

Empa PhD Symposium 2022

29.11.2022, Empa Akademie, Überlandstrasse 129, CH-8600 Dübendorf

The Organizing Committee

Alessia Cesarini - *Catalysis and Sustainable Chemistry*

Federica Orellana - *Center for X-ray Analytics*

Rani Boons - *Cellulose & Wood Materials*

Donato Rubinetti - *Biomimetic Membranes & Textiles*

Egzona Isufi Neziri - *Surface Science & Coating Technologies*

General Information

The Empa PhD Students' Symposium 2022 will include 10 student presentations, 8 invited speakers talks, and two poster sessions spread throughout the day. The permanent scientific photo gallery will be displayed in the main hall.

The event will be concluded with a ceremony to award the best contributions. The best presentation and best poster will be selected by an experts committee. This year there will be three additional prizes awarded by BASF Schweiz AG (best poster in the field of sustainability), and by Frontiers in Energy Research (best poster and best presentation).

The best scientific photo will be chosen by all participants.

The award ceremony will be followed by an aperò on-site, and a dinner at the Hardwald Brewhouse (Wallisellen). Registration for the dinner is mandatory.

Program Overview

Invited talks are highlighted in bold. An overview of the student presentations can be found under the respective section.

08:00 - 08:30 Registration and Coffee

08:30 - 08:45 Opening, Tanja Zimmermann

08:45 - 09:00 Melina Spycher, *Diversity and Inclusion at Empa*

09:00 - 09:30 **Sotiria Mostrou**, *A founder's journey from science to start-up*

09:30 - 10:30 Student Presentations

10:30 - 11:10 Coffee Break and morning Poster Session

11:10 - 11:40 **Andreas Fichtner**, *Fibre-optic seismology in volcanic, glacial and other challenging environments*

11:40 - 12:20 Student Presentations

12:20 - 13:30 Lunch at the Akademie

13:30 - 13:50 **Mario Jenni**, *How to start a spin-off at Empa*

13:50 - 14:50 Student Presentations

14:50 - 15:30 Coffee Break and afternoon Poster Session

15:30 - 15:50 **Karolina Bogacka**, *Frontiers: on a mission to make science open*

15:50 - 16:30 Student Presentations

16:30 - 16:50 **Stefan Baumgartner**, *Translate "green" ideas into reality*

16:50 - 17:10 **Olivier Enger**, *Sustainable Materials for a Circular Economy*

17:10 -17:20 **Raffael Kellner**, *Venture Briefing: Funding and support for turning science projects into startups*

17:20 - 18:00 **Felix Büning**, *viboo: An Empa Spin-off to reduce buildings' energy consumption*

18:00 - 18:30 Award Ceremony and Closing Remarks

18:30 - 19:20 Aperò on site

19:30 - 23:00 Dinner at Hardwald Brewhouse

Speakers

Below you can find the list of all speakers in order of appearance including a short description of their work.

Ms Melina Spycher - Head Diversity and Inclusion Empa



Melina is a psychologist, currently she works as head of the Center of Competence for Diversity and Inclusion at PSI, Empa, and Eawag. Previously, she worked as behavioral psychologist, HR specialist, and deepened her knowledge regarding strategies and measures for a diverse, inclusive, and respectful work environment. If you want to contact her, connect with her on linkedin <https://www.linkedin.com/in/melinaspycher> or via e-mail (melina.spycher@empa.ch).

Dr. Sotiria Mostrou - CEO and Founder Biosimo



Sotiria Mostrou is the CEO & co-Founder of Biosimo AG, which has the mission to make sustainable chemicals and contribute positively to the planet by reducing fossil CO2 emissions. She received her PhD at ETH Zurich, and her research was focused on catalysis engineering and chemical process design. Now she has more than eight years of experience in chemical engineering, renewable chemicals research, and entrepreneurship. Since building Biosimo, which is now an ETH spin-off, Sotiria has successfully combined deep technical knowledge with her entrepreneurial and leadership skills to develop and grow her company. She enjoys

giving back to the scientific community by working with researchers and students in chemical engineering.

Prof Dr. Andreas Fichtner - Professor of Geophysics at ETH Zurich



Andreas Fichtner is Professor of Seismology & Wave Physics at ETH Zurich. He received his PhD in 2010 from LMU Munich for his work on Full Seismic Waveform Modelling and Inversion. After spending three years as postdoctoral researchers, he joined ETH Zurich in 2013. His research interests include theoretical and computational seismology, inverse theory, the translation of seismic imaging techniques to medical ultrasound, and distributed acoustic sensing in environments where conventional seismometer arrays are difficult to install. Andreas Fichtner is the editor of one and author of four books on topics ranging from applied mathematics to general geophysics and inverse theory. He received in 2011 the Keitii Aki Award from the American Geophysical Union and in 2015 the Early Career Scientist Award from the International Union of Geodesy and Geophysics, as well as several other recognitions.

Mr Mario Jenni - CEO glatec



Mario Jenni is head of glatec, the business incubator of Empa and Eawag in Dübendorf and co-founder & CEO of the Bio-Technopark Schlieren-Zurich. He holds a MSc in Molecular Genetics from University of Zurich. He has been working for 30 years in industry and academia, of which more than 20 years in leading positions. He is founder, co-founder, board and jury member, and advisor of several companies, organizations and initiatives, and Honorary Ambassador of the Greater Zurich Area. <https://www.linkedin.com/in/mario-jenni-a039423/>

Ms Karolina Bogacka - Journal Specialist



Karolina Bogacka received MSc in Bioinformatics from Wroclaw University of Science and Technology in Poland. Her dissertation entitled "Computer-aided design of foldameric mini-proteins" focused on structure prediction of foldamers with sequence design with the aim to provide further insights into their enzyme-like catalytic activities. Part of her research interests included molecular modeling of RNA structures and the phenomena of adsorption of molecules on graphene surfaces with Monte Carlo method. She joined Frontiers in 2021 as a Journal Specialist and is responsible for the strategic development of Frontiers in Energy Research.

Mr Stefan Baumgartner - Sales Engineer Chromatography Shimadzu Schweiz



Stefan Baumgartner was born on 16.08.1976. In 1992 he started his education as a chemist in the laboratory. After several years in research and analytical labs, he moved forward into the Training and Support department for laboratory automation, liquid handling and robotics. Since 14 years he has been part of the sales force for different companies in the field of clinical diagnostic, lab supply and analytical instruments. In 2021 he started working at Shimadzu Switzerland GmbH as a Sales Engineer Chromatography.

Dr. Olivier Enger - Senior Principal Innovation Manager BASF Schweiz AG



Olivier Enger is a Senior Principal Scientist / Technology Scout in the central R&D division of BASF. He studied at the university of Strasbourg and Cambridge before getting his Ph.D. from the ETH Zürich with Prof. F. Diederich in 2002. After a postdoctoral stay with Prof. Dr. F. Stoddart at UCLA (USA), Olivier started his career at BASF SE (Germany) in 2003 as Research Teamleader in the field of liquid crystals and organic electronics. Moving from team leader to marketing manager for active pharmaceutical ingredients and then R&D group lead for photoinitiators and special dyes, he is now a technology scout at BASF Switzerland since 2012. He is co-located at Empa in Dübendorf for close collaboration and co-creation with Empa and NEST (in which BASF and partners are going to set up a new unit "STEP2"), and more broadly the ETH innovation ecosystem. Although his focus is broadly on sustainable technologies, he is more specifically interested in net zero technologies, sustainable materials and digital construction.

Mr Raffael Kellner - Program Manager Venturelab



Raffael Kellner studied Business Administration at the Catholic University of Eichstätt-Ingolstadt and at the Comenius University of Bratislava. After graduation in 2010, he worked in advisory firms focused on the digital economy and negotiation in Vienna, Berlin, New York, Hong Kong and Zurich. Since 2019, Raffael is a program manager at Venturelab, Switzerland's leading support organization for tech startups. In this role, he advises founders from Swiss universities and research institutions who strive to turn their science projects into successful startups.

Dr Felix Büning - CEO viboo



Felix Büning studied Mechanical Engineering at RWTH Aachen university and conducted research at various leading research institutes in the domain of building energy systems and control systems in Aachen, Berkeley and Zürich. He holds a PhD from the Automatic Control Lab at ETH Zürich and is currently a Postdoc at the Urban Energy Systems Lab at Empa. In addition to research, he is CEO and a co-founder of the start-up viboo. viboo develops self-learning predictive control algorithms for manufacturers of building heating equipment. The technology lowers the energy consumption of buildings by 20-40% and allows buildings to be operated as virtual batteries.

Student Presentations

List of student presentations and respective titles provided in chronological order.

Tatiana Kochetkova - Empa, University of Bern

Quantifying bone quality in a population of aging patients who underwent total hip replacement surgery.

Kevin Kleemann - ETH Zurich

Adsorption and transport of water-soluble, biodegradable polymers in soils: Process elucidation using experimental model systems.

Ye Zhu - Empa, ETH Zurich

Linear and Nonlinear Resonant Ultrasound Spectroscopy for Detection and Characterization of Damage in Building Materials.

Ahmed Zuned - Empa, University of Basel

How to overcome a barrier?

Leonard Krupnik - Empa, University of Fribourg

Illuminating the structure of iron carbohydrates in complex biological environments.

Huagui Lai - Empa, ETH Zurich

Solution Processed Flexible All-perovskite Tandem Solar Cells.

Kamran Iranshahi - Empa, ETH Zurich

Electrohydrodynamic Drying: A Sustainable Non-thermal Solution for Dehydration of Biological Materials.

Subas Scheibler - Empa, ETH Zurich

Thin Film Magnetic Nanoparticles with Disruptive Properties for Hyperthermia.

David Mennekes - Empa, ETH Zurich

The pathway of microplastics emitted into the Swiss nature: How much will remain in the country and how much will flow out via the rivers?

Khushdeep Sharma - Empa, EPFL

Microfluidic wet spinning of soft polymer optical fibres.

List of Posters

Akademie

A1. Oscar Mendo Diaz - Empa, University of Zurich

Fingerprinting of Chlorinated Paraffins and their Transformation Products in Plastic Consumer Products.

A2. Noémie Chénier - Empa, University of Basel

7up: What can we learn about N₂O production from simultaneous analysis of seven rare N₂O isotopic species?

A3. Oscar Cipolato - Empa, ETH Zurich

Nanoparticle-enhanced Laser Tissue Soldering.

A4. Talia Bergaglio - Empa, University of Bern

Label-free digital holotomography reveals ibuprofen-induced morphological changes to red blood cells.

A5. Prabhat Joshi – Eawag, ETH Zurich

Modelling pluvial flood risk and mitigation options in data-scarce environments

A6. Jiuke Chen - Empa, Maastricht University

Thermomechanical Recycling of PET Containing Flame Retardants.

A7. Roberto Cestaro - Empa, EPFL

Synthesis and Corrosion Properties of Manganese Oxide Films.

A8. Manon Murdeu - Empa, ETH Zurich

Human-based Placenta-embryo Chip for Developmental Toxicity Assessment of Nanoparticles.

A9. Wu Ruikai - Empa, ETH Zurich

Controlling microstructure of Polyethylene Synthesized by Surface-Tethered α -Diimine Ni Complexes on Al₂O₃ Substrate.

A10. Selim Kazaz - Empa, University of Zurich

Investigating Hydrogen Uptake and Permeation via Operando Reflecting Electron Energy loss Spectroscopy and Elastic Recoil Analysis.

A11. Sharath Rameshbabu - Empa, University of Zurich

Development of portable soft X-Ray laser for water window spectroscopy.

A12. Sizhe Wang - Empa, Tongji University

Bonded Fe-SMA/CFRP patches for repairing fatigue cracks of steel plates.

A13. Andrea Barbaresi - Empa, University of Parma

Process optimization for methane synthesis.

A14. Tamara Skrypyk - Empa, Institute for Scintillation Materials of NAS of Ukraine

Improvement of perovskite nanocrystals stability by incorporating them into polymer cross-linked systems.

A15. Xuejian Wang - Eawag, ETH Zurich

Seasonal profiles of toxic metabolites from cyanobacteria in Lake Greifensee and their biotransformation

A16. Simon Moser - Empa, ETH Zurich

Setup for absolute PL characterization of $\text{Cu}_2\text{ZnSn}(\text{S},\text{Se})_4$ -based thin film solar cells.

A17. Taras Sekh - Empa, ETH Zurich

Co-assembly of Lead Halide Perovskite Nanocrystals and Dielectric Nanodiscs into Multicomponent Functional Superlattices.

A18. Daniele Roncucci - Empa, ETH Zurich

Novel bio-based phosphorus flame retardant For poly(lactic acid).

A19. Nikolaos Tagaras - Empa, ETH Zurich

Intelligent single-atom nanozymes for effective and safe therapy of inflammatory diseases in pregnancy.

A20. Amir Hadian - Empa, University of Bern

Water-soluble binder for fused deposition modeling of polymer derived ceramics without shape distortion.

A21. Mariia Svyrydenko - Empa, ETH Zurich

Tail Engineering of Zwitterionic Phospholipid Ligands for Improving Colloidal Stability of Lead Halide Perovskite Nanocrystals.

A22. Jacopo Oswald - Empa, University of Basel

Hybrid Van Der Waals heterostructures for vertical organic transistors.

A23. Somashree Mondal - Empa, ETH Zurich

Multi-material extrusion-based 3D printing of magnetoactive soft elastomeric composite structures.

A24. Antonios Baganis - Empa, EPFL

Analysis of Metal Metal Composites Fabricated through Additive Manufacturing and Inducting Melting.

A25. Cansu Zeytun Karaman - Empa, EPFL

Novel Polyphosphazenes for dielectric elastomer applications.

A26. Joel Casella - Empa, ETH Zurich

Thin-film conversion cathodes for high-energy solid-state batteries.

A27. Alexander Wiczorek - Empa, ETH Zurich

Resolving oxidation states and Sn-halide interactions of perovskites through Auger parameter analysis in XPS.

A28. Kiarash Tajbakhsh - Empa, University of Fribourg

3D non-invasive tissue and multi-omics analysis of thyroid tumors for precision medicine.

NEST

N1. Ali Jafarabadi - Empa, ETH Zurich

Innovative Clamping and Coupling Technologies Using Iron-based Shape Memory Alloys (Fe-SMAs).

N2. Anastasia Batenkova - Empa, ETH Zurich

Al/CuO nanocomposite thin film for joining technologies.

N3. Arthur Couteau - Empa, ETH Zurich

Turbulent Heat Transfer in Large Eddy Simulations.

N4. Bao Zhao - Empa, ETH Zurich

Towards Self-powered Internet-of-Things with a Graded Metamaterial-based Piezoelectric Energy Harvesting System.

N5. Claudia Masucci - Empa, University of Zurich

Enhanced Mass Resolution by Absorption Mode Fourier Transform On a Combined Atomic and Molecular Plasma Source.

N6. Donato Rubinetti - Empa, KU Leuven

Electrohydrodynamic air amplifier for low-energy airflow generation.

N7. Fabian Weyand - Empa, ETH Zurich

Development of PVDF- fiber based Gas Diffusion Electrodes (GDE) through conformal bimetallic layers for electrochemical gas sensing applications.

N8. Filippo Longo - Empa, University of Zurich

Application of Soft- and Hard X-Ray Spectroscopy to Bridge Surface and Bulk Chemistry.

N9. Filippo Longo - Empa, University of Zurich

Resolving oxidation states and Sn-halide interactions of perovskites through Auger parameter analysis in XPS.

N10. Henrik Eliasson - Empa, ETH Zurich

HR-STEM nanoparticle- and growth-analysis of Pt sputtered on CeO₂.

N11. Dominik Lüthi - Empa, University of Bern

Intercalation of graphene nanoribbons in ultra-high-vacuum: new route towards a fully dry-transfer process.

N12. Rani Boons - Empa, ETH Zurich

Diatom encapsulation in three-dimensional nanocellulose based structures as indicator for water quality.

N13. Johannes von Szczepanski - Empa, ETH Zurich

High-Permittivity Polysiloxanes for Solvent-Free Fabrication of Dielectric Elastomer Actuators.

N14. Justin Plogmann - Empa, ETH Zurich

Numerical Simulations of the Exhaust Plume in the Vehicle Wake with Insights to Remote Emission Sensing.

N15. Egzona Isufi Neziri – Empa, University of Zurich

Low-dimensional metal organic frameworks based on squarate

N16. Jyotish Patidar - Empa, ETH Zurich

Metal-Ion Synchronized Reactive HiPIMS of AlN and AlScN films for Piezoelectric Applications.

N17. Lars Lüder - Empa, University of Basel

Multiscale MOF Architecture with Porosity Control for Wearable Sweat Sensing.

N18. Marco Knobloch - Empa, University of Zurich

R-based Automatic Spectra Evaluation Routine (RASER) for the selective and rapid analysis of chlorinated paraffins and olefins.

N19. Marin Nikolic - Empa, University of Zurich

Neutron insights into nickel metal hydride batteries.

N20. Matteo Bevione - Empa, EPFL

Toward powering colloidal-based robots: photo-thermal effect in oil-based titanium nitride nanofluids.

N21. Matthias Wiesli - Empa, EPFL

Investigating the link between the immune response and mineralization for applications in bone tissue engineering.

N22. Meet Jaydeepkumar Oza - Empa, EPFL

Room temperature in-situ synchrotron creep study of Fe-based shape memory alloy.

N23. Michael Steiner - Empa, ETH

Ensemble-based inverse estimates of European CH₄ emissions with ICON-ART.

N24. Milos Selakovic - Empa, ETH Zurich

Rapid Spectroscopic Detection of Volatile Organic Compounds With Widely Electrically Tuneable Quantum-Cascade Lasers.

N25. Mohammad Jafarpour - Empa, EPFL

High-Resolution and Highly-Scaled Gravure Printing.

N26. Nadja Manser - Empa, ETH Zurich

Timber framed shear walls with large openings contributing to the lateral load-resisting system of a building.

N27. Niels Pichler - Empa, ETH Zurich

A new method for extracting Mode I traction separation relationship of Fe-SMA bonded joints.

N28. Francesco Bernasconi - Empa, ETH Zurich

Control of Morphology of Gas Diffusion Electrodes to Tune the Product Selectivity of CO₂ and H₂O Electrolysis.

Sponsors of the event

This event is organized by Empa and kindly supported by Glatec, Venture Kick / Venturelab AG, BASF Schweiz AG, Shimadzu Schweiz AG, Dottikon AG, Frontiers in Energy Research, Avantama AG, Sensirion AG, GMP SA, ABB, and Physical Electronics GmbH. Thanks to these generous contributions the participation is free of charge.



Drinks and snacks are sponsored by Goba, RedBull, Calanda, Schützengarten, Doppelleu Boxer, and Chocolat Stella.



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VENTURE
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SENSIRION



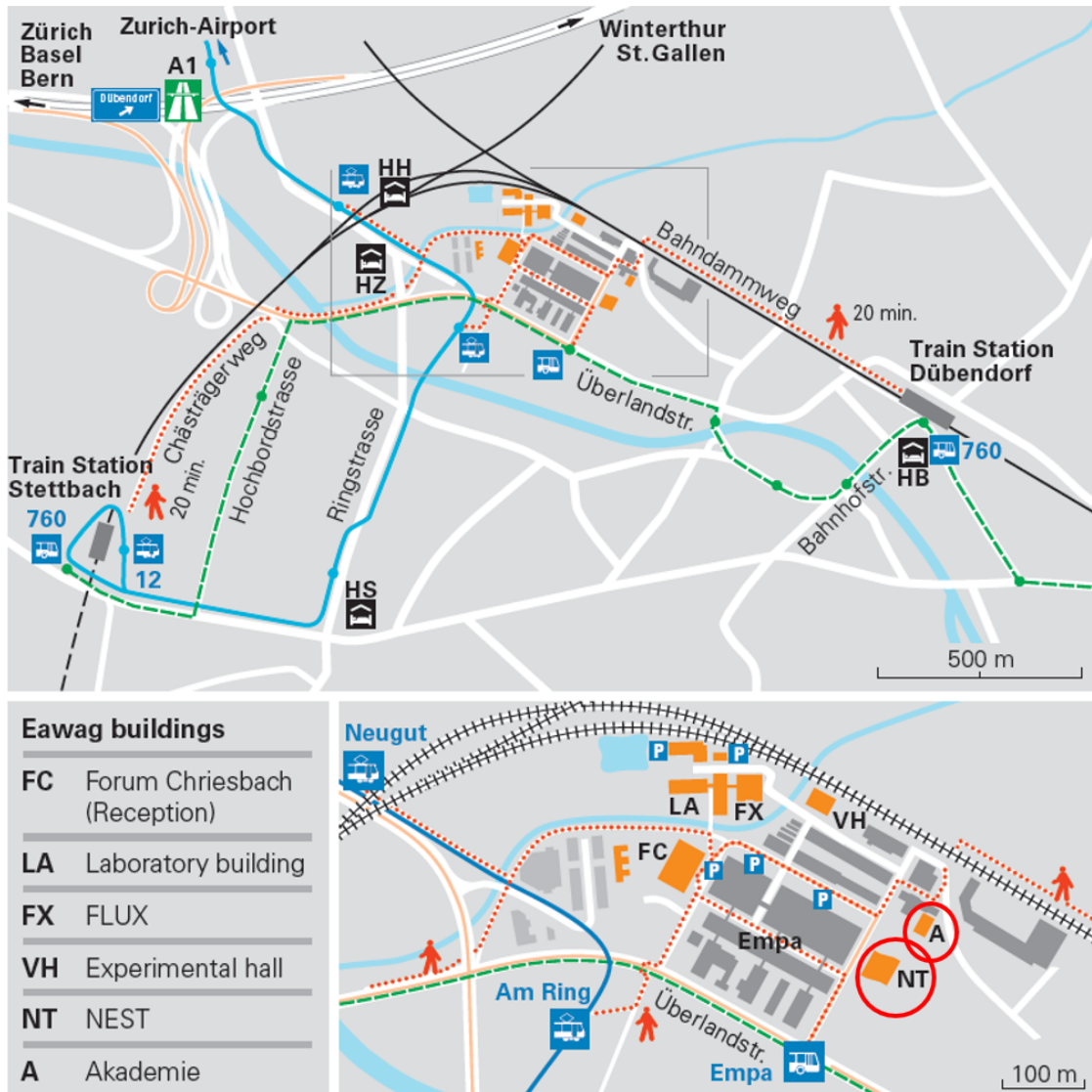
Empa - Materials and Technologies for a Sustainable Future

As an interdisciplinary research institute within the ETH Domain, Empa, the Swiss

Federal Laboratories for Materials Science and Technology, conducts cutting-edge materials and technology research. Empa's R&D activities focus on meeting the requirements of industry and the needs of society, and thus link applications oriented research with the practical implementation of new ideas.

As a result, Empa is capable of providing its partners with customized services and solutions that not only enhance their innovative edge and competitiveness, but also help to improve the quality of life for the public at large. Through an efficient technology transfer Empa is turning research results into marketable innovations. As part of the ETH Domain, Empa is committed to excellence in all its activities.

Map



Directions

Public Transport From Zurich Main Station (HB) by S-train (S3, S9, S12) to Stettbach. From there take the tram No. 12 (direction Flughafen) to the stop "Am Ring" or by bus No. 760 to "Empa". From Zurich Oerlikon by train S14 to Dübendorf and then by bus No. 760 to "Empa". From Zurich-Airport by tram No. 12 to "Neugut" or "Am Ring".

Car Motorway A1, exit Dübendorf, to the right towards Dübendorf, 300 meters after the major crossing turn left into the Eawag-Empa premises.