

Frank E. Osterloh

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(A) PROFESSIONAL PREPARATION

1994 Diploma (M.S.) in Chemistry, Department of Chemistry, Carl von Ossietzky Universität, Oldenburg, Germany

1997 Ph.D. in Chemistry (*summa cum laude*), Department of Chemistry, Carl von Ossietzky Universität, Oldenburg, Germany Thesis title: *Synthesis and Characterization of novel Fe- and Ni-Complexes as Model Compounds for the Active Sites of NiFe-Hydrogenase and Ni-CO-Dehydrogenase*

1997 – 2000 Postdoctoral Fellow in Chemistry, Department of Chemistry and Chemical Biology, Harvard University, Cambridge, MA

(B) APPOINTMENTS

2006 – Associate Professor, Department of Chemistry, UC Davis, CA.

2000 – 2005 Assistant Professor, Department of Chemistry, UC Davis, CA.

1997 – 2000 Postdoctoral Research Assistant, Department of Chemistry and Chemical Biology, Harvard University, Cambridge, MA.

1994 – 1997 Teaching Assistant, Department of Chemistry, Carl von Ossietzky University, Oldenburg, Germany

(C) SYNERGISTIC ACTIVITIES

1. Developed and taught courses : 'Chemistry of Nanoparticles' (grad + ugrad) , 'Principles of Transition Metal Chemistry' (grad. + ugrad), 'General Chemistry' (freshman), 'Main Group Element Chemistry' (senior), 'Inorganic Chemistry Lab (senior)'
2. Supervised outreach activities of the UC Davis Chemistry club; prepared and performed chemistry demonstrations for the public (reached over 2000 people in 2007/08).
3. Reviewed manuscripts for Chem. Mat., J. Am. Chem. Soc., Adv. Mat., Chem. Europ. J., Langmuir, Inorg. Chem., J. Phys. Chem., J. Colloid Interfac.. Sci., Angew. Chem.

(D) COLLABORATORS AND OTHER AFFILIATIONS

COLLABORATORS

Prof. Shirley Chiang (Physics, UC Davis), Prof. Delmar Larsen (Chemistry, UC Davis), Prof. Alexandra Navrotsky (Chemistry, UC Davis), Prof. David Britt (Chemistry, UC Davis), Prof. William Casey (Chemistry, UC Davis), Prof. James Rustad (Geology, UC Davis), Prof. Saif Islam (Computer and Electrical Engineering, UC Davis), Prof. Nigel Browning (Department of Engineering and Materials Science, UC Davis)

Graduate Students: Total number of graduate students advised: 17

Mr. Daniel P. Hewitt (M.S. 2003), Mr. Jason S. Martino (M.S. 2003), Mr. William Merrill (now with Dr. Power), Mr. Hiroki Hiramatsu (Ph.D, 2005, Intel Corp.), Ms. Xiubin Qi (Ph.D. 2007), Mr. Jin-Young Kim (Ph.D. 2007), Mr. Nick Akl (M.S. 2007), Mr. Owen Compton (Ph.D. 2008), Ms. Jenna Chan (Power Air Corporation), Mr. Mark Allen (current, 5th year), Mr. Erwin Sabio (current, 3rd year), Mr. Michael Sarahan (now Engineering), Mr. Andy Frame (current, 3rd year), Ms. Mollie Waller (current, 2st year), Ms. Sarah Gee (1st year), Mr. Troy Townsend (1st year), Ms. Zhou Han (exchange student, 1st year)

Undergraduate Students: Total number of students advised: 9

Mr. Roy Godzdenker (graduated 2004), Mr. Chris Simmons (graduated 2005), Mr. Jonathan Wassei (graduated 2005), Ms. Alexandra Timoshek (graduated 2005), Mr. Bokuba Nwengela (graduated 2008), Ms. Amna Hawatky (graduated 2008), Ms. Margaret Swarts (current), Mr. Seth Lustyan, Ms. Latisha Paw U (current).

(E) GRANTS

Current Support

- | | |
|-----------------------------------|--|
| 1. Project/Proposal Title: | Sensors: LiMo₃Se₃ Nanowires as Programmable Chemical Sensors |
| Source of Support: | National Science Foundation, CTS |
| Location: | UC Davis |
| Period: | 09/01/04-01/31/09 (no-cost extension) |
| Amount: | \$361,749 |
| P.I. | F. Osterloh |
| co-P.I.s | none |
| Person Months Committed: | Cal:2.5 Acad: 1.5 Summ: 1.0 |
| 2. Project/Proposal Title: | Modular Construction of Nanostructured Catalysts for Solar Hydrogen Generation from Water |
| Source of Support: | National Science Foundation, CBET |
| Location: | UC Davis |
| Period: | 09/01/08-08/31/11 |
| Amount: | \$300,000 |
| P.I. | F. Osterloh |
| co-P.I.s | none |
| Person Months Committed: | Cal: Acad: Summ: 1.0 |
| 3. Project/Proposal Title: | Photocatalytic Conversion of Cellulosic Biomass into Gaseous Fuels |
| Source of Support: | ACS-PRF New Directions Program |
| Location: | UC Davis |

Period: 02/01/09-08/31/11
Amount: \$100,000
P.I. F. Osterloh
co-P.I.s none
Person Months Committed: Cal:2.5 Acad:1.5 Summ: 1.0

4. Project/Proposal Title: Small Grant in Aid of Research
Source of Support: UC Davis, Committee of Research
Location: UC Davis
Period: 07/01/08-06/31/10
Amount: \$2,000
P.I. F. Osterloh
co-P.I.s none
Person Months Committed: Cal: Acad: Summ:

Past Support

1. Project/Proposal Title: Nanoparticle-Based Catalysts for Solar Hydrogen Generation
Source of Support: Energy Innovation Startup Program of the California Energy Commission
Location: UC Davis
Period: 10/01/06-12/31/07
Amount: \$95,000
P.I. F. Osterloh
co-P.I.s none
Person Months Committed: Cal: Acad: Summ: 1.0

2. Project/Proposal Title: Self-Assembling Inorganic Nanostructures
Source of Support: ACS-PRF Type G
Location: UC Davis
Period: 09/01/01-08/31/04
Amount: \$35,000
P.I. F. Osterloh
co-P.I.s none
Person Months Committed: Cal: Acad: Summ: 1.0

(F) PUBLICATIONS

1. Compton, O.C. and F.E. Osterloh, *Niobate Nanosheets as Catalysts for Photochemical Water Splitting into Hydrogen and Hydrogen Peroxide*. J. Phys. Chem. C, 2009. **113**(1): p. 479-485. doi:10.1021/jp807839b.
2. Sarahan, M.C., E.C. Carroll, M. Allen, D.S. Larsen, N.D. Browning, and F.E. Osterloh, *K4Nb6O17-derived photocatalysts for hydrogen evolution from water: Nanoscrolls versus nanosheets*. J. Solid State Chem., 2008. **181**(7): p. 1681-1686. Doi:10.1016/j.jssc.2008.06.021.
3. Osterloh, F.E., *Inorganic Materials as Catalysts for Photochemical Splitting of Water* Chem. Mater., 2008. **20**(1): p. 35-54. DOI: 10.1021/cm7024203.
4. Frame, F.A., E.C. Carroll, D.S. Larsen, M.S. Sarahan, N.D. Browning, and F.E. Osterloh, *First demonstration of CdSe as a photocatalyst for hydrogen evolution from water under UV and visible light*. Chem. Commun., 2008: p. 2206 - 2208. DOI: 10.1039/b718796c.
5. Compton, O.C., C.H. Mullet, S. Chiang, and F.E. Osterloh, *A Building Block Approach towards Photochemical Water Splitting Catalysts based on Niobate Nanosheets*. J. Phys. Chem. C, 2008. **112**(15): p. 6202 -6208. DOI: 10.1021/jp711589z.
6. Carroll, E.C., O.C. Compton, D. Madsen, D.S. Larsen, and F.E. Osterloh, *Ultrafast Carrier Dynamics in Exfoliated and Functionalized Calcium Niobate Nanosheets in Water and Methanol*. J. Phys. Chem. C, 2008. **112**(7): p. 2394 -2403. DOI: 10.1021/jp077427d.
7. Allen, M., E.M. Sabio, X.B. Qi, B. Nwengela, M.S. Islam, and F.E. Osterloh, *Metallic LiMo3Se3 nanowire film sensors for electrical detection of metal ions in water*. Langmuir, 2008. **24**(13): p. 7031-7037. 10.1021/la8004085.
8. Hawatky, A. and F.E. Osterloh, *A Simple Laboratory Method to Pattern Sub-Millimeter Features of Conductive Films of Gold and Indium Tin Oxide*. Instrumentation Science and Technology, 2007. **35**(1): p. 53-58. DOI: 10.1080/10739140601000879.
9. Compton, O.C. and F.E. Osterloh, *Evolution of Size and Shape in the Colloidal Crystallization of Gold Nanoparticles*. J. Am. Chem. Soc., 2007. **129**(25): p. 7793-7798. DOI: 10.1021/ja069033q.
10. Compton, O.C., E.C. Carroll, J.Y. Kim, D.S. Larsen, and F.E. Osterloh, *Calcium Niobate Semiconductor Nanosheets as Catalysts for Photochemical Hydrogen Evolution from Water* J. Phys. Chem. C, 2007. **111**(40): p. 14589-14592. DOI: 10.1021/jp0751155.
11. Asta, M., S.M. Kauzlarich, K. Liu, A. Navrotsky, and F.E. Osterloh, *Inorganic Nanoparticles — Unique Properties and Novel Applications*. Material Matters, 2007. **2**(1): p. 3-6.
12. Qi, X., F.E. Osterloh, J.A. Giacomo, and S. Chiang, *Effect of Additives on LiMo3Se3 Nanowire Film Chemical Sensors*. Langmuir 2006. **22**(19): p. 8253-8256. DOI: 10.1021/la0614278.

13. Qi, X., F.E. Osterloh, S.A. Barriga, J.A. Giacomo, and S. Chiang, *Molecular Adsorption to LiMo₃Se₃ Nanowire Film Chemiresistors*. Analytical Chemistry, 2006. **78**(4): p. 1306-1311. DOI: 10.1021/ac051701n.
14. Osterloh, F.E., *Directional Superparamagnetism and Photoluminescence in Clusters of Magnetite and CdSe Nanoparticles*. Comments on Inorganic Chemistry, 2006. **27**(1-2): p. 41-59. DOI: 10.1080/02603590500538654.
15. Kim, J.Y. and F.E. Osterloh, *Planar Gold Nanoparticle Clusters as Microscale Mirrors*. J. Am. Chem. Soc., 2006. **128**(12): p. 3868-3869. DOI: 10.1021/ja057958k.
16. Akl, N.N., O. Trofymuk, X. Qi, J.Y. Kim, F.E. Osterloh, and A. Navrotsky, *A Nanowire-Nanoparticle Cross-Linking Approach to Highly Porous Electrically Conducting Solids*. Angew. Chem. Int. Ed., 2006. **45**(22): p. 3653-3656. DOI: 10.1002/anie.200503950.
17. Qi, X. and F.E. Osterloh, *Chemical Sensing with LiMo₃Se₃ Nanowire Films*. J. Am. Chem. Soc., 2005. **127**(21): p. 7666-7667. DOI: 10.1021/ja050960r.
18. Osterloh, F.E., H. Hiramatsu, R.K. Dumas, and K. Liu, *Fe₃O₄-LiMo₃Se₃ Nanoparticle Clusters as Superparamagnetic Nanocompasses*. Langmuir, 2005. **21**(21): p. 9709-9713.
19. Kim, J.Y., F.E. Osterloh, H. Hiramatsu, R.K. Dumas, and K. Liu, *Synthesis and Real-Time Magnetic Manipulation of a Biaxial Superparamagnetic Colloid*. J. Phys. Chem. B, 2005. **109**(22): p. 11151-11157.
20. Kim, J.Y. and F.E. Osterloh, *ZnO-CdSe Nanoparticle Clusters as Directional Photoemitters with Tunable Wavelength*. J. Am. Chem. Soc., 2005. **127**(29): p. 10152-10153.
21. Kim, J.Y., H. Hiramatsu, and F.E. Osterloh, *Planar Polarized Light Emission from CdSe Nanoparticle Clusters*. J. Am. Chem. Soc., 2005. **127**(44): p. 15556-15561.
22. Osterloh, F., H. Hiramatsu, R. Porter, and T. Guo, *Alkanethiol-Induced Structural Rearrangements in Silica-Gold Core-Shell-type Nanoparticle Clusters: An Opportunity for Chemical Sensor Engineering*. Langmuir, 2004. **20**(13): p. 5553-5558.
23. Osterloh, F., *Silica-gold nanoparticle clusters as chemical sensors*. SPIE The International Society for Optical Engineering, Nanotechnology e-Bulletin 3, 2004(September 2004): p. <http://www.spie.org/app/EbulletinArchive/nano/091004nano/nanoSep04.html>.
24. Hiramatsu, H. and F.E. Osterloh, *A Simple Large-Scale Synthesis of Nearly Monodisperse Gold and Silver Nanoparticles with Adjustable Sizes and with Exchangeable Surfactants*. Chemistry of Materials, 2004. **16**(13): p. 2509-2511.
25. Osterloh, F.E., J.S. Martino, H. Hiramatsu, and D.P. Hewitt, *Stringing up the Pearls: Self-Assembly, Optical and Electronic Properties of CdSe- and Au-LiMo₃Se₃ Nanoparticle-Nanowire Composites*. Nano Lett., 2003. **3**(2): p. 125-129.
26. Osterloh, F.E. and D.P. Hewitt, *A low temperature cluster condensation approach to CdS nanocrystals: oxidative aggregation of [Cd₁₀S₄Br₄(SR)₁₂]⁴⁻ with sulfur*. Chem. Commun., 2003(14): p. 1700-1701.

27. Liu, K., L. Zhao, P. Klavins, F.E. Osterloh, J. Noguez, C. Leighton, H. Masuda, K. Nishio, I.V. Roshchin, and I.K. Schuller. *Synthesis and Thermal Stability of Nanomagnets*. in ICCE-10 Tenth Annual International Conference on Composites/Nano Engineering. 2003. University of New Orleans.
28. Liu, K., L. Zhao, P. Klavins, F.E. Osterloh, and H. Hiramatsu, *Extrinsic magnetoresistance in magnetite nanoparticles*. J. Appl. Phys., 2003. **93**: p. 7951-7953.
29. Hiramatsu, H. and F.E. Osterloh, *pH-Controlled Assembly and Disassembly of Electrostatically Linked CdSe-SiO₂ and Au-SiO₂ Nanoparticle Clusters*. Langmuir, 2003. **19**(17): p. 7003-7011.
30. Sanakis, Y., S.J. Yoo, F. Osterloh, R.H. Holm, and E. Munck, *Determination of Antiferromagnetic Exchange Coupling in the Tetrahedral Thiolate-Bridged Diferrous Complex [Fe₂(SEt)₆]²⁻*. Inorg. Chem., 2002. **41**(26): p. 7081-7085.
31. Osterloh, F., *Solution Self-Assembly of Magnetic Light Modulators from Exfoliated Perovskite and Magnetite Nanoparticles*. J. Am. Chem. Soc., 2002. **124**(22): p. 6248-6249.
32. Osterloh, F., C. Achim, and R.H. Holm, *Molybdenum-Iron-Sulfur Clusters of Nuclearities Eight and Sixteen, Including a Topological Analogue of the P-Cluster of Nitrogenase*. Inorg. Chem., 2001. **40**(2): p. 224-232.
33. Osterloh, F., B.M. Segal, C. Achim, and R.H. Holm, *Reduced Mono-, Di-, and Tetracubane-Type Clusters Containing the [MoFe₃S₄]²⁺ Core Stabilized by Tertiary Phosphine Ligation*. Inorg. Chem., 2000. **39**(5): p. 980-989.
34. Schneider, J., R. Hauptmann, F. Osterloh, and G. Henkel, *(3,7-Diethyl-3,7-diazanonane-1,9-dithiolato-S,N,N',S')nickel(II)*. Acta Crystallographica Section C, 1999. **C55**: p. 328-330.
35. Osterloh, F., Y. Sanakis, R.J. Staples, E. Munck, and R.H. Holm, *A Molybdenum-Iron-Sulfur Cluster Containing Structural Elements Relevant to the P-Cluster of Nitrogenase*. Angewandte Chemie, International Edition, 1999. **38**(13-14): p. 2066-2070.
36. Osterloh, F., W. Saak, D. Haase, and S. Pohl, *Crystal structure of the Ni(II)-complex of a redox switched crown ether*. Polyhedron, 1999. **18**(14): p. 1957-1960.
37. Osterloh, F., W. Saak, S. Pohl, M. Kroeckel, C. Meier, and A.X. Trautwein, *Synthesis and Characterization of Neutral Hexanuclear Iron Sulfur Clusters Containing Stair-like [Fe-6(mu(3)-S)(4)(mu(2)-SR)(4)] and Nest-like [Fe-6(mu(3)-S)(2)(mu(2)-S)(2)(mu(4))(mu(2)-SR)(4)] Core Structures*. Inorg. Chem., 1998. **37**(14): p. 3581-3587.
38. Osterloh, F., W. Saak, and S. Pohl, *Unidentate and Bidentate Binding of Nickel(II) Complexes to an Fe₄S₄ Cluster via Bridging Thiolates: Synthesis, Crystal Structures, and Electrochemical Properties of Model Compounds for the Active Sites of Nickel Containing CO Dehydrogenase/Acetyl-CoA Synthase*. J. Am. Chem. Soc., 1997. **119**(24): p. 5648-5656.
39. Osterloh, F., W. Saak, D. Haase, and S. Pohl, *Synthesis, X-ray structure and electrochemical characterisation of a binuclear thiolate bridged Ni-Fe-nitrosyl complex, related to the active site of NiFe hydrogenase*. Chem. Commun., 1997(10): p. 979-980.

40. Osterloh, F., W. Saak, D. Haase, and S. Pohl, *Nickel (II) complexes bound to an [Fe₄S₄] cluster via bridging thiolates: synthesis and crystal structures of model compounds for the active site of nickel CO dehydrogenase*. Chem. Commun., 1996(6): p. 777-778.

(G) PRESENTATIONS

Invited Talks

1. 'Inorganic Nanostructures by Self Assembly', Department of Chemistry, California State University, Sacramento, CA, November **2001**.
2. 'Nanoscale Devices by Chemical Synthesis', Department of Chemistry, Boise State University, Boise, IN, June **2002**.
3. 'Nanostructured Materials and Devices by Linkage of Inorganic Nanoparticles', Department of Chemistry, University of California, Santa Cruz, CA, November **2002**.
4. 'Inorganic Colloid Based Materials and Devices', Department of Chemistry, Carl von Ossietzky Universität, Oldenburg, Germany, June **2002**.
5. 'Inorganic Colloid Based Materials and Devices', Los Alamos National Laboratory, Chemistry Division, NM, August **2002**.
6. 'Clusters of Inorganic Nanoparticles: Bonding, Properties and Applications', Department of Chemistry, University of Washington, Seattle, WA, May **2003**.
7. 'Clusters of Inorganic Nanoparticles: Bonding, Properties and Applications', Department of Chemistry, University of California, Santa Barbara, CA, April **2003**.
8. 'Clusters of Inorganic Nanoparticles: Structure, Bonding, Applications', Gordon Research Conference Inorganic Chemistry, Newport, RI, July **2003**.
9. 'Bottom-up assembly and properties of one- and two-dimensional magnetic and photoluminescent nanostructures', Mardi Gras conference, Louisiana State University, Baton Rouge, LA, February **2004**.
10. 'LiMo₃Se₃ Nanowires as Programmable Chemical Sensors', NSF workshop, Inorganic Materials and Nanoscience, Broomfield, CO, October **2004**.
11. 'How to Use Chemistry to Make the World's Smallest Compasses and Flashlights', University of Redlands, Department of Chemistry, January **2005**.
12. 'Inorganic Nanoparticles as Versatile Building Blocks for the Construction of Pseudo 0-, 1-, and 2-Dimensional Nanostructures with Magnetic, Optical, and Sensoric Functions', Department of Chemistry and Biochemistry, University of California, Los Angeles, CA, January **2005**.
13. 'Inorganic Nanoparticles as Versatile Building Blocks for the Construction of Pseudo 0-, 1-, and 2-Dimensional Nanostructures with Magnetic, Optical, and Sensoric Functions', Department of Chemistry, University of New Orleans, New Orleans, LA, January **2005**.

14. 'How to use chemistry to make the worlds smallest flashlights and compasses', Department of Chemistry, Western Washington University, WA, February **2005**.
15. 'Inorganic Nanoparticles as Versatile Building Blocks for the Construction of Pseudo 0-,1-, and 2-Dimensional Nanostructures with Magnetic, Optical, and Sensoric Functions', University of California, Riverside, Department of Chemistry, CA, February **2005**.
16. 'How to use chemistry to make the worlds smallest flashlights and compasses', Department of Chemistry, Loyola Marymount University, CA, February **2005**.
17. 'Inorganic Nanoparticles as versatile Precursors for the Assembly of Pseudo 0-,1-, and 2-Dimensional Nanostructures with Magnetic, Optical, and Sensoric Functions', Department of Chemistry, Texas A&M University, TX, March **2005**.
18. 'Chemical Approaches to Functional Nanostructures Based on Inorganic Nanoparticles', Department of Chemistry, University of California, Berkeley, CA, April **2005**.
19. 'Inorganic Nanoparticles as Versatile Building Blocks for 0, 1, and 2D Functional Nanostructures', Department of Chemistry, University of California, Irvine, CA, April **2005**.
'How to use chemistry to make the worlds smallest flashlights and compasses', Department of Chemistry, University of Denver, NV, November **2005**.
'How to use chemistry to make the worlds smallest flashlights and compasses', Department of Chemistry, California State University, Los Angeles, CA, November **2005**.
20. 'How to Use Chemistry to Make the World's Smallest Compasses and Flashlights', Department of Chemistry and Biochemistry, University of Denver, Denver, CO, November **2005**.
21. 'Facile Synthesis and Surfactant Exchange of Oleylamine Coated Gold and Silver Nanoparticles', Tohoku University, Sendaj, Japan, January **2006**.
22. How to Use Chemistry to Make the World's Smallest Compasses and Flashlights', Department of Chemistry, Idaho State University, Pocatello, ID, February, **2006**.
23. Analyte binding and mechanism of LiMo_3Se_3 nanowire chemical sensors', Xiubin Qi, Frank E. Osterloh, S. A. Barriga, J. A. Giacomo, and S. Chiang, 40th Western Regional Meeting of the American Chemical Society, Los Angeles, CA, January, **2006**.
24. 'Planar Gold Nanoparticle Clusters as Microscale Mirrors', Frank E. Osterloh, Jin Y. Kim, 61st Northwest Regional Meeting of the American Chemical Society, Reno, NV, June **2006**.
25. 'How to Use Chemistry to Make the World's Smallest Compasses and Mirrors, Department of Chemistry, Willamette University, Salem, OR, November **2006**.
26. 'How to Use Chemistry to Build a Nanoscale Machine for Solar Hydrogen Generation from Water', Department of Chemistry and Biochemistry, Pomona College, March **2007**.
27. 'Nanomaterials for Chemical Sensing and Photochemical Hydrogen Generation', Frank Osterloh, NEAT Brown bag seminar, Department of Chemistry, UC Davis, May **2007**.

28. 'Inorganic Nanostructures for Photochemical Hydrogen Generation and Chemical Sensing Applications' Department of Chemistry and Biochemistry, UC San Diego, June **2007**.
29. "My Tenure at UC Davis", Professors for the Future meeting, UC Davis, January **2008**.
30. "Layered inorganic semiconductors as nanostructured photocatalysts for hydrogen generation from water", First Tokyo University of Science International Collaboration Workshop, Tokyo University of Science, Tokyo, Japan, March **2008**.
31. "Towards multicomponent nanoparticle-based catalysts for solar hydrogen generation from water", 35th FACSS meeting in Reno, NV, September, **2008**.
32. "Inorganic materials as catalysts for photochemical water splitting – a nano-building block approach", Department of Physics, California State University, Fresno, CA, September **2008**.
33. "Nanoparticle-Assembled Catalysts for Photoelectrolysis of Water", Department of Chemistry, University of Washington, Seattle, WA, October **2008**.

Contributed Talks

1. 'Solution Self-Assembly of Magnetic Light Switches from Exfoliated Perovskite and Magnetite Nanoparticles', NSF Workshop in Inorganic Chemistry, Santa Fe, NM, October **2002**.
2. 'Regioselective chemistry and reaction dynamics of silica-gold core-shell type nanoparticle composites', 225th Meeting of the American Chemical Society, New Orleans, LA. March **2003**.
3. 'Bottom-up assembly and properties of one- and two-dimensional magnetic and photoluminescent nanostructures', 227th Meeting of the American Chemical Society, Anaheim, CA, May **2004**.
4. 'LiMo₃Se₃ Nanowires as Programmable Chemical Sensors', 228th Meeting of the American Chemical Society, Philadelphia, CA, August **2004**.
5. 'Synthesis and real-time magnetic manipulation of biaxial inorganic nanostructures', 229th ACS Meeting of the American Chemical Society, San Diego, CA, March **2005**.
6. 'Directional Light Emission from ZnO-CdSe Nanoparticle Clusters', Pacifichem 2005, Honolulu, HI, December **2005**.
7. 'Mechanism of Chemical Sensing with LiMo₃Se₃ Nanowire Films', Pacifichem 2005, Honolulu, HI, December **2005**.
8. "CdSe Nanoribbons as Photocatalysts for Hydrogen Evolution from Water", Materials Research Society Spring Meeting, San Francisco, March **2008**.

9. "A modular approach to photochemical water splitting catalysts using $\text{KCa}_2\text{Nb}_3\text{O}_{10}$ nanosheets, IrO_2 and Pt nanoparticles", American Chemical Society National Meeting, New Orleans, April 2008.
10. "Photochemical Hydrogen Evolution from Water using CdSe Nanoribbons as Catalysts", American Chemical Society National Meeting, New Orleans, April 2008.
11. "Electrical Detection of Aqueous Metal Ions with Metallic LiMo_3Se_3 Nanowire Sensors", American Chemical Society National Meeting, New Orleans, April 2008.
12. "Effect of morphology in $\text{KNb}_6\text{O}_{17}$ nanosheets and nanoscrolls on photocatalytic H_2 evolution from water", American Chemical Society National Meeting, New Orleans, April 2008.
13. 'Nanoparticle-Assembled Catalysts for Solar Hydrogen Generation from Water', SPIE Meeting, San Diego, August 2008.
14. 'Quantum-Confined CdSe Nanoribbons as Catalyst for Photochemical Hydrogen Evolution from Water', SPIE Meeting, San Diego, August 2008.

Posters

1. 'From Transition Metal Clusters and Colloids to Inorganic Nanostructures', Frank E. Osterloh, Gordon Research Conference: Clusters, Nanocrystals and Nanostructures, Connecticut, CT, July 2001.
2. 'Inorganic Colloid Based Materials and Devices', Frank E. Osterloh, Gordon Research Conference: Inorganic Chemistry, Newport, RI, July 2002.
3. 'Synthesis of gold and magnetite-gold core-shell nanoparticles by a novel amine reduction route', Hiroki Hiramatsu and Frank E. Osterloh, 225th Meeting of the American Chemical Society, New Orleans, LA, March 2003.
4. 'Reactivity and bonding in clusters of silica, gold, silver, and cadmium selenide nanoparticles', Hiroki Hiramatsu and Frank E. Osterloh, 227th Meeting of the American Chemical Society, Anaheim, CA, March 2004.
5. 'Patterning CdSe and Fe_3O_4 nanoparticles in two dimensions with $\text{Ca}_2\text{Nb}_3\text{O}_{10}$ nanosheets', Hiroki Hiramatsu and Frank E. Osterloh, 228th Meeting of the American Chemical Society, Philadelphia, PA, August 2004.
6. 'Molecular Adsorption to and Chemical Sensing with LiMo_3Se_3 Nanowires', Xiubin Qi, Salvador A Barriga, Jason Giacomo, Frank E. Osterloh, Shirley Chiang, 229th Meeting of the American Chemical Society, San Diego, CA, March 2005.
7. 'Molecular Adsorption to and Chemical Sensing with LiMo_3Se_3 Nanowires', Xiubin Qi, Salvador A. Barriga, Jason Giacomo, Frank E. Osterloh, Shirley Chiang, University of

- California Conference on Nanowires, Nanotubes and Nanocables Array and Their Applications, UC Davis, May **2006**.
8. 'Design and properties of layered perovskite-based multicomponent nanostructures as catalysts for photochemical splitting of water', Jin Y. Kim, Frank E. Osterloh, 232th Meeting of the American Chemical Society, San Francisco, CA, September **2006**.
 9. 'Homogeneous colloidal crystallization of sterically-stabilized gold nanoparticles', Owen C. Compton, Frank E. Osterloh, 232th Meeting of the American Chemical Society, San Francisco, CA, September **2006**.
 10. 'A Nanowire-Nanoparticle Cross-Linking Approach to Highly Porous Electrically Conducting Solids', Nick Akl, Olga Trofymuk, Xiubin Qi, Jin Y. Kim, Frank E. Osterloh, and Alexandra Navrotsky, 232th Meeting of the American Chemical Society, San Francisco, CA, September **2006**.
 11. 'Photocatalytic water splitting using platinum and metal oxide decorated niobate nanosheets', Owen C. Compton, Jin Y. Kim, Frank E. Osterloh, 233th Meeting of the American Chemical Society, Anaheim, CA, March **2007**.
 12. 'Photocatalytic water splitting using platinum and metal oxide decorated niobate nanosheets', Owen C. Compton, Jin Y. Kim, Frank E. Osterloh, Berkeley Nanotechnology Forum, UC Berkeley, April **2007**.
 13. 'CdSe Nanoribbons as photocatalysts for hydrogen evolution from water', F. Andrew Frame, Elizabeth C. Carroll, Delmar S. Larsen, Michael Sarahan, Nigel D. Browning, and Frank E. Osterloh, ACS National Meeting, New Orleans, Louisiana, April **2008**.
 14. 'CdSe Nanoribbons as photocatalysts for hydrogen evolution from water', F. Andrew Frame, Elizabeth C. Carroll, Delmar S. Larsen, Michael Sarahan, Nigel D. Browning, and Frank E. Osterloh, Gordon Research Conference, Ventura, California, February **2009**.
 15. 'Nanoparticle-Assembled Catalysts for Photoelectrolysis of Water', Frank E. Osterloh, Owen C. Compton, Michael C. Sarahan, Mark Allen, F. Andrew Frame, Mollie Waller, Erwin M. Sabio, Elizabeth C. Carroll, Nigel N. Browning, Delmar S. Larsen, Gordon Research Conference, Ventura, California, February **2009**.