CURRICULUM VITAE
Dr. Udo D. Schwarz

November 7, 2024

1 GENERAL INFORMATION

Surname: **Schwarz**
Given names: **Udo Dietmar**
Title: **Dr., Professor of Mechanical Engineering and Chemical & Environmental Engineering**
Chair, Department of Mechanical Engineering

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2 PROFESSIONAL PREPARATION

- Diploma in Physics, University of Basel, Switzerland, 1989. Final Exams in Theoretical and Experimental Physics, Mathematics, and Solid State Physics. Area of Specialization in the Diploma Thesis: Nuclear Magnetic Resonance.
- Ph.D. in Physics, University of Basel, Switzerland, 1993, Area of Specialization: Surface Physics. Research Advisor: Prof. Dr. H.-J. Güntherodt. Title of the Thesis: *"Scanning Force Microscopy Applied to Photographic Materials"*.

3 APPOINTMENTS

Since July 2012	Chair, Department of Mechanical Engineering
Since July 2010	Professor of Mechanical Engineering and Chemical and Environmental Engineering, Yale University
Since July 2009	Professor of Mechanical Engineering, Yale University

July 2002 – June 2009	Associate Professor at the Department of Mechanical Engineering, Yale University
May 2001 – June 2002	Visiting Senior Scientist at the Materials Science Division, Lawrence Berkeley National Laboratory, University of California, Berkeley, (group of Dr. Miquel Salmeron)
Fall 1999 – spring 2001	Lecturer/group leader at the Microstructure Research Center, Institute of Applied Physics, University of Hamburg, Germany
Fall 1993 – fall 1999	Staff scientist at the Microstructure Research Center, Institute of Applied Physics, University of Hamburg, Germany, ("C1" position within the research department of Prof. Dr. Roland Wiesendanger)
Spring 1993 – fall 1993	Postdoctoral research associate in the research group of Prof. Dr. Roland Wiesendanger, Microstructure Research Center, Institute of Applied Physics, University of Hamburg, Germany

4 RESEARCH INTERESTS

My research interests are centered on the nanometer-scale mechanical, chemical, and physical properties of surfaces and interfaces. The main topics include:

- Fundamental study of force interactions at and between surfaces from the nanometer down to the atomic scale
- Probing of small-scale mechanical properties of materials
- The structure and properties of metallic glasses and high-entropy alloys
- High-resolution investigations of surfaces and surface properties. Material classes include metals (in particular adsorption and reactivity studies of molecules on single-crytalline metallic model catalysts and the study of mechanical properties and structure of bulk metallic glasses at the nanometer and atomic scale), layered materials (such as bilayer 2D silica and layered topological insluators), complex oxides, chalcogenides, and ferroelectric materials
- Catalytic properties of materials
- Chemical imaging
- Nanotribology, atomic mechanisms of friction
- Further development of scanning probe methods, in particular of vacuum-based high-resolution atomic force microscopy, ultrahigh vacuum low-temperature atomic force microscopy, friction force microscopy, and multi-dimensional & multi-channel imaging modes

5 AWARDS AND HONORS

- Gaede Award 1999 (Principal Prize of the German Vacuum Society)

- German "Habilitation", September 1999
- Venia Legendi ("Privatdozent") since October 1999
- "Heisenberg" Fellowship from the German Research Society Spring 2000-Fall 2002
- Magister of Arts Honorary (M.A.H.), Yale University, December 2009

6 PUBLICATIONS AND PRESENTATIONS

- *Over 140 original and review articles* published in peer-reviewed journals
- *24 invited book contributions*, which mostly review the various fields I am working in
- *Over 50 invited talks* given at conferences
- *Over 100 invited seminars* given at universities and research institutions
- In addition *over 300 regular conference contributions*

7 CITATIONS AND H-INDEX

- ISI Web of Science lists 163 of my publications, which have been cited over 5400 times as of November 7, 2024.
- By the same date, Google Scholar lists over 7800 citations.
- My *h*-index was 43 (Web of Science) and 51 (Google Scholar), respectively.

8 PATENTS

1. *Liquid crystal cells for integrated optics and methods of their fabrication*. European Patent No. 92120023.4-
2. Udo D. Schwarz, Eric I. Altman, Hendrik Hölscher, and Omur Erdinc Dagdeviren. *Tuned Oscillator Atomic Force Microscopy Methods and Apparatus.* Patent filed December 21, 2015. International Application Number PCT/US15/67065. United States Patent Application No. US2019/0056428 A1, published February 21, 2019

9 JOURNALS & EDITING

- Associate Editor (until October 2018) and Advisory Editor (since October 2018) of the Beilstein Journal of Nanotechnology, The Beilstein Institute for the Advancement of Chemical Sciences, Frankfurt, Germany.
- Guest editor (with Hendrik Hölscher and Roland Wiesendanger) for the proceedings of the 3rd Conference on Noncontact Atomic Force Microscopy (NC-AFM 2000), July 16-19, 2000, in Hamburg, Germany. Appeared in Applied Physics A **72**, S1-S143 (2001).
- Guest editor for the proceedings of the 7th Conference on Noncontact Atomic Force Microscopy (NC-AFM 2004), September 12-15, 2004, in Seattle, WA, USA. Appeared in Nanotechnology **16** (3), S1-S137 (2005).
- Guest editor (with Ruben Perez and Ricardo Garcia) of a "Topical Issue on High-Resolution Noncontact Atomic Force Microscopy", which has been published in Nanotechnology **20** (26), 264001-264021 (2009).
- Guest editor (with Hendrik Hölscher) for the proceedings of the 12th Conference on Noncontact Atomic Force Microscopy (NC-AFM 2009), August 10-14, 2009, in New Haven, CT, USA, which have been published in the Journal of Vacuum Science and Technology B **28** (3), C4a1-C4E47 (2010).

- Editor of a Special Issue on “Noncontact Atomic Force Microsopy”, which has been published in the Beilstein Journal of Nanotechnology in 2012.
- Editor (with Thilo Glatzel, Hendrik Hölscher, Thomas Schimmel, Mehmet Z. Baykara, and Ricardo Garcia) of a Special Issue on “Advances Atomic Force Microsopy Techniques”, which has been published in the Beilstein Journal of Nanotechnology in 2013.
- Editor (with Mehmet Z. Baykara) of a Themitic Series on “Noncontact Atomic Force Microsopy II”, which has been published in the Beilstein Journal of Nanotechnology in 2014.
- Editor (with Mehmet Z. Baykara) of a Thematic Series on “Noncontact Atomic Force Microsopy III”, which has been published in the Beilstein Journal of Nanotechnology in June 2016.
- Editor (with Thilo Glatzel, Mehmet Z. Baykara, Ricardo Garcia, and Thomas Schimmel) of a Thematic Series on "Advanced Atomic Force Microscopy", which has been published in the Beilstein Journal of Nanotechnology in 2017.

10 CONFERENCES

- Steering committee member of the Noncontact Atomic Force Microscopy (NC-AFM) Conference Series 2003-2022.
- 2022 Program committee member of the 29th International Colloquium on Scanning Probe Microscopy (ICSPM29), held in conjunction with the 22nd Triennual International Vacuum Conference (IVC-22) organized by the International Union for Vacuum Science, Technique and Applications (IUVSTA) in Sapporo, Japan, September 11-16, 2022.
- 2018 Member of the International Advisory Board for the 14th Nanoscience and Nanotechnology Conference (NanoTR-14), which was held September 22-25, 2018, in Izmir, Turkey.
- 2015 Co-organizer (with Igor Sokolov, Tufts University, Boston; Lukas Eng, Technical University Dresden, Germany; and Rober Ros, Arizona State University) of the Symposium “Frontiers in Scanning Probe Microscopy” at the 2015 Fall Meeting of the Materials Research Society in Boston (November 29 – December 4, 2015).
- 2014 Member of the Programming Committee of the International Conference on Nanoscience and Technology (ICN+T 2014), July 20-25, 2014, in Vail, CO.
- 2014 Member of the International Advisory Board for the “Materials Solutions for High Demanding Tribological Applications” Symposium at the 13th International Ceramics Congress (CIMTEC 2014) and the 6th Forum on New Materials, which was held June 8-13, 2014, in Montecatini Terme, Tuscany, Italy.
- 2013 Program Chair for the sessions of the Nanometer-Scale Science and Technology Division of the AVS at the society’s 60th International Symposium and Exhibition (AVS 2013), which was held October 27-Nov 1, 2013, in Long Beach, CA.
- 2009 Chairman and organizer of the 12th Conference on Noncontact Atomic Force Microscopy (NC-AFM 2009), which has been held in August 2009 in New Haven.
- 2009 Co-organizer (with Ruben Perez, Universidad Autónoma de Madrid, Seizo Morita, Osaka University, and Suzi Jarvis, University College Dublin) of the Symposium “Dynamic Scanning Probes: Imaging, Characterization, and Manipulation” at the 2009 Fall Meeting of the Materials Research Society in Boston.

- 2006 Co-organizer (with George Hentschel, Emroy University, and Yue Qi, GM Research) of the Friction, Fracture, and Deformation Symposium at the 2006 March Meeting of the American Physical Society in Baltimore.
- 2006 Member International Organizing Committee (with A. Raman and R. García) of the "Frontiers of Scanning Probe Microscopy" Conference in West Lafayette, IN, USA.
- 2004 Co-organizer (with Prof. Eric Altman, Yale University) of the surface science symposium at the 78th ACS Colloid and Surface Science Symposium.
- Program committee member of the 7th Conference on Noncontact Atomic Force Microscopy (NC-AFM 2004), September 12-15, 2004, in Seattle, WA, USA.
- Chair of numerous sessions at various conferences.

11 ORGANIZATIONS AND MEMBERSHIPS

- Board member (2008-2010), Chair-elect (2010-2011), Chair (2011-2012), and Programming Chair (2012-2013) of the Nanometer-Scale Science and Technology Division of the American Vacuum Society.
- In addition, I am a regular member of the following professional societies:
  - American Physical Society (APS)
  - American Vacuum Society (AVS)
  - American Chemical Society (ACS)
  - Materials Research Society (MRS)
  - The Minerals, Metals, and Materials Society (TMS)

12 GENERAL ACTIVITIES

I acted frequently as reviewer of proposals for various funding agencies in the US (most noticeably the National Science Foundation, the Department of Defense, the Department of Energy, the Petroleum Research Fund of the American Chemical Society, the U.S. Civilian Research and Development Foundation, and the Center for Nanophase Materials Science at the Oak Ridge National Laboratory), Germany (e.g., the German Science Foundation DFG and the Volkswagen Foundation), Switzerland (the Swiss Federal Institutes of Technology in Zürich and Lausanne), Austria (e.g., the Austrian Academy of Science and the Austrian Fund for the Promotion of Science), the Netherlands (Netherlands Foundation for Fundamental Research on Matter and Netherlands Organization for Scientific Research NWO), Japan (Japan Society for the Promotion of Science), the United Kingdom (Research Council UK), Finland (Academy of Finland), and the European Union (European Research Council).

Journals

I am very often asked to review papers for scientific journals and conference proceedings. The list of journals I worked with in the past includes:

- ACS Nano
- Advanced Materials
- Applied Mechanics
- Applied Physics A
- Applied Physics Letters

- Applied Surface Sciences
- Beilstein Journal of Nanotechnology
- Chemical Reviews
- Journal of Applied Physics
- Journal of Chemical Physics
- Journal of Colloid and Interface Science
- Journal of Micromechanics and Microengineering
- Journal of Microscopy
- Journal of Non-Linear Mechanics
- Journal of Physical Chemistry
- Journal of Physics: Condensed Matter
- Journal of Physics D: Applied Physics
- Journal of Vacuum Science and Technology
- Langmuir
- Materials Today
- Measurement Science & Technology
- Nano Letters
- Nanotechnology
- Nature
- Nature Communications
- Nature Materials
- Nature Nanotechnology
- Nature Physics
- Physical Review B
- Physical Review Letters
- Review of Scientific Instruments
- Science
- Scientific Reports
- Small
- Surface and Coatings Technology
- Surface and Interface Analysis
- Surface Science
- Tribology Letters
- Ultramicroscopy

Universities

Review of diploma and Ph.D. theses and member of Ph.D. committees for various universities in the US, Germany, and Switzerland.