JAN BALAJKA

CURRICULUM VITAE

TU Wien
Institute of Applied Physics
Wiedner Hauptstrasse 8-10/134
1040, Vienna
Austria
+43-1-58801-13466
jan.balajka@tuwien.ac.at

Website | Google Scholar | ORCID | Web of Science

PROFESSIONAL EXPERIENCE AND EDUCATION

2020–	Assistant Professor, Vienna University of Technology, Austria
2019–2020	Postdoctoral Associate, Cornell University, Ithaca, NY, USA (advisor: Melissa A. Hines)
2018	Ph.D. in physics, TU Wien, Austria (advisor: Ulrike Diebold)

RESEARCH INTERESTS

Oxide, hydroxide and mineral surfaces, solid-liquid interfaces, heterogeneous ice nucleation, carbon capture and mineralization, scanning probe microscopy

Macroscopic properties of materials originate from molecular and atomic scale. My research investigates surfaces of oxides, hydroxides and other minerals using a combination of scanning probe microscopy (STM/AFM) to image the atomic structure, and spectroscopic methods (XPS, LEIS) for chemical analysis. The experiments explore fundamental properties such as surface structure and stabilization mechanisms under ultrahigh vacuum and extend to complex environments of liquids and high pressures of gases using a custom-built apparatus for dosing ultrapure liquid water under highly controlled conditions. We strive to unveil the origins of environmental, atmospheric and geochemical processes, and enhance materials' properties in technologies such as energy harvesting and storage, production of commodity chemicals, and heterogeneous catalysis.

AWARDS

2019	Loschmidt Prize, Physical Chemistry Society, Austria
2013	Dean's Prize, Brno University of Technology, Czech Republic

SELECTED PUBLICATIONS

1. Jan Balajka, Melissa A. Hines, William J. I. DeBenedetti, Mojmír Komora, Jiří Pavelec, Michael Schmid, Ulrike Diebold
   High affinity adsorption leads to molecularly ordered interfaces on TiO_2 in air and solution
   Science 361, 6404, 786–789 (2018), 10.1126/science.aat6752

2. Jan Balajka, Jiří Pavelec, Mojmír Komora, Michael Schmid, Ulrike Diebold
   Apparatus for dosing liquid water in ultrahigh vacuum
   Review of Scientific Instruments 89, 8, 83906 (2018), 10.1063/1.5046846

3. Jan Balajka, Ulrich Aschauer, Stijn F. L. Mertens, Annabella Selloni, Michael Schmid, Ulrike Diebold
   Surface structure of TiO_2 rutile (011) exposed to liquid water
   Journal of Physical Chemistry C 121, 47, 26424–26431 (2017), 10.1021/acs.jpcc.7b09674

4. Giada Franceschi, Ulrike Diebold, Jan Balajka
   Atomic structure of oxide surfaces in aqueous environment (review chapter), edited by David E. Starr and Hendrik Bluhm
   Encyclopedia of Solid-Liquid Interfaces (First Edition), 200-209, Elsevier 2023, (eds. Klaus Wandelt and Gianlorenzo Bussetti)10.1016/B978-0-323-85669-0.00078-7

5. Florian Kraushofer, Francesca Mirabella, Jian Xu, Jiří Pavelec, Jan Balajka, Matthias Müllner, Nikolaus Resch, Zdeněk Jakub, Jan Hulva, Matthias Meier, Michael Schmid, Ulrike Diebold, Gareth S. Parkinson
   Self-limited growth of an oxyhydroxide phase at the Fe_3O_4(001) surface in liquid and ambient pressure water
   The Journal of Chemical Physics 151, 154702 (2019), 10.1063/1.5116652

6. Zdeněk Jakub, Matthias Meier, Florian Kraushofer, Jan Balajka, Jiří Pavelec, Michael Schmid, Cesare Franchini, Ulrike Diebold, Gareth S. Parkinson
   Rapid oxygen exchange between hematite and water vapor
   Nature Communications 12, 6488 (2021), 10.1038/s41467-021-26601-4

7. Francesca Mirabella, Jan Balajka, Jiří Pavelec, Markus Göbel, Florian Kraushofer, Michael Schmid, Gareth S. Parkinson, Ulrike Diebold
   Atomic-Scale Studies of Fe_3O_4(001) and TiO_2(110) Surfaces Following Immersion in CO_2-Acidified Water
   ChemPhysChem 21, 16, 1788–1796 (2020), 10.1002/cphc.202000471

INVITED AND DISTINGUISHED TALKS

2024/06/05 Invited talk at Marcus Wallenberg Symposium MOWiiE - Metal-Oxide/Water Interactions in Electrochemistry: Theory Meets Experiment in Uppsala, Sweden

"*Water on oxide and mineral surfaces – atomic scale insights*"

2024/03/21 Post-deadline talk at DPG 2024 - German Physical Society annual meeting in Berlin, Germany

"*Silver Iodide: Polar Surfaces as Ice Nuclei?*"

2023/11/15 Invited talk at Operando SPM 2023 - 1st International Conference on Nanoscale Catalysis and Energy Conversion in Berlin, Germany (organized by Christopher S. Kley and Florian Johann)

"*Atomic scale insights into oxide surfaces in aqueous environments*"

2023/11/03 Invited seminar at Pacific Northwest National Laboratory (PNNL), Richland, WA, USA (hosts: Zdenek Dohnálek and Zbyněk Novotný)

"*Atomic Structure of the Reconstructed α-Al_2O_3(0001) Surface Revealed by Chemically Sensitive Noncontact AFM*"

2023/07/03 Invited attendee talk at ZCAM Metal-Oxide Ultrathin Films and Nanostructures: Meets Theory in Zaragoza, Spain

"*The atomic structure of reconstructed Al_2O_3(0001) surface*"

2023/06/19 Hot topic talk at Cluster Meeting 2023 in Prague, Czech Republic

"*The atomic structure of reconstructed Al_2O_3(0001) surface*"

2022/09/01 Invited seminar at Uppsala University, Sweden (host: Chao Zhang)

"*Atomic Structure of Oxide Surfaces in Aqueous Environment*"

COMMUNITY ENGAGEMENT

2024 Organizer of a Marcus Wallenberg Symposium *MOWiiE - Metal-Oxide/Water Interactions in Electrochemistry: Theory Meets Experiment* in Uppsala, Sweden, with Chao Zhang (Uppsala University), Veronica Augustyn (North Carolina State University, USA), and Evert Jan Meijer (University of Amsterdam, The Netherlands)

2023 Reviewer of abstracts for ECOSS-36, in Łódź, Poland, organized by Pawel Kowalczyk

2023 Organizer of mini-symposium on *Atomic-scale mineral-water interfaces* within 36th European Conference of Surface Science (ECOSS) in Łódź, Poland, with Johannes Lützenkirchen (KIT) and Chao Zhang (Uppsala University)

2023 Reviewer for Deutsche Forschungsgemeinschaft (DFG) funding agency, Germany

2022 Committee member of Franz Viehböck Young Investigator Award, Austria

2022 Expert referee for Ph.D. stipend applications, Studienstiftung, Germany

2021 Co-organizer of 18th IUVSTA Summer School on *Physics at Nanoscale* (hybrid due to Covid-19)

2020 Committee member of Franz Viehböck Young Investigator Award, Austria

Peer reviewer for various journals

Nature Materials, *Nature Communications*, *JACS*, *Angewandte Chemie*, *Acc. Chem. Res*, *Nano Letters*, *Chem* (*Cell*), *Physical Review Letters, J. Phys. Chem. Letters*, *J. Phys. Chem. C*, *Phys. Chem. Chem. Phys.*, *Surface Science*, *Langmuir, Beilstein Journal of Nanotechnology*

MENTORING

Graduate Students

2021 – Johanna Hütner

2023 – David Kugler

2023 – Aishwarya Sudhama (co-supervisor, supervisor: Chao Zhang, Uppsala University, Sweden)

2024 Soumyajit Rajak (visiting student from University of Illinois in Chicago, Nan Jiang's lab)

Master Students

2022 David Kugler (Erasmus Internship)

2022 Dominik Hrůza (Erasmus Internship)

Bachelor Students

2023 Milena Zehetner

2021 Sophie Wrathall

Co-supervision of several other graduate students and postdocs

TEACHING & SCIENCE OUTREACH

2024 Undergraduate Physics Laboratory Exercises 3, TU Wien, Austria

2023 Surface Physics Lecture (substitute for U. Diebold), TU Wien, Austria

2023 Undergraduate Physics Laboratory Exercises 1, TU Wien, Austria

2022 Undergraduate Physics Laboratory Exercises 3, TU Wien, Austria

2021 Undergraduate Physics Laboratory Exercises 2, TU Wien, Austria

2019 Columbia University, New York, NY, USA

Educational activities within Cornell & Columbia STEM Workshop for elementary and middle-school teachers

2019 Harlem Promise Academy, New York, NY, USA

Educational activities within Cornell & Columbia STEM Workshop for 7th-grade students

PERSONAL BACKGROUND

Born May 21st, 1989, Hustopece, Czech Republic

Citizenship: Czech Republic