Sustained Patterns in Chlorite Iodide Reactions in a One- Dimensional Reactor. *J. Chem. Phys.* 95 (1991) 351.
- [174] Q. Ouyang, J. M. Flesselles, Transition from spirals to defect turbulence driven by a convective instability. *Nature* 379 (1996) 143.
- [175] M. Kim, M. Bertram, M. Pollmann, A. von Oertzen, A. S. Mikhailov, H. H. Rotermund, G. Ertl, Controlling chemical turbulence by global delayed feedback: Pattern formation in catalytic CO oxidation on Pt(110). *Science* 292 (2001) 1357.

- [176] M. Bertram, *Controlling turbulence and pattern formation in chemical reactions*. 2002, Ph. D. Thesis. Technische Universität Berlin: Berlin.
- [177] M. Bertram, C. Beta, M. Pollmann, A. S. Mikhailov, H. H. Rotermund, G. Ertl, Pattern formation on the edge of chaos: Experiments with CO oxidation on a Pt(110) surface under global delayed feedback. *Phys. Rev. E* 67 (2003) 063208.
- [178] C. Beta, M. Bertram, A. S. Mikhailov, H. H. Rotermund, G. Ertl, Controlling turbulence in a surface chemical reaction by time-delay autosynchronization. *Phys. Rev. E* 67 (2003) 046224.
- [179] A. Bîrzu, B. J. Green, N. I. Jaeger, J. L. Hudson, Spatiotemporal patterns during electrodissolution of a metal ring: three-dimensional simulations. *J. Electroanal. Chem.* 504 (2001) 126.
- [180] A. Bîrzu, F. Plenge, N. I. Jaeger, J. L. Hudson, K. Krischer, Complex spatiotemporal antiphase oscillations during electrodissolution of a metal disk electrode: Model calculations. *J. Phys. Chem. B* 107 (2003) 5825.
- [181] D. Britz, IR elimination in electrochemical cells. *J. Electroanal. Chem.* 88 (1978) 309.
- [182] R. M. Souto. Electronic Configurations in Potentiostats for the Correction of Ohmic Losses. *Electroanalysis* 6 (1994) 531.
- [183] P. Horowitz, W. Hill, *The Art of Electronics*. Second ed. 1989, Cambridge: Cambridge University Press.
- [184] U. Tietze, C. Schenk, *Halbleiter-Schaltungstechnik*. 1991, Berlin: Springer-Verlag.
- [185] C. Lamy, C. C. Herrmann, A New Method for Ohmic-Drop Compensation in Potentiostatic Circuits - Stability and Bandpass Analysis, Including Effect of Faradaic Impedance. *J. Electroanal. Chem.* 59 (1975) 113.
- [186] C. Gabrielli, M. Ksouri, R. Wiart, Compensation for Reduced Ohms Using Analogous Method - Application to Electrochemical Impedances and Determination of Polarization Curves. *Electrochim. Acta* 22 (1977) 255.
- [187] J. Lee, *Electro-Oxidation of Small Organic Molecules: Kinetic Instabilities and Spatiotemporal Pattern Formation*. 2001, Ph. D. Thesis. Freie Universität Berlin: Berlin.
- [188] A. Bîrzu, B. J. Green, R. D. Otterstedt, N. I. Jaeger, J. L. Hudson, Modelling of spatiotemporal patterns during metal electrodissolution in a cell with a point reference electrode. *Phys. Chem. Chem. Phys.* 2 (2000) 2715.

- [189] Y. J. Li, *Adsorption Processes and Spatiotemporal Pattern Formation during Electrochemical Reactions on Au(111) Film Electrodes: A Surface Plasmon Resonance Study*. 2003, Ph. D. Thesis. Freie Universität Berlin: Berlin.
- [190] L. F. Yang, M. Dolnik, A. M. Zhabotinsky, I. R. Epstein, Oscillatory clusters in a model of the photosensitive Belousov-Zhabotinsky reaction system with global feedback. *Phys. Rev. E* 62 (2000) 6414.
- [191] S. H. Strogatz, *Nonlinear Dynamics and Chaos*. 1994, Massachusetts: Addison-Wesley Publ.
- [192] C. Day, Feedback Tames Chaotic Surface Chemistry. *Physics Today* July (2001) 18.
- [193] I. Z. Kiss, Y. M. Zhai, J. L. Hudson, Emerging coherence in a population of chemical oscillators. *Science* 296 (2002) 1676.
- [194] D. Golomb, D. Hansel, B. Shraiman, H. Sompolinsky, Clustering In Globally Coupled Phase Oscillators. *Phys. Rev. A* 46 (1992) 3516.
- [195] V. Hakim, W.-J. Rappel, Dynamics of the globally coupled complex Ginzburg-Landau equation. *Phys. Rev. A* 46 (1992) 7347.
- [196] M. Falcke, H. Engel, Pattern Formation during the CO Oxidation on Pt(110) Surfaces under Global Coupling. *J. Chem. Phys.* 101 (1994) 6255.
- [197] M. Falcke, H. Engel, M. Neufeld, Cluster Formation, Standing Waves, and Stripe Patterns in Oscillatory Active Media with Local and Global Coupling. *Phys. Rev. E* 52 (1995) 763.
- [198] V. K. Vanag, L. F. Yang, M. Dolnik, A. M. Zhabotinsky, I. R. Epstein, Oscillatory cluster patterns in a homogeneous chemical system with global feedback. *Nature* 406 (2000) 389.
- [199] V. K. Vanag, A. M. Zhabotinsky, I. R. Epstein, Pattern formation in the Belousov-Zhabotinsky reaction with photochemical global feedback. *J. Phys. Chem. A* 104 (2000) 11566.
- [200] V. K. Vanag, A. M. Zhabotinsky, I. R. Epstein, Oscillatory clusters in the periodically illuminated, spatially extended Belousov-Zhabotinsky reaction. *Phys. Rev. Lett.* 86 (2001) 552.
- [201] I. Z. Kiss, W. Wang, J. L. Hudson, Populations of coupled electrochemical oscillators. *Chaos* 12 (2002) 252.
- [202] Z. Fei, J. L. Hudson, Pacemaker-driven spatiotemporal patterns on an electrode array. *J. Phys. Chem. B* 101 (1997) 10356.

- [203] Z. H. Fei, J. L. Hudson, Chaotic oscillations on arrays of iron electrodes. *Ind. Eng. Chem. Res.* 37 (1998) 2172.
- [204] I. Z. Kiss, W. Wang, J. L. Hudson, Experiments on arrays of globally coupled periodic electrochemical oscillators. *J. Phys. Chem. B* 103 (1999) 11433.
- [205] W. Wang, I. Z. Kiss, J. L. Hudson, Experiments on arrays of globally coupled chaotic electrochemical oscillators: Synchronization and clustering. *Chaos* 10 (2000) 248.
- [206] P. Coullet, J. Lega, B. Houchmanzadeh, J. Lajzerowicz, Breaking Chirality in Nonequilibrium Systems. *Phys. Rev. Lett.* 65 (1990) 1352.
- [207] A. Hagberg, E. Meron, Pattern formation in non-gradient reaction-diffusion systems: the effects of front bifurcations. *Nonlinearity* 7 (1994) 805.
- [208] C. Elphick, A. Hagberg, B. A. Malomed, E. Meron, On the origin of traveling pulses in bistable systems. *Phys. Lett. A* 230 (1997) 33.
- [209] C. Elphick, A. Hagberg, E. Meron. Phase front instability in periodically forced oscillatory systems. *Phys. Rev. Lett.* 80 (1998) 5007.
- [210] H. Varela, K. Krischer, *in preparation* (2003).
- [211] A. M. Zhabotinsky, M. Dolnik, I. R. Epstein, Pattern Formation Arising from Wave Instability in a Simple Reaction-Diffusion System. *J. Chem. Phys.* 103 (1995) 10306.
- [212] H. Varela, A. Bonnefont, K. Krischer, Trapping Electrochemical Oscillations between Self-Organized Potential Walls. *ChemPhysChem*, in press (2003).
- [213] M. D. Graham, S. L. Lane, D. Luss, Temperature Pulses Dynamics on a Ring Catalytic Ring. *J. Phys. Chem.* 97 (1993) 7564.
- [214] M. D. Graham, I. G. Kevrekidis, K. Asakura, J. Lauterbach, K. Krischer, H. H. Rotermund, G. Ertl, Effects of Boundaries on Pattern Formation - Catalytic Oxidation of CO on Platinum. *Science* 264 (1994) 80.
- [215] S. Y. Yamamoto, C. M. Surko, M. B. Maple, R. K. Pina, Pulse Propagation in the Catalytic Oxidation of Carbon Monoxide on Platinum. *Phys. Rev. Lett.* 74 (1995) 4071.
- [216] M. D. Graham, M. Bär, I. G. Kevrekidis, K. Asakura, J. Lauterbach, H. H. Rotermund, G. Ertl, Catalysis on Microstructured Surfaces - Pattern Formation during CO Oxidation in Complex Pt Domains. *Phys. Rev. E* 52 (1995) 76.
- [217] M. Bär, A. K. Bangia, I. G. Kevrekidis, G. Haas, H. H. Rotermund, G. Ertl, Composite catalyst surfaces: Effect of inert and active heterogeneities on pattern formation. *J. Phys. Chem.* 100 (1996) 19106.

- [218] M. Sheintuch, Spatiotemporal catalytic patterns due to local nonuniformities. *J. Phys. Chem.* 100 (1996) 15137.
- [219] J. Christoph, M. Eiswirth, N. Hartmann, R. Imbihl, I. Kevrekidis, M. Bär, Anomalous dispersion and pulse interaction in an excitable surface reaction. *Phys. Rev. Lett.* 82 (1999) 1586.
- [220] V. Barelko, I. I. Kurochka, A. G. Merzhanov, K. G. Shkadinskii, Investigation of Traveling Waves on Catalytic Wires. *Chem. Eng. Sci.* 33 (1977) 805.
- [221] M. D. Graham, U. Middya, D. Luss, Pulses and Global Bifurcations in a Nonlocal Reaction-Diffusion System. *Phys. Rev. E* 48 (1993) 2917.
- [222] U. Middya, D. Luss, M. Sheintuch, Spatiotemporal Motions due to Global Interaction. *J. Chem. Phys.* 100 (1994) 3568.
- [223] M. A. Liauw, M. Soman, J. Annamalai, D. Luss, Oscillating temperature pulses during CO oxidation on a Pd/Al<sub>2</sub>O<sub>3</sub> ring. *AICHE J.* 43 (1997) 1519.
- [224] J. Annamalai, M. A. Liauw, D. Luss, Temperature patterns on a hollow cylindrical catalytic pellet. *Chaos* 9 (1999) 36.
- [225] M. Bertram, A. S. Mikhailov, Pattern formation in a surface chemical reaction with global delayed feedback. *Phys. Rev. E* 63 (2001) 066102.