CURRICULUM VITAE

Jay A. Switzer

Donald L. Castleman Distinguished Professor of Chemistry
Adjunct Professor, Department of Materials Science & Engineering
Senior Investigator, Graduate Center for Materials Research
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Research Interests

Inorganic materials chemistry. Electrochemistry. Synthesis and processing of nanoscale materials. Electrodeposition of superlattices. Epitaxial growth. Optical and electrical studies of metal oxide semiconductors. X-ray diffraction and scanning tunneling microscopy (STM) studies of electrodeposited superlattices. Electrodeposition of single crystals. Quantum confinement in nanoscale materials. Evolution of microstructure in electrodeposited materials. Nanoscale materials for energy conversion and storage. Scanning probe nanolithography. Magnetic oxide thin films for spin-dependent transport. Chiral electrochemistry. Electrochemical biomineralization.

Education

Ph.D. Inorganic Chemistry, Wayne State University, Detroit, Michigan, March 1979.
Research Advisor: Professor John F. Endicott

M.A. Inorganic Chemistry, Wayne State University, Detroit, Michigan, December 1975.

B.S. Chemistry, University of Cincinnati, Cincinnati, Ohio, June 1973.

Experience

9/99-Present Donald L. Castleman Distinguished Professor of Chemistry,
Adjunct Professor (since May, 2005), Materials Science & Engineering
Senior Investigator, Graduate Center for Materials Research
Missouri University of Science and Technology (Formerly UMR)

1/96-9/99 Curators' Professor of Chemistry,
Senior Investigator, Graduate Center for Materials Research
University of Missouri-Rolla (UMR)

6/90-12/95 Professor of Chemistry and Senior Investigator
Graduate Center for Materials Research
University of Missouri-Rolla (UMR)

1/87-6/90	Associate Professor, Materials Science and Engineering University of Pittsburgh
2/84-12/86	Senior Research Chemist Alternative Energy and Minerals Resources Group Union Oil Company of California (UNOCAL)
4/79-2/84	Research Chemist Catalyst Research Group Union Oil Company of California (UNOCAL)

Biographical Data

Birthdate:	May 14, 1950
Birthplace:	Cincinnati, Ohio
Citizenship:	United States
Marital Status:	Married (Barbara Switzer, B. S. chemist)/One Child (Eric Switzer, Ph.D physicist)

Brief Summary of Research Accomplishments

1. Fabricated 14.3% efficient photoelectrochemical solar cell consisting of n-silicon coated with a thin electrocatalytic film of thallic oxide (U.S. Patent 4,532,499; *J. Electrochem. Soc.*, **133,** 722 (1986)).

2. Determined single crystal X-ray structure of $Co(III)N_4$ macrocyclic complex (*Inorg. Chem.*, **16**, 271) (1977). Measured rate and equilibrium constants for rapid uptake of molecular oxygen by $Co(II)N_4$ complexes *(J. Am. Chem. Soc.*, **102**, 5511 (1980)). Studied redox reactions of coordinated ligands (*J. Am. Chem. Soc.*, **102**, 1181 (1980)).

3. Established solar energy/electrochemistry/materials science lab at Union Oil Company. Designed lab, purchased and installed all equipment, determined research directions, hired personnel.

4. Made transparent rectifying contacts with n-silicon, and ohmic contacts with p-silicon using electrodeposited thallic oxide (U.S. Patent 4,706,104). Measured barrier height, dark saturation current, and diode quality factor (*J. Electrochem. Soc.*, **133**, 722 (1986)).

5. Discovered that semiconductor electrodes can serve as *in-situ* rectifiers for alternating current electrolysis (U.S. Patent 4,663,004; *J. Electrochem. Soc.*, **136,** 1009 (1989)).

6. Developed method to "direct write" transparent conducting contacts on semiconductor substrates. Studied the effects of potential and irradiance on the nucleation and growth of thallic oxide films. (U.S. Patent 4,626,322; *J. Mater. Res.*, **4(4),** 923 (1989)).

7. Developed electrochemical methods for synthesizing ceramic films and powders with controlled microstructures. Both redox change and electrogenerated base methods were used. The microstructure of deposited films was tuned from amorphous to highly oriented crystalline. Ceric oxide and zirconia powders with controlled particle size and morphology were produced (*Ceramic Bulletin*, **66(10),** 1521 (1987)).

8. Demonstrated first electrodeposition of nanomodulated ceramic superlattices. Studied the $Tl_aPb_bO_c/Tl_dPb_eO_f$ system, with modulation wavelengths in the 5-10 nm range. Showed that the films are highly oriented, and exhibit satellites around the Bragg reflections in the x-ray diffraction pattern. Correlated modulation wavelengths calculated from satellite spacings with those estimated from Faraday's law (*Science*, **247**, 444 (1990)). Imaged superlattice cross-sections in STM (*Science*, **258**, 1918 (1992)). Used STM to profile composition in nanoscale metal oxide superlattices (*Appl. Phys. Lett*, **63**, 1501 (1993)).

9. Discovered that $Ag(Ag_3O_4)_2NO_3$ can be epitaxially deposited onto conducting oxides in the Pb-Tl-O system (*Chemistry of Materials*, **4**, 1356 (1992)).

10. Electrodeposited nanoscale "defect-chemistry" superlattices based on highly conducting metal oxide degenerate semiconductors. Imaged superlattice cross-sections in STM (*Science*, **264**, 1573 (1994)).

11. Developed methodology to electrodeposit a wide range of metal oxide thin films using carboxylate complexation of metal ions in alkaline solution. Many of these oxides contain metal ions in unusual oxidation states that cannot be accessed by thermal processing. The electrodeposited thin films include, AgO (*J. Electrochem. Soc*, **143**, 2741 (1996)), Cu_2O (*Chemistry of Materials*, **9,** 1670-1677 (1997)), CuO, Bi_2O_3, and Bi_2O_5. The Bi_2O_3 deposits at room temperature as the face-centered- cubic high-temperature polymorph (*Solid-State Ionics, 131*, 97-107 (2000)). This structure has only been previously observed at temperatures greater than 729 ^oC.

12. Electrodeposited nanocomposite films of copper metal and cuprous oxide at room temperature from an alkaline copper(II) lactate solution (*Advanced Materials*, **9**, 334 (1997)). The phase composition varies from pure cuprous oxide at cathodic current densities below 0.1 mA/cm^2, to 97 mole percent copper at 2.5 mA/cm^2. The electrode potential oscillates spontaneously during constant-current deposition of the composites (*J. Materials Research*, **13,** 909-916 (1998)). Electrical transport parallel with the layers shows percolation behavior, with the resistivity varying by over ten orders of magnitude for a series of different copper contents. Transport perpendicular to the layers exhibits negative differential resistance, suggestive of resonant tunneling through the nanometer-scale cuprous oxide layers (*J. Am. Chem. Soc.* **120,** 3530-3531 (1998)).

13. Electrodeposited an epitaxial single-crystal film of β-bismuth oxide on a Au(111) single crystal. This oxide has the highest known oxide ion mobility. It is of interest for use in fuel cells, oxygen sensors, and oxygen pumps. This is the first time a single crystal oxide film has been electrodeposited from solution precursors. (*Science*, **284**, 293-296 (1999)).

14. Electrodeposited an epitaxial film of magnetite, Fe_3O_4, onto single-crystal gold. Magnetite is a half-metallic material with 100% spin polarization at the Fermi level. There is considerable interest in the material (especially as an epitaxial film) for use in spin-dependent transport devices such as spin valves and GMR devices (*J. Am. Chem. Soc*., **124,** 7604-7609 (2002)). An epitaxial film of Fe_3O_4 has also been electrodeposited directly onto InP(001).

15. Electrodeposited an epitaxial film of Cu_2O directly onto single-crystal Si(001). This is the first example of the electrodeposition of a bulk epitaxial film onto Si. (*J. Phys. Chem B*, **106**, 12369-12372 (2002)).

16. Electrodeposited chiral films of CuO on Au(001). The handedness of the film was determined by the enantiomer of tartrate ion in solution. (*Nature*, **425**, 490 (2003)). This was also demonstrated on Cu(111) (*J. Am. Chem. Soc*., **126**, 488 (2004)). Amino acids can be used to direct the chirality in addition to tartrate (*Chemistry of Materials*, **16**, 4232 (2004)). The chiral films in all cases were shown to be enantioselective for electrochemical oxidation (*J. Am. Chem. Soc.* **129**, 8972-8973 (2007)), (US. Patent #7,361,261, issue April 22, 2008).

17. Electrodeposited spintonic superlattices in the $Fe_3O_4/ZnFe_2O_4$ system.

Research Support

Current Research Support

1. "Epitaxial Electrodeposition of Metal Oxide Thin Films and Superlattices for Energy Conversion and Storage" Department of Energy, Office of Basic Energy Science, Division of Materials Sciences & Engineering, Synthesis & Processing Programs, Proposal #DE-FG02-08ER46518, $700,000, four years, September 1, 2008 – August 31, 2012. Sole PI on grant (100% shared credit).

2. "MRI: Acquisition of an Analytical TEM for Multi-User Materials Research Environment," National Science Foundation, Proposal #DMR-0922851, $496,500, two years, October 1, 2009- September 30, 2011 (20% shared credit).

3. "Renovation of the Graduate Center for Materials Research at Missouri S&T," National Science Foundation, Proposal #OIA-0963050, $1,995,813, two years, approved for funding, 2010 (20% shared credit).

Pending Research Support

1. "Resistance Switching in Electrodeposited Metal Oxide Thin Films," National Science Foundation, Division of Materials Research (Ceramics), Proposal #DMR-1005418, $445,966, three years. Sole PI on grant (100% shared credit).

Previous Research Support

1. "Epitaxial Electrodeposition of Chiral Metal Oxide Films," National Science Foundation, Division of Materials Research (Ceramics), Proposal #DMR-0504715, $452,000, four years, August 1, 2005 – July 31, 2009. Sole PI on grant.

2. "Nanophase Inorganic Materials Chemistry," $345,000, four years, NSF, CHE-0243424, May 1, 2003 - April 30, 2007. Sole PI on grant.

3. "The Development and Evaluation of Multispectral Obscurant Materials, Improved Engine Exhaust Smoke Systems, Computer Modeling and Simulation Tools for Analyzing Obscurant Cloud Transport and Diffusion, and Diffusion and Robotic Obscurant Projectors," $380,000, one year, U. S. Army Robert Morris Acquisition Center, Contract #DAAD13-03-C-0052, July 28, 2003- September 30, 2006. J. A. Switzer (55% shared credit), PI, M. Bertino (45% shared credit), co-PI.

4. "Acquisition of a Dual Beam Focused Ion Beam System as a Regional Resource for Collaborative Research and Education in Missouri," National Science Foundation, Division of Materials Research, MRI program, Proposal #DMR-0723128, $500,000 (with $900,000 matching from UMR), one year, September 1, 2007 – August 31, 2008. Scott Miller (PI), Melanie Mormile, Jay Switzer, Hai-Lung Tsai, and Kai-tak Wan (Co-PIs).

5. "Nanophase Inorganic Materials Chemistry," $285,000, three years, NSF, CHE-9816484, 2/15/1999 - 5/30/2002. Sole PI on grant.

6. "Unleaded Drinking Water," $150,000, one year, NSF, CHE-0437346, July 1, 2004 - December 31, 2005. J. A. Switzer, PI (93% shared credit) and E. W. Bohannan, Co-PI (7% shared credit).

7. "Epitaxial Electrodeposition of Metal and Metal Oxide Capping Layers for RABiTS-based Second Generation Coated Conductors," $450,000, three years, DOE, DE-FC07-031D14509, September 1, 2003 - August 31, 2006. Sole PI on grant.

8. "Chiral Electrochemical Sensors," $50,000, AstraZeneca Corporation, December, 2004-November, 2005. Sole PI on grant.

9. "High-Aspect-Ratio Nanostructured Metals and Metal Oxides as IR Obscurants," $602,810, U. S. Army Edgewood Chemical Biological Center, Contract DAAD13-02-C-0049, July 26, 2002 - January 31, 2005. J. A. Switzer (50% shared credit) and M. Bertino (50% shared credit), co-PIs.

10. "Epitaxial Electrodeposition of Metal Oxide Semiconductors," $364,689, three years, NSF, DMR-0071365, 3/1/2000 - 9/30/2003. Sole PI on grant.

11. "Epitaxial Nanostructures of Spintronic Metal Oxides," $30,369, one year, January 1, 2003 – December 31, 2003, University of Missouri Research Board, J. A. Switzer, sole PI.

12. "Acquisition of a High-Resolution X-ray Diffractometer for Characterization of Epitaxial Films," $99,000 (with $99,000 matching funds from UMR), NSF, Instrumentation for Materials Research Program, Division of Materials Research, DMR-0076338, 6/1/2000-12/31/2001.

13. "Request for Funds to Purchase a Field Emission Scanning Electron Microscope for Nanophase Materials Characterization," $200,000 (with $200,000 matching funds from UMR). NSF grant #DMR-9704288, 7/97 - 6/99.

14. "Electrochemically Self Assembled Tunnel Diodes," $50,000, University of Missouri Research Board, 1/15/1999 - 1/14/2000.

15. "Electrodeposition of Nanoscale Epitaxial Architectures," $275,000, ONR, N00014-96-1-0984. 11/96 - 10/98.

16. "Electrodeposited Ceramic Superlattices," $421,631, three years, National Science Foundation, Division of Materials Research, Materials Synthesis and Processing Initiative, grant #DMR-9202872, 10/92 - 10-96.

17. "Scanning Tunneling Microscopy of Nanoscale Electrodeposited Superlattices," $110,000, three years, ONR AASERT Program, N00014-94-1-0917, 7/94 - 10/97.

18. "Electrochemical Architecture and Optical Studies of Nanomodulated Ceramic Superlattices, $417,141, three years, ONR, Grant #N00014-91-J-1499, 3/91 - 3/94.

19. "Electrodeposited Ceramic Superlattices," $35,000, one year, National Science Foundation, Division of Materials Research, Grant #DMR-9202872-001, Performance-based supplement to parent grant (see #15 above), 9/1/93 - 4/1/94.

20. "Acquisition of an Energy Dispersive X-ray Spectrometer," $90,500 (with $90,500 matching
funds from UMR), National Science Foundation, Grant #DMR-9402887, 7/94 - 6/95, with David C. Van Aken and Thomas J. O'Keefe.

21. "Electrodeposition of Nanoscale Epitaxial Architectures," $20,000, one year, University of Missouri Research Board, 3/95 - 2/96.

22. "Scanning Tunneling Microscopy of Electrodeposited Ceramic Superlattices," $30,000, one year, University of Missouri Research Board, 3/93-2/94.

23. "Electrodeposited Ceramic Superlattices," $50,000, one year, National Science Foundation, Division of Materials Research, Grant #DMR-9020026, 8/90-1/92.

24. "Electrodeposited Ceramic Superlattices," $35,000, one year, Center for Advanced Technology, University of Missouri-Rolla, 6/90 - 6/91.

25. Mitsubishi Kasei Faculty Development Award, Mitsubishi Kasei Corp., $70,000, 4/89. This was the first award by Mitsubishi to a professor in the United States.

Teaching Experience

University of Pittsburgh - Department of Materials Science & Engineering

Winter 1986/87: Engineering 22 - Introduction to Materials Science and Engineering

Course for non-majors in MSE. Taught two sections, with 70 students per section. Coordinated lab and recitation (four teaching assistants).

Fall 1987/88: MSE 185 - Ceramics Laboratory

Senior level course in MSE department. Responsible for development of course; purchase and installation of new equipment, course format, writing lab procedures. Lab experiments include powder characterization (particle size, surface area, DTA, density, X-ray diffraction), forming processes (slip casting, isostatic and uniaxial pressing), and sintering (dilatometry, density, and porosity of sintered compact).

Winter 1987/88: MSE 272 - Ceramics Processing

Graduate level course in MSE department. Course emphasized new methods of producing ceramic films and powders.

Engineering 22- Introduction to Materials Science and Engineering

Fall 1988/89: Engineering 22 - Introduction to Materials Science and Engineering

Winter 1988/89: MSE 192 - Ceramic Materials
Junior level course in MSE department. Introduction to Ceramics. Bonding, crystal structure, glasses, structural imperfections, diffusion, phase diagrams, and ceramic microstructures.

Fall 1989/90: MSE 175 - Ceramics Laboratory (formerly developed as MSE 185)
Engineering 22- Introduction to Materials Science and Engineering

Winter 1989/90: MSE 272 - Ceramics Processing
MSE 163 - Crystal Chemistry

University of Missouri-Rolla - Department of Chemistry

Fall 1991/92: Chem. 438 - Inorganic Materials Chemistry

Upper level graduate course for chemists and ceramic engineers (16 students). Crystal chemistry, bonding in solids, diffraction, optical and electrical properties of materials, quantum effects in nanoscale materials. Student evaluation average = 3.4 / 4.0

Winter 1992/93: Chem. 401 - Electrochemistry

Upper-level graduate course in physical electrochemistry (15 students). Thermodynamics of cells, kinetics of electron-transfer reactions, mass transfer by migration and diffusion, controlled potential microelectrode techniques, hydrodynamic methods (e.g., rotating disk), electrodeposition, epitaxy, semiconductor electrochemistry, surface electrochemistry. Student evaluation average = 3.5 / 4.0

Winter 1992/93: Chem. 101 - Invitational Seminar

New course for exceptional students. (20 students) Introduction to research in chemistry. Student evaluation average = 3.7 / 4.0

Fall 1993/94: Chem. 331 - Selected Topics in Inorganic Chemistry

First-year graduate course in inorganic chemistry (22 students).

Winter 1993/94:	Chem. 101 - Invitational Seminar (29 students).
Fall 1994/95:	Chem. 401 - Inorganic Materials Chemistry (14 students). Student evaluation average = 3.3 / 4.0.
Fall 1995/96:	Chem. 441 - Physical Chemistry of Surfaces
Winter 1995/96:	Chem. 101 - Invitational Seminar
Fall 1996/97:	Chem. 002 - General Chemistry Laboratory Chem. 410 - Graduate Seminar
Winter 1996/97:	Chem. 438 - Inorganic Materials Chemistry Chem. 101 - Invitational Seminar Chem. 410 - Graduate Seminar
Fall 1997/98:	Chem. 441 - Physical Chemistry of Surfaces Chem. 002 - General Chemistry Laboratory Chem. 410 - Graduate Seminar
Winter 1998/98:	Chem. 003 - General Chemistry - 100 students
Fall 1998/99:	Chem. 002 - General Chemistry Laboratory
Winter 1998/99:	Chem. 003 - General Chemistry - 100 students
Fall 1999/2000:	Chem. 438 - Inorganic Materials Chemistry
Winter 2000/2001	Chem. 331 - Inorganic Chemistry Chem. 101 - Invitational Seminar
Winter 2002	Chem. 003 - General Chemistry - 120 students
Fall 2002	Chem. 438 - Inorganic Materials Chemistry
Fall 2003	Chem. 002 - General Chemistry Lab
Fall 2004	Chem. 438 - Inorganic Materials Chemistry Chem. 002 - General Chemistry Lab
Winter 2006	Chem. 008 – Qualitative Analysis
Fall 2006	Chem. 438 – Inorganic Materials Chemistry
Winter 2007	Chem. 008 – Qualitative Analysis

Winter 2008	Chem. 008 – Qualitative Analysis
Fall 2008	Chem. 438 – Inorganic Materials Chemistry
Winter 2009	Chem. 008 – Qualitative Analysis
Winter 2010	Chem. 008 – Qualitative Analysis
Fall 2010	Chem. 438 – Inorganic Materials Chemistry

Professional Affiliations

American Association for the Advancement of Science

American Chemical Society, Inorganic Division
Editorial Board of *Chemistry of Materials* 1/1/99 – 1/1/05.
Editorial Board of *Analytical Chemistry,* 1/1/10 - Present

American Physical Society

The Electrochemical Society
Chairman, Southern California/Nevada Section, 1986.
Vice-Chairman, Southern California/Nevada Section, 1985-86.
Host Committee Member: ECS National Meeting, San Diego, October 1986; ECS National M
Organizer, Symposium on "Electrodeposition of Bulk, Thin-Film, and Surface Compounds," San Francisco, 1994.
Organizer, Symposium on "Electrosynthesis of Ceramics, Semiconductors, and Composites," Chicago, 1995.
Organizer, Symposium on “Electrodeposition of Nanoscale and Nanophase Materials,” Boston, 1998.
Organizer, Symposium on “Electrodeposition of Nanoscale and Nanophase Materials II,” Washington, DC, March 2001.
Organizer, Symposium on, “Electrochemistry in Nanoscale Dimensions,” with Reg Penner, Salt Lake City, Utah, October, 2002.
Organizer, Symposium on, “Surfactant and Additive Effects on Thin Film Deposition and Particle Growth,” with Tom Moffat, Quebec City, May 15-20, 2005.

Materials Research Society
Principal Editor, *Journal of Materials Research*, January 2002 - Present.

Awards and Offices

1. Mitsubishi Kasei Faculty Development Award, $70,000. Mitsubishi Kasei Corporation (April, 1989 - present). This was the first award by Mitsubishi to a professor in the United States.
2. Vice-chairman (1985-86) and Chairman (1986), Southern California/Nevada Section of Electrochemical Society.
3. Unocal Research Award, $5,000. Unocal Corporation (1986).
4. Chairman, American Ceramic Society, Bleininger Award Symposium on "Advanced Ceramic Processing" (March, 1988).
5. Invited Speaker, Gordon Research Conference on Electrochemistry; 1991, 1996, 2005.
6. Phillips Petroleum Faculty Excellence Award, $2,500, (1993-94).
7. Second and Sixth NSF Materials Chemistry Workshops, Selected Participant, October, 1994 & 1998.
8. AMOCO Faculty Excellence Award, $2,500, (1994-95).
9. Appointed as Curators' Professor of Chemistry at UMR, December, 1995.
10. Invited speaker, Electrodeposition Gordon Conference, August, 1996, 2000 & 2008.
11. Outstanding Research Award, Department of Chemistry, UMR, 1995-96.
12. Elected to editorial board of *Chemistry of Materials* for six years, 1/1/99 - 12/31/2005.
13. Appointed as first Donald L. Castleman Distinguished Professor in Chemistry at UMR, September, 1999.
14. Plenary lecturer at International Symposium on Soft Solution Processing of Advanced Inorganic Materials, Tokyo Institute of Technology, Tokyo, December 11-13, 2000.
15. Invited speaker at Gordon Conference on Chemical Reactions at Surfaces, Ventura, CA, February, 2001.
16. Appointed as Principal Editor, *Journal of Materials Research* from 1/1/2002 until present.
17. Elected as Vice Chair (2004) and Chair (2006), Electrodeposition Gordon Conference.
18. Fakultetsopponent (External Examiner), University of Uppsala, Sweden, February, 2003.
19. 2003 ECS Electrodeposition Research Award, 204th Electrochemical Society National Meeting, Orlando, FL, October 12-16, 2003. Award address given in Symposium A2 - Nanostructured Materials. Award address, "Epitaxial Electrodeposition of Metal Oxide Nanostructures."
20. 2006 American Chemical Society Midwest Award ($4,000), ACS Midwest Meeting, Quincy Illinois, October 26, 2006. Award address, "Chiral Electrodeposition."
21. President's Award for Research and Creativity ($15,000) – May, 2007.
22. Fakultetsopponent (External Examiner), University of Uppsala, Sweden, September 28, 2007.
23. Elected to Editorial Board of *Analytical Chemistry*, 1/1/2010-Present.

Refereed Publications and Patents

1. B. Durham, T. J. Anderson, J. A. Switzer, J. F. Endicott, and M. D. Glick, "The Cobalt(II) Mediated Oxygenation of a Macrocyclic Ligand. X-Ray Structures of the Cobalt(II) and Cobalt(III) Products," *Inorg. Chem*., **16**, 271 (1977).

2. J. A. Switzer and J. F. Endicott, "Metal-Ligand Synergism in the Chemistry of Macrocyclic Complexes. Base-Induced Reduction of a Cobalt(III) Complex," *J. Am. Chem. Soc*., **102**, 1181 (1980).

3. C. L. Wong, J. A. Switzer, K. P. Balakrishnan, and J. F. Endicott, "Oxidation_ Reduction Reactions of Complexes with Macrocyclic Ligands. Oxygen Uptake Kinetics, Equilibrium, and Intermediates in Aqueous Co(II) (N_4) Systems," *J. Am. Chem. Soc*., **102**, 5511 (1980).

4. J. A. Switzer, E. L. Moorehead, and D. M. Dalesandro, "Photoelectrochemistry of the Thallic/Thallous Couple. The Thallic Ion Catalyzed Photo-oxidation of Propylene," *J. Electrochem. Soc*., **129**, 2232 (1982).

5. J. A. Switzer, E. L. Moorehead, and D. M. Dalesandro, "Interfacial Electron-Transfer in Photoelectrochemical Cells: The Thallic/Thallous Couple," in "Photoelectrochemistry: Fundamental Processes and Measurement Techniques," *W. L. Wallace, A. J. Nozik, S. K. Deb, and R. H. Wilson, Eds.*, Vol. 82-3, p. **304**, The Electrochemical Society, Pennington, NJ, 1982.

6. J. A. Switzer, John F. Endicott, Mohamed A. Khalifa, Francois P. Rotzinger, and Krishan Kumar, "Oxidation-Reduction Reactions of Complexes with Macrocyclic Ligands. Kinetic and Electrochemical Studies of Metal-Ligand Synergism," *J. Am. Chem. Soc*., **105**, 56 (1983).

7. Jay A. Switzer* and Eric L. Moorehead, "Photoelectrochemical Generation of Thallium(III)," U.S. Patent 4,371,431, issued February 1, 1983.

8. Jay A. Switzer, "Highly Conductive Photoelectrochemical Electrodes and Uses Thereof," U.S. Patent 4,521,499, issued June 4, 1985.

9. Jay A. Switzer, "Heterojunction Photovoltaic Device," U.S. Patent 4,492,811, issued January 8, 1985.

10. Jay A. Switzer, "Electrode Containing Thallium(III) Oxide," U.S. Patent 4,495,064, issued January 22, 1985.

11. Jay A. Switzer, "Highly Conductive Photoelectrochemical Electrodes and Uses Thereof," U.S. Patent 4,592,807 issued June 3, 1986.

12. Jay A. Switzer, "Photoelectrochemical Preparation of a Solid-State Semiconductor Photonic Device," U.S. Patent 4,626,322, issued December 2, 1986.

13. J. A. Switzer, "The n-Silicon/Thallium(III) Oxide Heterojunction Photoelectrochemical Solar Cell," *J. Electrochem. Soc.*, **133**, 722 (1986).

14. J. A. Switzer, "Electrochemical Synthesis of Ceramic Films and Powders," invited paper, *Ceramic Bulletin*, **66,** 1521 (1987).

15. J. A. Switzer, "AC Electrolysis at Semiconductor Electrodes," in "Electrode Materials Processes for Energy Conversion and Storage," S. Srinivasan, S. Wagner, and H. Wroblowa, Eds., The Electrochemical Society, Pennington, NJ, 1987.

16. J. A. Switzer and R. J. Phillips, "Electrochemical Synthesis of Zirconia," in "Better Ceramics Through Chemistry III," C. J. Brinker, D. E. Clark, and D. R. Ulrich, Eds., Vol. 121, Materials Research Society, 1988.

17. Jay A. Switzer, "Electrical Contacts Containing Thallium(III) Oxide," U.S. Patent 4,706,104, issued November 10, 1987.

18. Jay A. Switzer, "Electrochemical Conversion Using Alternating Current and Semiconductor Electrodes, U.S. Patent 4,663,004, issued May 5, 1987.

19. Jay A. Switzer, "Methods of Making Highly Conductive Photochemical Electrodes," U.S. Patent 4,592,807, issued June 3, 1986.

20. Jay A. Switzer, "Preparation of Photovoltaic Device by Electrochemical Deposition," U.S. Patent 4,608,750, issued September 2, 1986.

21. Jay A. Switzer, "Photovoltaic Device Prepared by Electroless Deposition," U.S. Patent 4,644,638, issued February 24, 1987.

22. Jay A. Switzer, "Electrical Contacts Containing Thallium(III) Oxide Prepared at Relatively Low Temperature," U.S. Patent 4,766,087, issued August 23, 1988.

23. R. Tom Coyle and Jay A. Switzer, "Electrochemical Synthesis of Ceramic Films and Powders," U.S. Patent 4,882,014, issued November 21, 1989.

24. J. A. Switzer, "Alternating Current Electrolysis at Semiconductor Electrodes," *J. Electrochem. Soc.*, **136** (4), 1009 (1989).

25. R. J. Phillips, M. J. Shane, and J. A. Switzer, "Electrochemical and Photoelectrochemical Deposition of Thallium(III) Oxide Thin Films," *J. Mater. Res*., **4,** 923 (1989).

26. J. A. Switzer, R. J. Phillips, and M. J. Shane, "Photoelectrochemical Deposition of Thallium(III) Oxide Thin Films onto n-Silicon," *Ceramic Transactions*, **11**, 231 (1990).

27. J. A. Switzer, M. J. Shane, and R. J. Phillips, "Electrodeposited Ceramic Superlattices,"

Science, **247,** 444 (1990). *Reviewed in Chemical and Engineering News*, January 22, 1990, page 22.

28. J. A. Switzer, M. J. Shane, and R. J. Phillips, "Electrodeposition of Nanomodulated Ceramic Superlattices," in "Better Ceramics Through Chemistry IV," C. J. Brinker, D. R. Ulrich, and B. Zelinski, Materials Research Society, 1990.

29. J. A. Switzer, "Electrodeposition of Nanomodulated Electronic Ceramic Thin Films," NIST Special Publication 804, "Chemistry of Electronic Materials," 185 (1991).

30. J. A. Switzer, "Nanomodulated Ceramic Superlattices by Electrodeposition," Chapter 76 in "Chemical Processing of Advanced Materials," L. Hench, D. Ulrich, and J. West, eds., John Wiley & Sons, 1992.

31. J. A. Switzer, R. J. Phillips, and M. J. Shane, "Photoelectrochemical Deposition of Thallium(III) Oxide Thin Films onto n-Silicon," in "Ultrastructure Processing of Materials," D. Uhlmann, editor, Wiley, Chapter 21 (1992).

32. J. A. Switzer, "Electrodeposition of Nanoscale Artificially-Layered Ceramics," in "Supramolecular Architecture," Thomas Bein, editor, ACS Books, Chapter 18 (1992).

33. J. A. Switzer, "Electrochemical Architecture of Ceramic Nanocomposites," *Nanostructured Materials*, **1**, 43 (1992), invited.

34. J. A. Switzer, R. P. Raffaelle, R. J. Phillips, Chen-Jen Hung, and Teresa D. Golden, "Scanning Tunneling Microscopy of Electrodeposited Ceramic Superlattices," *Science*, **258**, 1918 (1992). Reviewed in December 21st issue of *Chemical and Engineering News*.

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99. J. A. Switzer, "Two-dimensional Chirality in Electrodeposited Metal Oxides," *Angewandte Chemie*, invited mini-review, in preparation (2007).

100. S. K. Shaibal, N. Burla, E. W. Bohannan, and J. A. Switzer, "Enhancing enantioselectivity of electrodeposited CuO films by chiral etching," *J. Am. Chem. Soc.* **129**, 8972-8973 (2007).

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105. G. Mu, R. V. Gudavarthy, E. A. Kulp, and J. A. Switzer, "Tilted epitaxial nanospears on Si(001) by chemical bath deposition," *Chem. Mater.* **21**, 3960-3964 (2009).

106. E. A. Kulp, H. M. Kothari, S. J. Limmer, Y. Yang, R. V. Gudavarthy, E. W. Bohannan, and J. A. Switzer, "Electrodeposition of epitaxial magnetite films and ferrihydrite nanoribbons on single-crystal gold," *Chem. Mater.* **21**, 5022-5031 (2009).

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Invited Seminars

1. J. A. Switzer, "Oxidation-Reduction Chemistry of Coordinated Macrocyclic Ligands," Chemistry Department Seminar Series, California State University, Fullerton, March, 1981 (invited).

2. J. A. Switzer, "An Efficient Aqueous Photoelectrochemical Solar Cell Based on n-Type Silicon," Physical Chemistry Seminar Series, University of California, Irvine, November, 1983 (invited).

3. J. A. Switzer, "Photoelectrochemical Conversion of Solar Energy," American Chemical Society, Orange County CA Section, September, 1984 (after-dinner talk).

4. J. A. Switzer, "Photoelectrochemical Conversion of Solar Energy," The Electrochemical Society, Southern California-Nevada Section, January, 1985 (after-dinner talk).

5. J. A. Switzer, "Electrochemical Deposition of Electroceramic Materials. The n-Silicon/Thallic Oxide Heterojunction Solar Cell," University of California-Los Angeles, Department of Materials Science & Engineering, June, 1986 (departmental seminar).

6. J. A. Switzer, "Photoelectrochemistry," American Chemical Society, San Gorgonio Section, November, 1986 (after-dinner talk).

7. J. A. Switzer, "Electrochemical Synthesis of Ceramic Films and Powders," 1987 Fall Meeting of the Pittsburgh Section of the Electrochemical Society, November, 1987 (after-dinner talk).

8. J. A. Switzer, "Superconductivity," PPG Technical Seminar Series, PPG Fiber Glass Research Center, Pittsburgh, PA, January, 1988 (invited seminar).

9. J. A. Switzer, "Electrochemical Processing of Advanced Ceramics," Bleininger Symposium on Processing of Advanced Ceramics, Pittsburgh, PA, March, 1988 (invited).

10. J. A. Switzer, "Electrochemical Synthesis of Ceramic Films and Powders," American Society of Metals, Pittsburgh Section, March, 1988 (after-dinner talk).

11. J. A. Switzer, "Electrochemical Processing of Optoelectronic Ceramics," Department of Materials Science and Engineering, University of Pittsburgh, September, 1988 (invited seminar).

12. J. A. Switzer, "Atomic-Level Architecture of Conducting Ceramic Thin Films," Department of Metallurgical Engineering and Materials Science, Carnegie Mellon University, May, 1989 (invited seminar).

13. J. A. Switzer, "Electrodeposited Ceramic Superlattices," Better Ceramics Through

Chemistry Symposium at Materials Research Society Meeting, San Francisco, CA, April, 1990 (invited 40 minute talk).

14. J. A. Switzer, "Electrodeposition of Nanomodulated Electronic Ceramic Thin Films," International Conference on the Chemistry of Electronic Ceramic Materials, Teton Village, WY, August, 1990 (invited talk).

15. J. A. Switzer, "Electrochemical Synthesis of Nanomodulated Ceramic Superlattices," Electrochemical Society National Meeting, Seattle, WA, October, 1990 (invited talk).

16. J. A. Switzer, "Electrodeposited Ceramic Superlattices," University of Washington, Department of Materials Science & Engineering, Seattle, WA, October, 1990 (departmental seminar).

17. J. A. Switzer, "Electrochemical Processing of Metal Oxide Nanostructures," Acta Metallurgica Conference on Materials with Ultrafine (Nanoscale) Microstructures, Atlantic City, NJ, October, 1990 (invited one hour talk).

18. J. A. Switzer, "Electrodeposited Ceramic Superlattices," Electrochemistry Gordon Conference, Santa Barbara, CA, January, 1991 (invited talk).

19. J. A. Switzer, "Nanomodulated Ceramic Superlattices by Electrodeposition," 5th International Conference on Ultrastructure Processing of Ceramics, Glasses, Composites, Ordered Polymers and Advanced Optical Materials, Orlando, FL, February, 1991 (invited talk).

20. J. A. Switzer, "Electrodeposited Ceramic Superlattices," University of Missouri-Columbia, Department of Chemistry, March, 1991 (Chemistry Colloquium).

21. J. A. Switzer, "Design, Synthesis, and Characterization of Nanomodulated Superlattice Materials," American Chemical Society National Meeting, Atlanta, GA, April, 1991.

22. J. A. Switzer, "Electrodeposition of Nanoscale Artificially-Layered Ceramics," American Chemical Society National Meeting, Atlanta, GA, April, 1991 (invited talk). Reviewed in May 27, 1991 issue of *Chemical and Engineering News* (page 26).

23. J. A. Switzer, "Electrochemical Deposition of Artificially-Layered Metal Oxides," MRS Symposium on Synthesis/Characterization and Novel Applications of Molecular Sieve Materials, Materials Research Society, Anaheim, CA, April, 1991 (invited talk).

24. J. A. Switzer, "Electrodeposition of Conductive Metal Oxide Nanostructures," Eighth Penn State Read Conference on Electrodeposition, State College, PA, July, 1991 (invited one-hour talk).

25. J. A. Switzer, "Electrodeposited Ceramic Superlattices," University of Missouri-Rolla, Department of Ceramic Engineering, October, 1991 (departmental seminar).

26. J. A. Switzer, "Electrochemical Architecture and STM Studies of Nanoscale Metal Oxide Superlattices," Department of Physics, University of Missouri-Columbia, August 26, 1992 (departmental seminar).

27. J. A. Switzer, "Making Nanoscale Materials in a Beaker. Electrochemical Architecture and STM Studies of Ceramic Superlattices." Department of Chemistry, Wayne State University, October 8, 1992 (departmental seminar).

28. J. A. Switzer, "Scanning Tunneling Microscopy of Electrodeposited Ceramic Superlattices," Department of Chemistry, University of Arkansas, November 2, 1992 (departmental seminar).

29. J. A. Switzer, "Making Nanoscale Materials in a Beaker. Electrochemical Architecture and STM Studies of Ceramic Superlattices." University of Minnesota, Department of Chemical Engineering and Materials Science, January 5, 1993 (departmental seminar).

30. J. A. Switzer, "Scanning Tunneling Microscopy of Electrodeposited Ceramic Superlattices," Washington University, Department of Physics, February 1, 1993.

31. J. A. Switzer, "Electrodeposited Ceramic Superlattices," NATO Advanced Study Institute on, "Nanoscale Probes of the Solid/Liquid Interface," Sofia Antipolis (France), July, 1993.

32. J. A. Switzer, "Electrochemical Synthesis of Ceramic Superlattices," Ninth Penn State Read Conference on Electrodeposition," State College, June 13-16, 1994.

33. J. A. Switzer, "Electrodeposited Defect-Chemistry Superlattices," American Chemical Society Meeting, Washington D.C., August 21-26, 1994.

34. J. A. Switzer, "Electrodeposited Ceramic Superlattices," National Institute of Standards and Technology (NIST), Gaithersburg, August 22, 1994.

35. J. A. Switzer, "Electrochemical Architecture and Scanning Tunneling Microscopy of Nanoscale Ceramic Superlattices," The Second NSF-Sponsored Materials Chemistry Workshop, St. Louis, MO, October 13-16, 1994.

36. J. A. Switzer, "Making Nanoscale Materials in a Beaker - Electrodeposited Ceramic Superlattices," Washington University, Department of Chemistry, December 13, 1994.

37. J. A. Switzer, "Making Nanoscale Materials in a Beaker - Electrodeposited Ceramic Superlattices," University of Illinois - Urbana, Department of Materials Science and Engineering, April 7, 1995.

38. J. A. Switzer, "Nanoscale Epitaxial Architectures," American Chemical Society Meeting, Chicago, IL, August 20-25, 1995.

39. J. A. Switzer, "Real-Time Studies of the Electrocrystallization of Nanoscale Epitaxial Architectures," American Chemical Society Meeting, Chicago, IL August 20-25, 1995.

40. J. A. Switzer, "Scanning Probe Microscopy of Electrodeposited Superlattices of Conducting Metal Oxides," Electrochemical Society Meeting, Chicago, IL, October 8-13, 1995.

41. J. A. Switzer, "Nanoscale Epitaxial Architectures," week of December 4, 1995. Circuit of Chemistry Departments of Texas Universities, including: Texas A&M, University of Texas - Austin, University of Houston, and University of North Texas.

42. J. A. Switzer, “Nanoscale Epitaxial Architectures,” Gordon Research Conference on Electrochemistry, Ventura, CA, January 14-18, 1996 (invited 1 hour talk).

43. J. A. Switzer, “Electrodeposition of Copper/Cuprous Oxide Nanocomposites,” symposium on, “Biomimetic Approaches to Electrochemical Generation of Advanced Materials,” at the American Chemical Society Meeting, New Orleans, March 24-29, 1996.

44. J. A. Switzer, “Electrodeposition of Nanoscale Epitaxial Architectures,” Department of Chemistry, University of Utah, May 9, 1996.

45. J. A. Switzer, “Electrodeposition of Superlattices and Nanocomposites,” Gordon Research Conference on Electrodeposition, Colby-Sawyer College, New Hampshire, August 11-16, 1996.

46. J. A. Switzer, “Electrodeposition and Scanning-Probe Lithography of Nanoscale Structures,” Conference on, “Electrochemistry in Submicroliter Domains,” Potter’s Lodge, NY, September, 5-7, 1996.

47. J. A. Switzer, “Nanophase Materials,” Department of Chemistry, University of Missouri - Rolla, February, 3, 1997.

48. J. A. Switzer, “Nanophase Metal Oxide Semiconductors,” Department of Ceramic Engineering, University of Missouri - Rolla, March 6, 1997.

49. J. A. Switzer, “Electrochemical Self-Organization of Metal/Semiconductor Multilayers,” ONR Electrochemistry Workshop, Atlanta, GA, April 3-4, 1997.

50. J. A. Switzer, “Electrochemical Assembly of Quantum-Confined Metal/Semiconductor Nanocomposites,” 4th IUMRS International Conference in Asia, Makuhari, Chiba, Japan, September 16-18, 1997.

51. J. A. Switzer, “Thinking Really Small. The Electrodeposition of Nanoscale Architectures,” JSPS International Workshop on the Design of Advanced Materials and Processing, Tokyo Institute of Technology, Yokohama, Japan, September 19, 1997.

52. J. A. Switzer, “Thinking Really Small. The Electrodeposition of Nanoscale Architectures,” Departmental Seminar, Department of Applied Chemistry, Kumamoto University, Kumamoto, Japan, September 22, 1997.

53. J. A. Switzer, “Electrochemical Self Assembly of Layered Nanostructures,” Department of Chemistry, Vanderbilt University, February 12, 1998.

54. J. A. Switzer, “Electrochemical Self Assembly of Layered Nanostructures,” Department of Chemistry, University of Ulm, Ulm, Germany, March 5, 1998.

55. J. A. Switzer, “Electrodeposition of Ceramic Superlattices,” Workshop on Interfacially Controlled Functional Materials: Electrical and Chemical Properties,” Schloss Ringberg, Germany, March 8-13, 1998.

56. J. A. Switzer, “Room-temperature Electrodeposition of the High-Temperature Cubic Polymorph of Bismuth(III) Oxide,” Workshop on Interfacially Controlled Functional Materials: Electrical and Chemical Properties,” Schloss Ringberg, Germany, March 8-13, 1998.

57. J. A. Switzer, “Electrochemical Self Assembly of Layered Nanostructures,” Southern California Circuit - UC- Irvine, Caltech, and UC- San Diego, May 26-29, 1998.

58. J. A. Switzer, “Electrochemical Self Assembly of Layered Nanostructures,” Sixth Annual NSF-Sponsored Materials Chemistry Workshop, Morristown, NJ, October 15-18, 1998.

59. J. A. Switzer, “Thinking Small. The Electrochemical Self Assembly of Layered Nanostructures,” University of Georgia, Division of Analytical Chemistry Seminar, October 7, 1998.

60. E. Bohannan, C.-J. Hung, L.-Y. Huang, E. Raub, and J. Switzer, “Electrodeposition of Copper/Cuprous Oxide Layered Nanostructures,” symposium on “Electrodeposition of Nanoscale and Nanophase Materials,” Electrochemical Society Meeting, Boston, MA, November 1-6, 1998.

61. J. A. Switzer, “Thinking Small. The Electrodeposition of Layered Nanostructures,” Department of Chemistry, St. Louis University, St. Louis, MO, February 12, 1999.

62. J. A. Switzer, “Thinking Small. The Electrodeposition of Layered Nanostructures,” Departments of Chemistry and Chemical Engineering, Clarkson University, February 19, 1999.

63. J. A. Switzer, “Negative Differential Resistance in Electrochemically Self Assembled Layered Nanostructures,” symposium on, “Electrochemical Synthesis of Nanomaterials,” at the Anaheim ACS Meeting, March 21-25, 1999.

64. J. A. Switzer and E. W. Bohannan, “Epitaxial Electrodeposition of Layered

Nanostructures," 50th International Society of Electrochemistry Meeting in Pavia, Italy, September 5-10, 1999. Keynote lecture.

65. J. A. Switzer, "Epitaxial Electrodeposition of Layered Nanostructures," Seminars at University of Colorado, Colorado State University, and the University of Wyoming, April 10-12, 2000.

66. J. A. Switzer, "Electrodeposited Single Crystals," Gordon Research Conference on Electrodeposition," Colby-Sawyer College, New London, NH, August 13-18, 2000.

67. J. A. Switzer, "Epitaxial Electrodeposition of Metal Oxide Semiconductors," International Symposium on Electrochemistry of Ordered Interfaces, Hokkaido University, Sapporo, Japan, August 24-26, 2000. Keynote lecture.

68. J. A. Switzer, "Epitaxial Electrodeposition," Fourth Institute for Chemical Reaction Science (ICRS) International Symposium, Tohoku University, Sendai, Japan, November 16-17, 2000. Plenary lecture.

69. J. A. Switzer, "Epitaxial Electrodeposition," International Symposium on Soft Solution Processing of Advanced Inorganic Materials, Tokyo Institute of Technology, Meguro, Tokyo, December 11-13, 2000. Plenary lecture.

70. J. A. Switzer, "Epitaxial Electrodeposition of Metal Oxide Semiconductors," Department of Physics, University of Missouri-St. Louis, January 26, 2001.

71. J. A. Switzer, "Epitaxial Electrodeposition," Department of Chemistry, Southwestern Missouri State University, January 29, 2001.

72. J. A. Switzer, "Epitaxial Electrodeposition of Metal Oxide Semiconductors," Gordon Research Conference on Chemical Reactions at Surfaces, Ventura, California, February 18-23, 2001. Invited presentation.

73. J. A. Switzer, "Epitaxial Electrodeposition of Thin Films and Ordered Nanostructures," American Chemical Society Meeting, April 1-5, 2001, San Diego, CA. Keynote lecture at symposium on "Thin Films: Preparation, Characterization, Application," sponsored by the Division of Colloid and Surface Chemistry.

74. J. A. Switzer, "Epitaxial Electrodeposition of Metal Oxide Semiconductors," Department of Chemistry, University of Texas - Arlington, April 27, 2001.

75. J. A. Switzer, "Epitaxial Electrodeposition of Metal Oxide Nanostructures," Materials Science and Engineering, Case Western Reserve University, September 4, 2001.

76. H. M. Kothari and J. A. Switzer, "Ordered Metal Oxide Nanostructures Produced by the Thermodynamic to Kinetic Transition in Epitaxial Electrodeposition," Symposium M, Surface Science and Thin-Film Growth in Electrolytes, Materials Research Society

Meeting, Boston, MA, November 26-30, 2001.

77. R. Liu, T. A. Sorenson, H. M. Kothari, and J. A. Switzer, "Epitaxial Electrodeposition of Ordered Nanostructures of Metal Oxide Semiconductors," Materials Research Society Meeting, Boston, MA, November 26-30, 2001.

78. J. A. Switzer, "Electrodeposition of Nanophase Ceramic Films and Metal/Ceramic Nanocomposites," Nanomaterials Workshop (sponsored by AFOSR), Las Vegas, NV, December 11, 2001.

79. J. A. Switzer, "Electrochemical Processing of Nanomaterials," 10th International Ceramics Congress, Florence, Italy, July 14-19, 2002.

80. J. A. Switzer, Keynote Address, "Epitaxial Electrodeposition of Metal Oxide Nanostructures," 4th Annual Chemistry Graduate Symposium, Wayne State University, October 12, 2002.

81. R. Liu, E. W. Bohannan, H. Kothari, and J. A Switzer, "Epitaxial Electrodeposition of Cu_2O Nanocubes on InP(001)," 202nd Meeting of The Electrochemical Society, Salt Lake City, Utah, October 20-24, 2002.

82. J. A. Switzer, "Epitaxial Electrodeposition of Metal Oxide Nanostructures," Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign (UIUC), January 23, 2003.

83. J. A. Switzer, "Epitaxial Electrodeposition of Metal Oxide Nanostructures," Department of Inorganic Materials Chemistry, Uppsala University, Uppsala, Sweden, February 13, 2003.

84. R. Liu, E. W. Bohannan, H. M. Kothari and J. S. Switzer, "Epitaxial Electrodeposition of Cuprous Oxide onto Single-Crystal Silicon(001)," 203rd Meeting of The Electrochemical Society, Paris, France, April 27-May 2, 2003.

85. J. A. Switzer, "Electrodeposition of Semiconductor Metal Oxide Superlattices," Keynote lecture, "Gerischer Symposium on Nanostructured Semiconductor Materials and Interfaces," 203rd Meeting of The Electrochemical Society, Paris, France, April 27-May 2, 2003.

86. J. A. Switzer, "Epitaxial Electrodeposition of Metal Oxide Films with Solution-Controlled Nanostructures," Symposium C-2 on "Soft Solution Processing," IUMRS-ICAM-2003 meeting in Yokohama, Japan, October 8-13, 2003.

87. H. Kothari, R. Liu, E. Bohannan, and J. Switzer, "Epitaxial Electrodeposition of Functional Metal Oxide Thin Film," Abstract #849, Symposium on Epitaxial Growth of Functional Oxides, 204th Meeting of The Electrochemical Society, Orlando, Fl, October 12-16, 2003.

88. J. A. Switzer, "Epitaxial Electrodeposition of Metal Oxide Nanostructures," Abstract #146,

Symposium on Nanostructured Materials, 204th Meeting of The Electrochemical Society, Orlando, Fl, October 12-16, 2003. Award address for the 2003 ECS Electrodeposition Award.

89. J. A. Switzer, "Chiral Electrodeposition," Chemistry Department, University of Missouri-Rolla, Departmental Seminar, September 20, 2004.

90. J. A. Switzer, "Chiral Electrodeposition," Chemistry Department, Truman State University, March 4, 2005.

91. J. A. Switzer, "Chiral Electrodeposition," Gordon Research Conference on Electrochemistry, Ventura, California, February 20-25, 2005.

92. J. A. Switzer, "Epitaxial Electrodeposition of Chiral Metal Oxide Nanostructures," International Society of Electrochemistry (ISE), Busan, Korea, September 27, 2005.

93. J. A. Switzer, "Chiral Electrodeposition," 4th International Symposium on Electrochemical Processing of Tailored Materials," Kyoto, Japan, October 3-5, 2005.

94. J. A. Switzer, "Chiral Electrodeposition," First Annual Conference on the Frontiers of Electrochemistry, Plenary Lecture, Case Western Reserve University, Cleveland, Ohio, October 12-14, 2005.

95. J. A. Switzer, "Epitaxial Electrodeposition of Chiral Metal Oxide Nanostructures," University of Washington, Departments of Chemistry, Materials Science and Engineering, and Chemical Engineering, January 10, 2006.

96. J. A. Switzer, "Epitaxial Electrodeposition of Chiral Metal Oxide Nanostructures," American Physical Society National Meeting, Baltimore, MD, March 13-17, 2006.

97. J. A. Switzer, "Epitaxial Electrodeposition of Chiral Metal Oxide Nanostructures," Purdue University, Department of Chemistry, March 21, 2006.

98. J. A. Switzer, "Epitaxial Electrodeposition of Chiral Metal Oxide Films," 11th International Ceramics Congress, Acireale, Sicily, Italy, June 4-9, 2006.

99. J. A. Switzer, H. Kothari, S. Limmer, E. Bohannan, and E. A. Kulp, "Epitaxial Electrodeposition of Fe_3O_4 Films on Low Index Gold Single Crystals by the reduction of Fe(III)-triethanolamine," 210th ECS Meeting, Cancun, Mexico, October 29 – November 3, 2006.

100. J. A. Switzer, "Chiral Electrodeposition," Award Address, 2006 ACS Midwest Award, Quincy, Il, October 26, 2006.

101. J. A. Switzer, S. J. Limmer, and E. A. Kulp, "Epitaxial electrodeposition of ZnO onto Au from highly alkaline solution, 211th ECS Meeting, Chicago, IL, May 6-11, 2007.

102. J. A. Switzer, “Epitaxial electrodeposition of nanostructured zinc oxide from alkaline solution,” Joint Symposium on Fundamental Aspects of Nanostructured Marterials and Electrocatalysis, Hokkaido University, Sapporo, Japan, June 22-23, 2007.

103. J. A. Switzer, “Electrodeposition of Chiral Metal Oxide Films,” International Conference on Electrified Interfaces 2007 (ICEI-2007), Sahoro, Hokkaido, Japan, June 24-29, 2007.

104. J. A. Switzer, “Chiral Electrodeposition,” 58th Annual Meeting of the International Society of Electrochemistry, Banff, Canada, September 9-14, 2007. Keynote lecture.

105. J. A. Switzer, “Chiral Electrodeposition,” Department of Inorganic Materials Chemistry, Uppsala University, Uppsala, Sweden, September 27, 2007.

106. J. A. Switzer, “Epitaxial Electrodeposition of Chiral Metal Oxide Films,” 4th Gerischer Symposium on “Electrochemistry with Spatial and Temporal Resolution,” Berlin, Germany, June 25-27, 2008.

107. J. A. Switzer, “Epitaxial Electrodeposition of Ceramics – from Electronic Materials to Chiral Biominerals,” Gordon Research Conference on Electrodeposition, Colby-Sawyer College, New London, NH, July 27 – August 1, 2008.

108. J. A. Switzer, “Electrodeposited Spintronic Superlattices,” Electrochemical Society Meeting, Vienna, Austria, Oct. 4-9, 2009.

Contributed Technical Presentations

1. R. E. DeSimone and J. Switzer, "Complexes of Molybdenum and Niobium with Cyclic Polythiaethers and Their Open Chain Precursors," Abstracts, 170th National Meeting of the American Chemical Society, Chicago, IL, August 1975, No. INOR 148.

2. T. J. Anderson, J. Switzer, B. Durham, M. D. Glick, and J. F. Endicott, "The Structures of ($CoL(OH_2)$) ($Cl0_4$), where L = $C_{12}N_4OH_{22}$. Two Novel (N_4) Diene Macrocyclic Complexes," American Crystallographic Association, Evanston, IL, Vol. 4, No. 2, August 1976, Abstract No. M2.

3. Chung-Lai Wong, J. A. Switzer, and J. F. Endicott, "The Chemistry of Intermediates in Transition Metal Mediated Reactions of Dioxygen," Abstracts, 176th National Meeting of the American Chemical Society, Miami Beach, FL, September 1978, No. INOR 161.

4. J. A. Switzer, "Mechanistic Studies of the Oxidation-Reduction Chemistry of Coordinated Macrocyclic Ligands," Ph.D. Dissertation, Wayne State University, March 1979.

5. J. A. Switzer, E. L. Moorehead, and D. M. Dalesandro, "Interfacial Electron_Transfer in Photoelectrochemical Cells. The Thallic/Thallous Couple," Abstracts, 160th Meeting of the Electrochemical Society, Denver, CO, October 1981, No. 567.

6. J. A. Switzer, E. L. Moorehead, and D. M. Dalesandro, "Photoelectrochemistry of the Thallic/Thallous Couple. The Thallic Ion Catalyzed Photo-oxidation of Propylene," California Catalysis Society 1983 Spring Meeting, Oakland, CA, March 1983.

7. J. A. Switzer, "The Aqueous Photoelectrochemistry of n-Type Silicon Protected with an Electrocatalytic Film of Thallic Oxide," Abstracts, 186th National Meeting of the American Chemical Society, Washington, D.C., August, 1983, No. INOR 73. Reviewed in *Chemical and Engineering News,* September 12, 1983, p. 48.

8. J. A. Switzer, "Catalysis in Photoelectrochemistry. An Aqueous Liquid-Junction Solar Cell Based on n-Silicon," California Catalysis Society 1983 Fall Meeting, Brea, CA, October 1983.

9. J. A. Switzer, "The Aqueous Photoelectrochemistry of n-Type Silicon Protected with an Electrocatalytic Film of Thallic Oxide," 1983 Pacific Conference on Chemistry and Spectroscopy, Pasadena, CA, October 1983, Abstract No. 348.

10. J. A. Switzer, "The n-Silicon/Thallic Oxide Photoelectrochemical Solar Cell," Poster Session, Electrochemistry Gordon Research Conference, Santa Barbara, CA, January 1984.

11. J. A. Switzer, "The n-Silicon/Thallium(III) Oxide Heterojunction Photoelectrochemical Cell," Abstract A05(1), The Fifth International Conference on Photochemical Conversion and Storage of Solar Energy, Osaka, Japan, August 1984.

12. J. A. Switzer, "Interfacial Energetics of the n-Silicon/Thallic Oxide Heterojunction," Poster Session, Gordon Research Conference on the Chemistry of Electronic Materials, Santa Barbara, CA, February 1985.

13. J. A. Switzer, "Electrochemical Deposition of Thin-Film Electroceramics," Gordon Research Conference on Photoconductivity and Related Phenomena, Poster Session, Santa Barbara, CA, February 1986.

14. J. A. Switzer, "Electrochemical Synthesis of Ceramic Films and Powders," Third International Conference on Ultrastructure Processing of Ceramics, Glasses, and Composites, Poster Session, San Diego, CA, February 1987.

15. J. A. Switzer, "Ceramic Semiconductor Interfaces: The Thallic Oxide/n-Silicon Heterojunction," 89th Annual Meeting of the American Ceramic Society, Pittsburgh, PA, April 1987, No. 187-B-87.

16. J. A. Switzer, "Control of Microstructure in the n-Silicon/Thallic Oxide Heterojunction," 193rd Annual Meeting of the American Chemical Society, Denver, CO, April 1987, No.

COLL-104.

17. J. A. Switzer, "Electrochemical Synthesis of Ceramic Films and Powders," 89th Annual Meeting of the American Ceramic Society, Pittsburgh, PA, April 1987, No. 61-B-87.

18. J. A. Switzer, "AC Electrolysis at Semiconductor Electrodes," Abstracts, 171st Meeting of the Electrochemical Society, Philadelphia, PA, May 1987, No. 513.

19. J. A. Switzer, "Electrochemical Synthesis of Ceramic Films and Powders," 171st Meeting of The Electrochemical Society, Philadelphia, PA, May 1987, No. 335.

20. J. A. Switzer, "Electrochemical Synthesis of Ceramic Powders," The First International Conference on Ceramic Powder Processing Science, American Ceramic Society, Orlando, FL, November 1987, No. 55-BP-87F.

21. J. A. Switzer and R. J. Phillips, "Electrochemical Synthesis of Zirconia," Better Ceramics Through Chemistry III Symposium, Materials Research Society Meeting, Reno, NV, April 1988.

22. J. A. Switzer and R. J. Phillips, "Control of Microstructure of Electrogenerated Zirconia," 90th Annual Meeting of the American Ceramic Society, Cincinnati, OH, May 1988, No. 154-B-88.

23. J. A. Switzer, and R. J. Phillips, "Photoelectrochemical Deposition of Highly Conductive Metal Oxide Thin Films onto n-Silicon," Symposium on Chemical Perspectives of Microelectronic Materials," Materials Research Society Meeting, Boston, MA, November 1988, No. E9.45.

24. J. A. Switzer and R. J. Phillips, "Photoelectrochemical Nucleation and Growth of Thin Thallium(III) Oxide Films onto n-Silicon," Fourth International Conference on Ultrastructure Processing of Ceramics, Glasses, and Composites, Tucson, AZ, February 1989.

25. J. A. Switzer, R. J. Phillips, and M. J. Shane, "Transparent Conducting Metal Oxide Ohmic and Rectifying Contacts to Silicon," 91st Annual Meeting of the American Ceramic Society, Indianapolis, IN, April 1989.

26. J. A. Switzer and R. J. Phillips, "Nucleation and Growth of Electrodeposited Thallium(III) Oxide Thin Films," 91st Annual Meeting of the American Ceramic Society, Indianapolis, IN, April 1989.

27. J. A. Switzer and R. J. Phillips, "Photoelectrochemical Nucleation and Growth of Thallium(III) Oxide Thin Films," 175th Meeting of The Electrochemical Society, Los Angeles, CA, May 1989.

28. J. A. Switzer and R. J. Phillips, "Electrochemical Synthesis of Nanocrystalline Metal

Oxides," 176th Meeting of The Electrochemical Society, Hollywood, FL, October 1989.

29. R. J. Phillips, M. J. Shane, and J. A. Switzer, "Electrodeposited Transparent Conducting Metal Oxide Contacts," 176th Meeting of The Electrochemical Society, Hollywood, FL, October 1989.

30. J. A. Switzer, M. J. Shane, and R. J. Phillips, "Electrodeposited Ceramic Superlattices," 45th Annual Pittsburgh Diffraction Conference, Pittsburgh, PA, November 1989.

31. J. A. Switzer, M. J. Shane, and R. J. Phillips, "Electrodeposited Ceramic Superlattices," Materials Research Society Meeting, Boston, MA, November 1989.

32. B. Breyfogle and J. A. Switzer, "Electrodeposition of Epitaxial Films of $Ag(Ag_3O_4)_2NO_3$," Electrochemical Society National Meeting, St. Louis, MO, May 1992.

33. R. J. Phillips, R. P. Raffaelle, and J. A. Switzer, "Potential Step Probes of Epitaxial Growth in Electrodeposited Ceramic Superlattices," Electrochemical Society National Meeting, St. Louis, MO, May 1992.

34. J. A. Switzer, R. J. Phillips, and R. P. Raffaelle, "Electrochemical Architecture of Nanomodulated Tl-Pb-O Superlattices," Electrochemical Society National Meeting, St. Louis, MO, May 1992.

35. J. A. Switzer, R. J. Phillips, and R. P. Raffaelle, "Electrodeposition and Scanning Tunneling Microscopy of Nanoscale Metal Oxide Superlattices," European Materials Research Society Meeting, Strasbourg, France, June 1992.

36. J. A. Switzer, R. J. Phillips, and R. P. Raffaelle, "Scanning Tunneling Microscopy of Nanoscale Electrodeposited Metal Oxide Superlattices," First International Conference on Nanostructured Materials, Cancun, Mexico, September, 1992.

37. R. J. Phillips, R. P. Raffaelle, and J. A. Switzer, "Potential-Step Probes of Epitaxial Growth in Electrodeposited Ceramic Superlattices," Materials Research Society Meeting, Boston, MA, November, 1992.

38. J. A. Switzer, B. E. Breyfogle, and R. J. Phillips, "Epitaxial Electrodeposition of $Ag(Ag_3O_4)_2NO_3$ onto Highly-Oriented Conducting Metal Oxides in the Pb-Tl-O System," Materials Research Society Meeting, Boston, MA, November, 1992.

39. J. A. Switzer, R. P. Raffaelle, and R. J. Phillips, "Electrochemical Architecture and STM Studies of Nanoscale Metal Oxide Superlattices," Materials Research Society Meeting, Boston, MA, November, 1992.

40. J. A. Switzer, R. P. Raffaelle, and R. J. Phillips, "Scanning Tunneling Microscopy of Electrodeposited Ceramic Superlattices," MRS Meeting, Boston, MA, November, 1992.

41. J. A. Switzer and T. D. Golden, "Scanning Probe Microscopy Studies of Epitaxial Growth in Electrodeposited Conducting Metal Oxides," NATO ASI on "Nanoscale Probes of the Solid/Liquid Interface," Sofia Antipolis (France), July, 1993.

42. R. J. Phillips, T. D. Golden, and J. A. Switzer, "Epitaxial Electrodeposition of Nanoscale Conducting Metal Oxide Superlattices," AIChE Meeting, St. Louis, November, 1993.

43. J. A. Switzer, "Electrocrystallization and Cross-Sectional STM Profiling of Nanoscale Metal Oxide Superlattices," AIChE Meeting, St. Louis, November, 1993.

44. J. A. Switzer, T. D. Golden, and C. J. Hung, "Cross-Sectional STM Imaging of Thallic Oxide Doping Superlattices," MRS Meeting, Boston, MA, December, 1993.

45. T. D. Golden, C. J. Hung, R. J. Phillips, R. P. Raffaelle, and J. A. Switzer, "Cross-Sectional Scanning Tunneling Microscopy of Compositional Superlattices in the Pb-Tl-O System," MRS Meeting, Boston, MA, December, 1993.

46. J. A. Switzer, R. J. Phillips, and T. D. Golden, "Potential-Step Probes of Electochemical Epitaxial Growth," MRS Meeting, Boston, MA, December, 1993.

47. R. J. Phillips, T. D. Golden, M. G. Shumsky, and J. A. Switzer, "Evolution of Crystallinity During the Electrodeposition of bcc Thallic Oxide onto Glassy Carbon," MRS Meeting, Boston, MA, December, 1993.

48. R. J. Phillips, T. D. Golden, and J. A. Switzer, "Atomic Force Microscopy Studies of Island Formation During Electrochemical Epitaxial Growth," MRS Meeting, Boston, MA, December, 1993.

49. J. A. Switzer, C. J. Hung, T. D. Golden, M. Shumsky, B. E. Breyfogle, R. van Leeuwen, "Electrodeposited Defect Chemistry Superlattices," MRS Meeting, San Francisco, April, 1994.

50. J. A. Switzer, R. J. Phillips, T. D. Golden, and C. J. Hung, "Electrochemical Architecture of Nanoscale Conducting Metal Oxides Superlattices in the Pb-Tl-O System," MRS Meeting, San Francisco, April, 1994.

51. J. A. Switzer and Y. C. Zhou, "Electrochemical Growth of Nanoscale Ceric Oxide Films and Powders," MRS Meeting, San Francisco, April, 1994.

52. J. A. Switzer, C. J. Hung, T. D. Golden, B. E. Breyfogle, and R. van Leeuwen, "Electrodeposited Defect-Chemistry Superlattices," Electrochemical Society Meeting, San Francisco, May, 1994.

53. R. J. Phillips, T. D. Golden, M. Shumsky, and J. A. Switzer, "Evolution of Crystallinity in the Electrodeposition of bcc Thallic Oxide onto Glassy Carbon," Electrochemical Society Meeting, San Francisco, May, 1994.

54. T. D. Golden and J. A. Switzer, "Electrodeposition of Cu/Cu_2O Nanomodulated Nanocomposites, MRS Spring Meeting, San Francisco, April, 1995.

55. C. J. Hung, R. Van Leeuwen, and J. Switzer, "Optical and Electrical Transport Properties of Electrodeposited Tl_2O_3 Films, Electrochemical Society Meeting, Chicago, October, 1995.

56. B. E. Breyfogle and J. A. Switzer, "Electrodeposition of AgO Films," Electrochemical Society Meeting, Chicago, October, 1995.

57. T. D. Golden and J. A. Switzer, "Electrochemical Deposition of Cuprous Oxide Films," Electrochemical Society Meeting, Chicago, October, 1995.

58. T. D. Golden, R. Van Leeuwen, and J. A. Switzer, "Electrodeposition of Copper/Cuprous Oxide Textured Nanocomposites," Electrochemical Society Meeting, Chicago, October, 1995.

59. J. A. Switzer and T. D. Golden, "Electrodeposition of Superlattices and Nanocomposites," NATO ARE workshop on, "Nanoparticles in solids and solutions - an integrated approach to their preparation and characterization," Szeged, Hungary, March 8-13, 1996.

60. J. A. Switzer, E. W. Bohannan, T. D. Golden, and C.-J. Hung, "Electrodeposition of Quantum-Confined Metal/Semiconductor Nanocomposites," Materials Research Society, talk #P6.1, Boston, December, 1996.

61. J. A. Switzer, E. W. Bohannan, T. D. Golden, C.-J. Hung, "Optical Properties of Electrodeposited Copper/Cuprous Oxide Nanocomposites," Materials Research Society, talk #Q6.14, Boston, December, 1996.

62. E. W. Bohannan, M. G. Shumsky, and J. A. Switzer, "Electrodeposited Ceramic Single Crystals," Electrochemistry Gordon Conference, poster, January, 1999.

63. J. K. Barton, E. W. Bohannan, R. Liu, M. G. Shumsky, A. A. Vertegel, and J. A. Switzer, "Epitaxial Electrodeposition," Materials Research Society, talk #H5.3/M5.3, San Francisco, CA, April 23-26, 2000.

64. R. Liu, A. A. Vertegel, T. A. Sorenson, and J. A. Switzer, "Epitaxial Electrodeposition of ZnO Nanopillars on Single-Crystal Gold," poster presentation, Gordon Research Conference on Electrodeposition, Colby-Sawyer College, New London, New Hampshire, August 13-18, 2000.

65. J. A. Switzer, "Epitaxial Electrodeposition of Electronic and Magnetoelectonic Metal Oxides," Second International Conference on Inorganic Materials, University of California, Santa Barbara, September 13-16, 2000.

66. T. A. Sorenson, M. P. Nikoforov, and J. A. Switzer, "Electrodeposition of Fe_3O_4 onto

Single-Crystal Silicon Substrates," Symposium # K1 on, "Electrochemical Processing in ULSI Fabrication and Electrodeposition of and on Semiconductors IV," Meeting of The Electrochemical Society, Washington, DC, March 25-30, 2001.

67. R. Liu, A. A. Vertegel, and J. A. Switzer, "Epitaxial Electrodeposition of Cu/Cu_2O Multilayers on Au(100) and Au(111)," Symposium #L1 on, "Electrodeposition of Nanoscale and Nanophase Materials II," Meeting of The Electrochemical Society, Washington, DC, March 25-30, 2001.

68. H. Kothari, A. A. Vertegel, and J. A. Switzer, "Ordered Nanostructures Produced by the Thermodynamic to Kinetic Transition During Epitaxial Electrodeposition of Copper(I) Oxide onto Single-Crystal Gold," Symposium #L1 on, "Electrodeposition of Nanoscale and Nanophase Materials II," Meeting of The Electrochemical Society, Washington, DC, March 25-30, 2001.

69. T. A. Sorenson, M. P. Nikiforov, and J. A. Switzer, "Epitaxial Electrodeposition of Magnetite Thin Films on the Low Index Planes of Gold," , Symposium F on Spintronics, Materials Research Society Meeting, Boston, MA, November 26-30, 2001.

70. E. A. Kulp and J. A. Switzer, "Electrochemical Deposition of Thin Films of Nanocrystalline Ceric Oxide." Poster, Gordon Conference on Electrodeposition, Colby-Sawyer College, August 11-16, 2002.

71. R. Liu and J. A. Switzer, "Epitaxial Electrodeposition of Cu_2O onto Single-Crystalline Silicon." Poster, Gordon Conference on Electrodeposition, Colby-Sawyer College, August 11-16, 2002.

72. R. Liu, E. Bohannan, H. Kothari, and J. A Switzer, "Epitaxial Electrodeposition of Cu_2O Nanocubes on InP(001), Abstract #920, Symposium U3 on Electrochemistry at Nanoscale Dimensions, Meeting of The Electrochemical Society, Salt Lake City, October 20-24 (2002).

73. E. Kulp, A. Vertegel, E. Bohannan, and J. Switzer, "Electrochemical Deposition of Thin Films and Powder Synthesis of Nanocrystalline Cerium(IV) Oxide," Abstract #925, Symposium U3 on Electrochemistry at Nanoscale Dimensions, Meeting of The Electrochemical Society, Salt Lake City, October 20-24 (2002).

74. F. Oba, R. Liu, E. W. Bohannan, J. A. Switzer, "Microstructure of Interfaces Made by Epitaxial Electrodeposition, Abstract #645, Symposium H1 on Interfaces in Electronic Materials," 204th Meeting of The Electrochemical Society, Orlando, Fl, October 12-16, 2003.

75. E. A. Kulp and J. A. Switzer, "Epitaxial Electrodeposition of Silver(II) Oxide," Poster, Gordon Research Conference on Electrodeposition, Colby Sawyer College, NH, August 8-13, 2004.

76. I. Nicic and J. A. Switzer, "Chiral Electrodeposition on the Low Index Faces of Copper Single Crystals," Poster, Gordon Research Conference on Electrodeposition, Colby Sawyer College, NH, August 8-13, 2004.

77. E. W. Bohannan and J. A. Switzer, "Chiral Electrodeposition on RABiTS," Poster, Gordon Research Conference on Electrodeposition, Colby Sawyer College, NH, August 8-13, 2004.

78. H. M. Kothari and J. A. Switzer, "Electrodeposition of a Spintronic Metal Oxide," Poster, Gordon Research Conference on Electrodeposition, Colby Sawyer College, NH, August 8-13, 2004.

79. H. M. Kothari and J. A. Switzer, "Enantiospecific Electrodeposition of a Chiral Catalyst," Poster, Gordon Research Conference on Electrodeposition, Colby Sawyer College, NH, August 8-13, 2004.

80. J. A. Switzer "Chiral Electrodeposition," Electrochemical Society National Meeting, Quebec City, Quebec, May 15-20, 2005.

81. S. J. Limmer, G. Mu, E. A. Kulp, and J. A. Switzer, "Anodic electrodeposition of ZnO films on Au single crystals," Gordon Research Conference on Electrodeposition, Poster, Colby Sawyer College, NH, July 30 – August 4, 2006.

82. S. K. Sarkar, N. Burla, S. J. Limmer, and J. A. Switzer, "Imparting chirality to electrodeposited epitaxial CuO on Au(100)," Poster, Gordon Research Conference on Electrodeposition, Colby Sawyer College, NH, July 30 – August 4, 2006.

83. E. W. Bohannan, S. Boonsalee, V. V. Rajasekharen, B. N. Clark, and J. A. Switzer, "Evidence that monochloramine disinfectant could lead to elevated Pb levels in drinking water," Poster, Gordon Research Conference on Electrodeposition, Colby Sawyer College, NH, July 30 – August 4, 2006.

84. E. A. Kulp, S. J. Limmer, E. W. Bohannan, and J. A. Switzer, "Electrochemical biomineralization – the deposition of calcite with chiral facets," Poster, Gordon Research Conference on Electrodeposition, Colby Sawyer College, NH, July 30 – August 4, 2006.

85. S. Boonsalee, E. W. Bohannan, V. V. Rajasekharen, B. N. Clark, and J. A. Switzer, "Evidence that monochloramine disinfectant could lead to elevated Pb levels in drinking water," Poster, Gordon Research Conference on Drinking Water Disinfection Byproducts, Mount Holyoke College, MA, August 13 - August 18, 2006.

86. E. A. Kulp, S. J. Limmer, E. W. Bohannan, and J. A. Switzer, "Electrochemical biomineralization – the deposition of calcite with chiral facets," 210th ECS Meeting, Cancun, Mexico, October 29 – November 3, 2006.

87. J. A. Switzer, E. A. Kulp, R. V. Gudavarthy, and G. Mu, "Epitaxial electrodeposition of

metal oxide thin films and superlattices for energy conversion and storage," University of Missouri Energy Summit, Columbia, MO, April 22-23, 2009.

88. J. A. Switzer, R. V. Gudavarthy, and E. A. Kulp, "Electrodeposited spintronic superlattices in the magnetite/zinc ferrite system," International Society of Electrochemistry meeting, Beijing, China, August 16-22, 2009.

Service

Professional Service

The Electrochemical Society

Chairman, Southern California/Nevada Section, 1986

Vice Chairman, Southern California/Nevada Section, 1985-86

Host Committee Member: ECS National Meeting, San Diego, 1986
ECS National Meeting, Las Vegas, 1985

Symposium Organizer, "Electrodeposition of Bulk, Thin Film, and Surface Compounds," ECS National Meeting, San Francisco, May, 1994.

Symposium Organizer, "Electrosynthesis of Ceramics, Semiconductors, and Composites," ECS National Meeting, Chicago, October, 1995.

Symposium Organizer, "Electrodeposition of Nanoscale and Nanophase Materials," ECS National Meeting, Boston, October, 1998.

Symposium Organizer, "Electrodeposition of Nanoscale and Nanophase Materials II," ECS National Meeting, Washington, DC, March, 2001.

Symposium Organizer, "Electrochemistry in Nanoscale Dimensions," with Reg Penner ECS National Meeting, Salt Lake City, UT, October 20-25, 2002.

Symposium Organizer, "Surfactant and Additive Effects on Thin Film Deposition and Particle Growth," with Tom Moffat, Quebec City, May 15-20, 2005.

American Ceramic Society

Chairman, Bleininger Award Symposium, 1988
Session Chairman, Thin Films Session, 1989 Annual Meeting, Pittsburgh, PA, 1987
Member, Executive Committee, Pittsburgh Section, 1988

American Chemical Society

Session Chairman, Symposium on Supramolecular Architecture in Two and Three Dimensions, ACS National Meeting, Atlanta, GA, 1991.
Member of Editorial Board, *Chemistry of Materials*, 1/1/99 - 12/31/2005.
Member of Editorial Board, *Analytical Chemistry*, 1/1/2010-Present.

Materials Research Society

Principal Editor, *Journal of Materials Research*, 1/1/2002 - Present.
Session Chairman, Symposium on Electrochemical Processing and Modification of

Advanced Materials, MRS National Meeting, Boston, MA, 1996.

Gordon Conferences

Vice chair (2004) and Chair (2006) of Electrodeposition Gordon Conference.

University Service - UMR

Head, Inorganic Division, Department of Chemistry, 1992-present.

Chairman, Personnel Committee, Department of Chemistry, 1992-97

Chairman, Personnel Committee, Department of Chemistry, 1999-2000

Member, Chair Search Committee, Department of Chemistry, 1999-2000

Member, Foundation for Chemical Research, Department of Chemistry, 1999-2000

Chairman, Safety Committee, Department of Chemistry, 1992-93

Member, Recruitment Committee, Department of Chemistry, 1991-92

Member, Graduate Faculty Council, 1991-93

Member, Scholarship Committee, Graduate Faculty Council, 1991-93

Jackling Institute at UMR - presented kick-off lecture 1990, 1991, 1992, 1993, 2000.

Presented short course, "Atomic-level Architecture of New Materials," at 1990 Homecoming for MSM-UMR Alumni Association

Organized conference on, "Inorganic Chemistry Day," on UMR campus, May 1992, May 1996.

Chairman, Chair Search Committee, Department of Chemistry, 1995-96.

Personnel Committee, Department of Chemistry, 1998-2000.

Chairman, Chair Search Committee, Department of Chemistry, 1998-99.

Chairman, Faculty Search Committee, Department of Chemistry, 2000-2002.

Chairman, Director Search Committee, Materials Research Center, 2002.

Personnel Committee, Department of Chemistry, 2002-2005.

Chair, Vitek Professor Search Committee, Department of Chemistry, 2006-2007.

FACILITIES

Instruments in Prof. Switzer's Laboratory

1.	Electrochemistry System #1: (voltammetry, electrodeposition)	PARC 273A potentiostat/galvanostat PARC 270 electrochemistry software Seiko electrochemical quartz nanobalance
2.	Electrochemistry System #2: (voltammetry, electrodeposition)	PARC 273 potentiostat/galvanostat Nicolet 310 digital oscilloscope
3.	Electrochemistry System #3: (transient studies)	PARC 2273 potentiostat/galvanostat Nicolet Pro 10 digital oscilloscope Seiko electrochemical quartz nanobalance
4.	Electrochemistry System #4: (transient studies)	PARC 273A potentiostat/galvanostat PARC 270 software Nicolet Pro 10 digital oscilloscope
5.	Electrochemistry System #5: (mechanistic and mass transport studies)	Pine AFRDE4 Bipotentiostat Pine 636 Ring-disk rotator Pt/Pt ring-disk electrodes Pt and C disk electrodes Quick change electrode holder
6.	Electrochemistry System #6: (general electrochemistry)	PARC 273A potentiostat/galvanostat PARC 124 A lock-in amplifier
7.	Electrochemistry System #7	Ecochemie Autolab Model 100 potentiostat/galvanostat

8. Nanoscope III Scanning Tunneling Microscope/Atomic Force Microscope ($110,000). Both STM and AFM have short (0.7 μm) and long (12 μm) scan heads, tapping mode AFM, fluid cells, and electrochemical microscope upgrades. High resolution Mitsubishi CP100U video color printer.

9. CARY 5 UV-Vis-NIR Spectrophotometer ($62,000) with wavelength range of 175 to 3300 nm and photometric range of ± 5.5 Abs. Spectrophotometer equipped with solid sample holders, computer control, absolute specular reflectance, praying mantis diffuse reflectance, and integrating sphere diffuse reflectance accessories.

10.	Irradiation System:	Oriel 250 W Tungsten-halogen source Melles Griot UV-Vis-NIR interference filters Eppley E6 thermopile radiometer HP 3455A multimeter

11. Resistivity Station:
    Alessi CPS-6 four-point test fixture
    Alessi WC and Os four-point probes
    Keithley 220 programmable current source
    Keithley 181 nanovoltmeter
    Janis cryostat and temperature controller

12. Heat Systems W-385 ultrasonic processor

13. Gaertner Model L116B ellipsometer (single HeNe wavelength).

14. Magnetic susceptibility balance with low-temperature capabilities (donated by Monsanto)

15. Silicon Graphics Indigo2 workstation with Cerius2 solid-state modeling software and Seiko dye sublimation color printer.

16. Hitachi S-4700 Field Emission Scanning Electron Microscope (SEM).

17. Philips X'pert MRD High Resolution X-ray Diffractometer for characterization of epitaxial films and nanometer-scale materials. Diffractometer equipped with texture stage for pole figure analysis and azimuthal scans, triple axis stage for reciprocal space maps, x-ray multilayer mirror for high intensity, and Ge high-resolution monochromators for rocking curves (purchased with funds from NSF, grant #DMR- 0076338, total cost = $198,000, J. A. Switzer, sole PI).

18. Quantum Design PPMS System with 9T magnet.