

William E. Kaden, Ph.D.

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Education

Ph.D., Analytical Chemistry

University of Utah, SLC, Utah, 2010
Prof. Scott L. Anderson

B.S., Chemistry

State University of New York at Oswego, Oswego, NY, 2002
Prof. Joseph Lefevre

Research Appointments

Assistant Professor – *University of Central Florida*, 2014 – Present

- Bridging the materials gap between applied and model-catalysis using innovative adaptations upon conventional UHV-based surface-science methodologies.

Postdoctoral Research Assistant – *Fritz-Haber-Institut der Max-Planck-Gesellschaft*, 2010-2014

- Developed and characterized thin-film model-oxides for catalytic applications.

Graduate Research Assistant – *U of U*, 2004-2010

- Established atomically size-dependent correlations between the structure, electronic properties and catalytic activity of oxide-supported nanoclusters.

Undergraduate Research Assistant – *SUNY Oswego*, 2002-2003

- Natural products isolation and identification using separations chemistry and various organic characterization techniques.

Undergraduate Research Assistant - *Princeton University*, 2002

- Surface-science investigations of organic corrosion inhibitors on iron.

Honors and Awards

A.T. Kearney Scholarship, *Falling Walls Conference*, Berlin, 2013

Alexander von Humboldt Postdoctoral Fellowship, *FHI*, 2011-2013

Cheves T. Walling Award for the best Ph.D. dissertation and defense in Chemistry, *U of U*, 2010

Cal Giddings Fellowship for excellence in Analytical Chemistry, *U of U*, 2003

Hypercube Scholar Award for use of computers in the lab, *SUNY Oswego*, 2002

ACS Award for excellence in Analytical Chemistry, *SUNY Oswego*, 2001

Publications

Peer Reviewed Journal Articles

18. Pomp, S., **Kaden, W.E.**,* Sterrer, M.,* and Freund, H.-J., “Exploring Pd adsorption, diffusion, permeation, and nucleation on bilayer SiO₂/Ru as a function of hydroxylation and precursor environment; from UHV to catalyst preparation,” *Surface Science*, (In Press, Available online)
17. Yu, X., Emmez, E., Pan, Q., Yang, B., Pomp, S., **Kaden, W.E.**, Sterrer, M., Shaikhutdinov, S.,* Freund, H.-J., Goikoetxea, I., Wlodarczyk, R., and Sauer, J., “Electron stimulated hydroxylation of a metal supported silicate film,” *Physical Chemistry Chemical Physics*, **18**, (2016), 3755-3764
16. Ringleb, F., Fujimori, Y., Brown, M.A., **Kaden, W.E.**, Calaza F., Kuhlenbeck, H., Sterrer, M.,* and Freund, H.-J., “The role of exposed silver in CO oxidation over MgO(001)/Ag(001) thin films,” *Catalysis Today*, **240**, (2015), 206-213

15. Büchner, C., Lichtenstein, L., Stuckenholz, S., Heyde, M.,* Ringleb, F., Giordano, L., Sterrer, M., **Kaden, W.E.**,* Pacchioni, G., and Freund, H.-J., “Adsorption of Au and Pd on Ruthenium Supported Bilayer Silicates,” *Journal of Physical Chemistry C*, **118**, (2014), 20959-20969
14. Fujimori, Y., **Kaden, W.E.**, Brown, M. A., Roldan Cuenya, B., Sterrer, M.,* and Freund, H.-J., “Hydrogen evolution from metal – surface hydroxyl interaction,” *Journal of Physical Chemistry C*, **118**, (2014), 17717-17723
13. Büchner, C., Lichtenstein, L., Yu, X., Boscoboinik, J.A., Yang, B., **Kaden, W.E.**, Heyde, M., Shaikhutdinov, S.K., Włodarczyk, R., Sierka, M., Sauer, J., and Freund, H.-J.,* “Ultrathin Silica Films: The Atomic Structure of Two-dimensional Crystals and Glasses,” *Chemistry – A European Journal*, **20**, (2014), 9176-9183
12. **Kaden, W.E.**,* Büchner, C., Lichtenstein, L., Stuckenholz, S., Ringleb, F., Heyde, M., Sterrer, M., Freund, H.-J., Giordano, L., Pacchioni, G., Nelin, C.J., and Bagus, P.S., “Understanding Surface Core-Level Shifts using the Auger Parameter: a study of Pd atoms adsorbed on SiO₂ ultra-thin films,” *Physical Review B*, **89**, (2014), 115436-115443
11. **Kaden, W.E.**,* Kunkel, W.A., Kane, M.D., Roberts, F.S., and Anderson, S.L., “Pd_n/TiO₂(110) Stability under CO-oxidation Conditions and the Strong Metal-Support Interaction,” *Surface Science*, **621**, (2014), 40-50
10. Yang, B., Emmez, E., **Kaden, W.E.**, Yu, X., Boscoboinik, J.A., Sterrer, M., Shaikhutdinov, S.,* and Freund, H.-J., “Hydroxylation of metal supported sheet-like silica films,” *Journal of Physical Chemistry C*, **117**, (2013), 8336-8344
9. Wang, H.-F., **Kaden, W.E.**, Dowler, R., Sterrer, M.,* and Freund, H.-J., “Model oxide supported metal catalysts – comparison of ultrahigh vacuum and solution based preparation of Pd nanoparticles on a single-crystalline oxide substrate,” *Physical Chemistry Chemical Physics*, **14**, (2012), 11525-11533
8. Yang, B., **Kaden, W.E.**, Yu, X., Boscoboinik, J. A., Martynova, Y., Lichtenstein, L., Heyde, M., Sterrer, M., Włodarczyk, R., Sierka, M., Sauer, J., Shaikhutdinov, S.,* and Freund, H.-J., “Thin Silica Films on Ru(0001): monolayer, bilayer and three-dimensional networks of [SiO₄] tetrahedra,” *Physical Chemistry Chemical Physics*, **14**, (2012), 11344-11351
7. **Kaden, W.E.**, Kunkel, W.A., Roberts, F.S., Kane, M., and Anderson, S.L.,* “CO adsorption and desorption on size-selected Pd_n/TiO₂(110) model catalysts: Size dependence of binding sites and energies, and support-mediated adsorption,” *Journal of Chemical Physics*, **136**, (2012), 204705-204716
6. **Kaden, W.E.**, Kunkel, W.A., Kane, M.D., Roberts, F.S., and Anderson, S.L.,* “Size-Dependent Oxygen Activation Efficiency over Pd_n/TiO₂(110) for the CO Oxidation Reaction,” *Journal of the American Chemical Society*, **132**, (2010), 13097-13099
5. **Kaden, W.E.**, Wu, T., Kunkel, W.A., and Anderson, S.L.,* “Electronic Structure Controls Reactivity of Size-Selected Pd Clusters Adsorbed on TiO₂ Surfaces,” *Science*, **326**, (2009), 826-829
4. **Kaden, W.E.**, Kunkel, W.A., and Anderson, S.L.,* “Cluster Size Effects on sintering, CO adsorption, and implantation in Ir/SiO₂,” *Journal of Chemical Physics*, **131**, (2009), 114701-114717
3. Wu, T., **Kaden, W.E.**, Kunkel, W.A., and Anderson, S.L.,* “Size-dependent oxidation of Pd_n (n ≤ 13) on alumina/NiAl(110): Correlation with Pd core level binding energies,” *Surface Science*, **603**, (2009), 2764-2770
2. Wu, T., **Kaden, W.E.**, and Anderson, S.L.,* “Water on Rutile TiO₂(110) and Au/TiO₂(110): Effects on Au Mobility and the Isotope Exchange Reaction,” *Journal of Physical Chemistry C*, **112**, (2008), 9006-9015
1. Fan, C., Wu, T., **Kaden, W.E.**, and Anderson, S.L.,* “Cluster size effects on hydrazine decomposition on Ir_n/Al₂O₃/NiAl(110),” *Surface Science*, **600**, (2006), 461-467

Books

1. **Kaden, W.E.**,* “Studies of Size Selected Palladium and Iridium Model Catalysts,” University of Utah, 2010

Presentations

Invited Conference Presentations

26. **“Exploring the role of non-traditional support effects in model-catalyst studies;” BIT’s 6th annual Global Congress of Catalysis, Xi’an, China, 9/24/2015**
25. **“The study of hydrazine decomposition over size-selected Ir_n/Al₂O₃ model catalysts;” American Physical Society Annual Conference, Baltimore Convention Center, Baltimore, Md, 3/16/2006**

Contributed Conference Presentations

24. “Preparation, hydroxylation, and permeability of ultra-thin two-dimensional silicate films;” Science and Technology of 2D Materials workshop, UCF, 8/21/2015
23. “Exploring the binding mechanisms and physical properties of Pd and Au atoms over thin-film SiO₂/Ru(0001) supports;” 247th ACS National Meeting, Dallas, Tx, 3/20/2014
23. **“Breaking the wall of catalytic quantum size-effects;” Falling Walls Lab 2013, Berlin, Germany, 11/8/2013**
21. “Hydroxylation of SiO₂ Bilayer Films Grown on Ru(0001) & the Resultant Effects on Pd Particle Growth and Reactivity;” *15th International Congress on Catalysis*, Munich International Congress Center, Munich, Germany 7/4/2012
20. “Hydroxylation of SiO₂ Bilayer Films Grown on Ru(0001) & the Resultant Effects on Pd Particle Growth and Reactivity;” *Catalysis Gordon Research Conference*, Colby-Sawyer College, New London, New Hampshire, 6/27/2012
19. “The Influence of H₂O on Pd/SiO₂ Model-Catalysts: From UHV to Liquids;” *Network Meeting of the Alexander von Humboldt Foundation*, University of Hamburg, Hamburg, Germany, 11/24/2011
18. **Represented the University of Utah collaborative team at an AFOSR funding evaluation meeting, *Nanocatalysis for Propulsion MURI Review*, Doubletree Hotel Crystal City, Crystal City, Virginia, 12/3/2009**
17. **“Studies of Size-Selected Palladium and Iridium Model Catalysts;” *Thesis Defense*, University of Utah, Salt Lake City, Utah, 2/25/2010**
16. **“Mass Selecting Ion Beam-Line for the Creation of Size Selected Metal Particle Covered Surfaces;” *Nano Utah '08*, University of Utah, Salt Lake City, Utah, 10/17/2008**
15. “Studies of N₂H₄ Breakdown over Ir_n/SiO₂ Model Catalysts;” *Grand Challenges in Electron Chemistry and Catalysis at Surfaces*, University of California at Santa Barbara, Santa Barbara, California, 8/11/2008
14. “Studies of Size Selected Metal/Metal-Oxide Surfaces;” *Nano Utah '07*, University of Utah, Salt Lake City, Utah, 10/26/2007
13. “Studies of Hydrazine Decomposition over Size Selected Metal Cluster/Metal Oxide Model Catalyst Surfaces;” *Dynamics at Surfaces Gordon Research Conference*, Proctor Academy, Andover, New Hampshire, 8/14/2007
12. **“Cluster size effects on hydrazine decomposition on Ir_n/Al₂O₃/NiAl (110);” *21st Annual Symposium of the Western States Catalysis Club*, Provo Marriott Hotel and Conference Center, Provo, Utah, 2/23/2007**
11. “Studies of Size Selected Metal Clusters on Surfaces of Interest;” *Nano Utah '06*, University of Utah, Salt Lake City, Utah, 10/5/2006
10. “Studies of Size Selected Model Catalysts;” *Dynamics at Surfaces Gordon Research Conference*, Proctor Academy, Andover, New Hampshire, 8/15/2005

Seminars/Colloquia

9. **“Fundamental materials gap explorations of Pd/SiO₂ model-catalysts: from UHV to wet-chemistry;” Brookhaven National Laboratory, Upton, NY, 12/1/2015**
8. **“A brief career at the intersection of surface-science and catalysis;” BASF, Iselin, New Jersey, 1/3/2014**

7. “Metal atoms confined at the bilayer SiO₂/Ru(0001) interface: The Auger parameter and surface core level shifts;” *FHI Chemical-Physics Workshop*, Schloss Hasenwinkel, Hasenwinkel, Germany, 9/24/2013
6. “Pd/SiO₂/Ru(0001) Model Catalyst Studies; Film growth, metal nucleation and particle formation as a function of precursor environment;” *FHI Chemical-Physics Workshop*, Hotel Döllnsee, Templin, Germany, 9/26/2012
5. “Studies of Size-Selected Palladium and Iridium Model Catalysts;” *Department Seminar*, Fritz-Haber Institute of the Max Planck Society, Berlin, Germany 5/10/2010
4. “Incorporation of Infrared Reflection Absorption Spectroscopy (IRAS) with the Beam Line Ion Cluster Experiment;” *Student Seminar*, University of Utah, Salt Lake City, Utah, 5/31/2005
3. “Studies of Molecular Inhibitors on the Surface of Iron;” *Quest Presentation*, SUNY Oswego, Oswego, New York, 4/23/2003
2. “Isolation of Natural Products from *Tilia Americana*;” *Quest Presentation*, SUNY Oswego, Oswego, New York 4/23/2003
1. “Studies of Molecular Inhibitors on the Surface of Iron;” *REU Colloquium*, Princeton University, Princeton, New Jersey, 8/8/2002

***Bold Font Indicates Oral Presentations**

Classes Taught

Fall 2015 – PHY2053C, Introductory Physics I for non-majors

Supervised Students

Asim Khaniya – 2nd year graduate student working on layered MoN catalysts for hydrogdenitrogenation applications.

Bijoya Dhar – 2nd year graduate student working on metal supported dissimilar activated metal monolayers for ORR reactions relevant to fuel cell applications.

Service

Department of Physics

- Outreach committee member (2015-present)
 - i-stem day participant (Spring 2015; Physics of Football)
 - physics career day (Fall 2015; careers in physics presentation)
- Undergraduate life committee member (2015-present)
- Freshman seminar and research committee member (2015-present)
- Machine shop/shared facilities committee member (2015-present)
- Planetary Science search committee participation (2015-present)
- Machine shop search committee participation (2015-present)
- Undergraduate advisor (sophomore majors) (2015-present)

University

- Student Conduct Review Board Member (2015-present)
 - Served on several academic and disciplinary panel and administrative hearings.
- Core developer and active member of the “rational design of materials for energy and propulsion” faculty cluster initiative (2015-present)

Professional

- FL-AVS executive committee member (2015-present)
 - Poster session judge at 2015 FL-AVS symposium
 - Session chair at 2016 FL-AVS symposium

-Ad hoc journal reviewer

Surface Science (2015)

Journal of Physical Chemistry C (2016)

ACS Applied Materials and Interfaces (2016)

-Textbook reviewer for an upcoming revision of Pearson's Introduction to Physics (2015)