

Ulrike Diebold

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Professional Objectives:

Interdisciplinary research in surface science, physical chemistry, condensed matter physics, materials science, and nanoscience. Investigating the atomic-scale geometric and electronic surface structure of pure and doped oxide materials; adsorption of gases and metals; correlating nanoscopic measurements with materials applications in nanocatalysis, photocatalysis, gas sensing, (opto) electronics, and spintronics. Growth of epitaxial thin films and supported nanoclusters. Electrochemical surface science. Teaching and mentoring.

Professional Experience:

Institute of Applied Physics, TU Wien

Professor of Surface Science (2010 -)

Deputy Department Head (2010 -)

Department of Physics, Tulane University, New Orleans

Research Professor (2010 -)

Yahoo! Founder Chair in Science and Engineering (2006 -2009)

Associate Department Chair (2002 -2009)

Professor of Physics (2001 -2009)

Associate Professor (1999 – 2001)

Assistant Professor (1993 – 1999)

Adjunct Professor of Chemistry (1993 - 2009)

Visiting and Short-Term Appointments:

4/2012: Guest Professor, Hubei University, Wuhan, China

6/2008: Fellow, Research Center Dresden-Rossendorf, Dresden, Germany

Fall 2005 (displaced by Hurricane Katrina) Visiting Professor, Rutgers, The State University of New Jersey, and Visiting Research Collaborator, Princeton University

Summer 2004: Professor, Institute of Materials Chemistry, Surface and Interface Chemistry Group, University of Technology, Vienna, Austria

5/2002 – 12/2002 Visiting Scientist, Department of Chemical Physics, Fritz-Haber Institut of the Max-Planck-Gesellschaft, Germany, and Department of Surface Chemistry and Catalysis, University of Ulm, Germany (Alexander-von-Humboldt Research Prize and Fellowship)

7/ 1997 – 10/1997: Visiting Scientist, Pacific Northwest National Laboratory, Environmental Molecular Sciences Laboratory, Richland, WA (Research Sabbatical)

March 1997 - June 1997: Visiting Professor, Technische Universität Wien, Vienna, Austria (Research Sabbatical)
1990 - 1993: Research Associate, Rutgers, The State University of New Jersey, Advisor: Prof. Theodore E. Madey
1986 – 1990: Research Assistant, University of Technology, Vienna, Austria

Education:

1986 Diplom Ingenieur in Engineering Physics (eq. MS)
1990 Ph.D. in Physics, both degrees from the TU Wien, Vienna, Austria; Advisor: Prof. Peter Varga
1998 Habilitation in "Experimental Physics", TU Wien

Personal Background:

Born 12. 12. 1961 in Kapfenberg, Austria
Married to Gerhard Piringer, 2 sons (Thomas *1996 and Niklas *1999)
Dual citizenship (Austria/United States)

Research Programme:

Recent research is focused on investigating the surfaces of metal oxides (e.g., TiO₂, Fe₃O₄, In₂O₃, ZnO, SnO₂, perovskites) with scanning probe techniques and surface spectroscopies. The goal is to understand, with atomic-scale detail, electronic and geometric surface structure (including intrinsic and extrinsic defects), and its relation to chemical reactivity and surface electrical and magnetic properties. Growth of nanostructures (supported 1D, 2D, and 3D clusters), and epitaxial thin films with the ultimate goal to improve materials functionality in applications (photocatalysis, nanocatalysis, spintronics, (opto)electronics, chemical sensing, and biomaterials).

Established an international reputation as one of the leading groups in metal oxide surfaces, first at Tulane University, and, since 2010, at the TU Vienna. Research laboratory with several ultrahigh vacuum chambers with Scanning Tunneling/Force Microscopes, surface characterization, and growth (molecular-beam epitaxy) facilities, electrochemistry (EC-STM and ancillary equipment). Additional experiments are conducted at synchrotron radiation sources. Collaborations with several theoretical and experimental groups.

Ongoing and recently concluded research projects include:

- Single P.I., Wittgenstein Preis (€1.5 M, 2013 – 2017): The Wittgenstein-Preis is the highest Austrian science award. It is awarded once per year by the Austrian Science Fund on behalf of the Austrian Ministry for Science to one (sometimes two) researchers in all of science, humanities, and engineering. The prize money of 1.5 million € is tied to research activities in the following six years. The recipients are selected by an international jury of experts.
- Single P.I., *European Research Council Advanced Research Grant*, (€2.5M, 2012 – 2016) “Microscopic Processes and Phenomena at Oxide Surfaces, OxideSurfaces”: This grant explores the relationship and dynamical exchange

between surface and bulk defects; complex oxide surfaces; and extends the research program towards solid-liquid interfaces.

- Co-P.I. and Deputy Speaker, *Austrian Science Fund, Special Research Programme (SFB) "Functional Surfaces and Interfaces (FOXSI)"* (€6.3M; €982k to U.D., 2011 – 2018) The goal of this multi- investigator project is to significantly contribute to the understanding of fundamental surface processes relating to solid oxide fuel cells. U.D.'s subproject focuses on atomic-scale investigations of oxidation and reduction reactions on perovskite cathodes. To this end, a laser-MBE system is interfaced to one of her surface analysis chambers.
- Co-P.I. and Deputy Speaker, *COST Action Structure, functions and applications of reducible oxide systems* (Speaker: M. Reichling, €500k, 2012 – 2016, ca. €30k to U.D.)
- Co-P.I., *Austrian Science Fund Doctoral Program DK+, 'Building Solids for Function – Solids4Fun'*, (Speaker: U. Schubert, €5,870k, 2012 – 2020, ca. €300k to U.D.) Interdisciplinary Training Program in graduate education.
- Co-P.I. and Deputy Speaker, *Vienna University of Technology, Doctoral College 'Catalysis Materials and Technology, CatMat'* (€300k, 2011 – 2014, ca. €90k to UD): Training program for 20+ graduate students in catalysis through an integrated, interdisciplinary teaching and research programme.
- Co-P.I., *Department of Energy, Energy Focused Research Center* (2009 – 2014, \$12.5M total, \$537k to U.D.) "Computational Catalysis and Atomic-Level Synthesis of Materials: Building Effective Catalysts From First-Principles–CALC-D". The goal of this inter-university, interdisciplinary research project is to develop novel approaches to catalyst design, starting at the atomic level. UD has lead a seven-P.I. subproject entitled 'Designing Nanocatalysts via Atomically Controlled Metal Clusters and their Supports'.
- P.I. – *National Science Foundation* (2007-2011, \$488k) Atomic-scale Investigations of Metal Oxide Single Crystals, Nanostructures, and Thin Films. Single-investigator grant that laid the base for UD's research on metal oxide surfaces. Based on a previous NSF-CAREER grant (1997 – 2001), and a single-PI grant (2001 – 2004, with a two-year 'Grant extension for special creativity' 2005-2007).
- Lead P.I. - *Department of Energy- Basic Energy Sciences, Catalytic and Chemical Transformations Program*: (2005 – 2011, \$762 k over the last 3 years): Joint experimental and theoretical (with A. Selloni, Princeton University) approach to investigate molecular-based processes in photocatalysis.
- P.I. – *Infrastructure Grants*: Wrote several grants to secure funds for scientific infrastructure improvements at Tulane University and the TU Vienna: Surface Chemistry Setup (*Louisiana Board of Regents*, 2004-2007; \$200k); Oxygen-plasma-assisted MBE chamber with in-situ characterization (*NSF-MRI*, 2002-2005, \$420k; *Louisiana Board of Regents*, 2002-2005; \$200k); Multi-user Atomic Force Microscopy/surface characterization facility (*Louisiana Board of Regents* 1999-2002; \$270k); *Vienna University of Technology*, 'Innovative Project: An Apparatus for Investigating Organic Molecules on Oxide Surfaces', €141k, 2011 - 2013

- Co-P.I. – *Intel Corporation* (2006-2011, \$300k to U.D.): Devising a coating of optical mirrors compatible with new extreme ultraviolet (EUV) lithographic processes; fundamental studies of radiation-induced surface chemistry combined with a search of appropriate mitigation conditions for mirror degradation.

Publications:

200 peer-reviewed papers and book chapters
 >19,000 citations to papers, 35 papers with more than 100 citations, h-index: 61 (Google Scholar),
 ISI Web of Science Researcher ID A-3681-2010
 (see separate Publication List)

Invited Lectures:

>130 at technical conferences, and >120 seminars and colloquia
 (see separate List of Invited Talks)

Honors and Awards:

- 2016 Zhongshan Colloquium, Nanjing University, China
- 2015 Erwin Schrödinger Memorial Lecture, Trinity College Dublin, Institute of Advanced Studies in Dublin, and Austrian Embassy in Ireland
<http://www.tcd.ie/Physics/news/seminars/schrodinger/>
- 2015 Debye Lecture, Utrecht University, The Netherlands
<http://www.uu.nl/en/research/debye-institute-for-nanomaterials-science/archive/debye-lectures>
- 2015 Elected Member, Leopoldina Nationale Akademie der Wissenschaften
<http://www.leopoldina.org/de/home/>
- 2015 Blaise Pascal Medal in Materials Science http://www.eurasc.org/medals/pb_medals.asp
- 2015 Brdicka Memorial Lecture, Heyrovský Institute of Physical Chemistry, Academy of Sciences of the Czech Republic, Prague (<http://www.jh-inst.cas.cz/www/lecture.php?p=53>)
- 2014 Elected Member, European Academy of Sciences
- 2014 Elected Full Member, Austrian Academy of Sciences
- 2014 Eminent Visitor Award, Catalysis Society of South Africa (CATSA)
- 2013 Wittgenstein-Prize (<http://en.wikipedia.org/wiki/Wittgenstein-Preis>)
- 2013 Arthur W. Adamson Award for Distinguished Service in the Advancement of Surface Chemistry from the American Chemical Society
- 2012 Elected Corresponding Member, Austrian Academy of Sciences
- 2012 Shouheng Lecture, Zhejiang University of Technology, Hangzhou, China
- 2012 Guest Professor, Hubei University, Wuhan, China
- 2012 European Research Council (ERC), Advanced Research Grant
- 2008 Fellow, Research Center Dresden-Rossendorf, Germany
- 2008 Outstanding Researcher Award, Tulane's School of Science and Engineering
- 2007 Fellow, American Association for the Advancement of Science
- 2006 Yahoo! Founder Chair in Science and Engineering
- 2005 Fellow, AVS – The Science and Technology Society
- 2005 Provost's Recognition Award for Research and Scholarly Achievement
- 2004 Tulane Liberal Arts and Sciences Faculty Research Award
- 2004 Fellow, American Physical Society
- 2003 National Science Foundation, "Special Creativity Award"

- 2001 Friedrich Wilhelm Bessel Research Prize from the Alexander von Humboldt Foundation, Germany
- 1997 NSF CAREER Award
- 1995 Oak Ridge Associated Universities, Junior Faculty Enhancement Award
- 1992 "Charlotte Bühler Fellowship" for Habilitation from the Austrian Science Foundation" (not assumed)
- 1983, 1984, 1985 Fellowships for 'Especially Talented Students', University of Technology, Vienna

Editorial Activities:

- 2012 – 2017 Divisional Associate Editor (Materials Physics), *Physical Review Letters*
- 2010 – 2016 Advisory Editorial Board for *Surface Science*
- 2013 – 2015 International Advisory Board, *Advanced Materials Interfaces*
- 2009 – 2010 Reader Panel, *Nature*
- 2007 – 2010 Advisory Editorial Board *Open Journal of Physical Chemistry*
- 2006 – 2007 Surface, Interface and Atomic-Scale Science Editorial Board of *Journal of Physics: Condensed Matter*
- 2003 – Advisory Editorial Board for *Surface Science Reports*

- 2009 Guest Editor (together with T.M. Orlando), "Non-Thermal Processes on Surfaces. Dedicated to the Memory of Prof. Theodore E. Madey" Special Issue in *J. Phys.: Cond. Matter*
- 2006 – 2007 Guest Editor (together with A. Selloni and C. Di Valentin), "Doping and Functionalization of Semiconducting Metal Oxides", Special Issue in *Chemical Physics*, 2006 – 2007

Professional Activities and Service:

- 2016 – 2017 Vice-Chair (scheduled to take over as chair), Surface Physics Division, German Physical Society
- 2016 - Member, Scientific Advisory Board, Kardinal Innitzer Studienfonds
- 2014 - Scientific Advisory Board, Bessy Synchrotron Berlin
- 2014 - Senate of the Christian-Doppler Society
- 2014 - 2016 Board Austrian Chemical-Physical Society, Austria
- 2014 – 2016 Elected to head the Surface, Interface, and Thin Film Division of the Austrian Physical Society
- 2013, 2015 Local organization of the 'Lise Meitner Lecture' of the German and Austrian Physical Society
- 2006 - 2007 American Physical Society, Selection Committee for the David Adler Lectureship Award
- 1998 – 2001 Executive Committee, Surface Science Division, American Vacuum Society
- 2006 – 2009 General Committee of the Physical Electronics Conference
- 2005 – 2007 Elected member, CAMD (Center for Advanced Microstructures and Devices, LSU) User's Committee

Organizer (together with Günther Rupprechter and Jürgen Fleig) FOXSI International Meeting, Vienna, Austria, May 11-13, 2015 and May 23-25, 2016

Organizer (together with Gottfried Strasser, Gareth Parkinson, et al., Joint Meeting of the Austrian and Swiss Physical Societies, Aug. 31 – Sept. 5, 2015)

Organizer (together with P. Varga and F. Aumayr), 25th Symposium on Surface Science, ‘3S, St. Christoph/Arlberg, Austria, March 11 – 16, 2012), 27th Symposium on Surface Science, ‘3S, St. Christoph/Arlberg, Austria, March 9 – 14, 2014), 29th Symposium on Surface Science, ‘3S, St. Christoph/Arlberg, Austria, February 21 – 27, 2016)

Organizer (together with Art Baddorf, Dietrich Hesse, Andrew Rappe, Nayoe Shibata) Symposium for the 2010 MRS Spring Meeting on “Structure-Function Relations at Perovskite Surfaces and Interfaces”

Organizer (together with Thom Orlando), International Workshop on Desorption Induced by Electronic Transitions, DIET XII, Spring 2009

Organizer (together with Kieron Burke) of the “Tulane DFT Fest: celebrating the achievements of Prof. John Perdew (New Orleans, March 2008)

Organizer (together with A. Selloni and M. Batzill), Focus Session entitled “Materials for photovoltaic and photocatalysis”, March Meeting of the American Physical Society, March 2008, New Orleans

Organizer (together with D.W. Goodman and D. Jennison), 2nd International Workshop on Oxide Surfaces IWOX-2, Taos, New Mexico, January 2001

Local Organizing Committee, 60th Physical Electronic Conference, Baton Rouge, LA, Spring 2000

General Committee of the Physical Electronics Conference (2006 – 2009)

European Research Council, Advanced Investigator Grant Initiative, Panelist, Panel PE 4 (Physical and Analytical Chemical Sciences), 2008, 2010, 2012, 2015

Committee of Visitors for the Materials Sciences and Engineering Division in the Department of Energy Office of Basic Energy Sciences, March 31 – April 2, 2009, Germantown, MD

Member evaluation Committee, Department of Materials Science, TU Darmstadt (Dec. 2014)

Co-Chair, Evaluation Committee, Faculty of Physics, TU Munich (Fall 2016)

Member, Evaluation Committee, Department of Materials Science, ETH Zürich (Fall 2016)

Serving on the International Advisory Board of multiple international conferences and workshops, reviewer for multiple funding agencies, tenure and promotion packages, etc.

Teaching and Mentoring:

Supervised 25 post-docs and 23 graduate students; 9 former co-workers now hold faculty positions. Current research group consist of 6 post-docs, 11 PhD and 3 Masters students.

Professional Affiliations:

Member of the American Physical Society (Fellow), American Vacuum Society (Fellow), AAAS (Fellow), Austrian Academy of Sciences (Full Member), European Academy of Sciences, National Academy of Sciences Leopoldina,