

Preliminary Program

September 17, 2026

Nanomechanical Testing in Materials Research and Development X

October 4 - 9, 2026

Rhodes, Greece

Conference Chair

Verena Maier-Kiener
Montan Universität Leoben, Austria



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Sunday, October 4, 2026

- 09:30 – 10:00 Check-in for Optional Tutorial Session
- 10:00 – 13:00 **Tutorial Session**
Accelerated Materials Discovery: Introduction to Thin Film Libraries and High-throughput Nanomechanics
Andrea M. Hodge, University of Southern California, USA
- Dynamic in situ Micromechanics – Fundamentals and Beyond** Markus Alfreider,
Montanuniversität Leoben, Austria
- 13:00 - 14:30 Lunch on your own
- 14:30 – 15:45 Conference Check-In
- 15:45 – 16:00 **Conference Welcome Remarks** – Verena Maier-Kiener
- 16:00 – 16:20 **Nanoindentation: The Great Legacy of Warren Oliver**
George Pharr, Texas A&M
- Session 1A: Machine Learning and Mechanical Mapping**
Moderator: Verena Maier-Kiener, Montanuniversität Leoben, Austria & Sandra Korte-Kerzel, RWTH Aachen, Germany
- 16:20 – 16:50 **Highlight talk 1**
Using Data Science and AI to enhance Experimental Micromechanics
Christoph Eberl, Fraunhofer IMW, Freiburg, Germany
- 16:50 – 17:10 **Correlative mechanical microscopy of deformation**
Jeffrey Wheeler, EMPA Dübendorf, Switzerland
- 17:10 – 17:40 **Highlight Talk 2**
From 3d to 4d nanoindentation mapping: machine learning for high-dimensional mechanical data analysis and correlative interpretation
Edoardo Rossi, Department of Civil, Computer Science and Aeronautical Technologies Engineering, Roma Tre University, Italy
- 17:40 – 18:00 **Probing phase complexity in combinatorial thin film libraries via high-throughput characterization**
Marco Sebastiani, Department of Civil, Computer Science and Aeronautical Technologies Engineering, Rome Tre University, Italy
- 18:00 – 18:20 **Expanding the Ashby Chart for Nanoengineered Complex Concentrated Alloy Thin Films: Overcoming Strength–Plasticity Trade-Off**
Matteo Ghidelli, LSPM-CNRS, Paris, France
- 19:00 – 21:30 Opening reception and dinner

Monday, October 5, 2026

07:30 – 08:30 Breakfast buffet

Session 2A: Activating Plasticity: The Role of Beams, Fields, and Light

Moderator: Karsten Durst, TU Darmstadt, Germany

09:00 – 09:30

Highlight Talk 3

From Artifact to Opportunity: Electron-Beam-Induced Activation of Viscous Flow in Oxide Glasses

Sebastian Bruns, Technical University Darmstadt, Germany

09:30 – 09:50

Electro-Plasticity and Photo-Plasticity of Ionic Crystals and Semiconductors at the Micrometre Scale

Yu Zou, University of Toronto, Canada

09:50 – 10:10

Electron-Beam-Assisted Mechanical Deformation in Oxide Ceramics

In-Suk Choi, Seoul National University, South Korea

10:10 – 10:30

Stress relaxation of amorphous silicates under electron irradiation – mechanism and dynamics of plastic flow in the glassy state

Etienne Barthel, SIMM/ESPCI, France

10:30 – 10:50

Ion irradiation induced hardening and toughening of amorphous alumina protective coating

Sergio Sao Jao, CNRS Laboratoire Georges Friedel, MINES Saint-Etienne, France

10:50 – 11:20

Coffee break

Session 2B: From Stress Fields to Structural Transformations

Moderator: Daniel Kiener, Montanuniversität Leoben, Austria

11:20 – 11:50

Highlight Talk 4

Metastable group-iv allotropes via nanoindentation: converging theory and experiments

Emilio Scalise, University Milano-Bicocca, Italy

11:50 – 12:10

A new approach to study the deformation behavior of bulk metallic glass from the atomic to the micrometer scale using micropillar compression

Udo Schwarz, Yale University, USA

12:10 – 12:30

Thermally activated plasticity of silicon up to 900 °C - from twinning to perfect dislocation slip

Gerald Schaffar, KAI-Infiniteon, Austria

12:30 – 12:50

Fracture of Brittle Materials and interfaces at the Nanoscale

Oriol Gavalda Diaz, Imperial College, UK

12:50 – 13:10

80nm-resolved in situ x-ray diffraction reveals multiaxial stress transfer at the indenter-sample interface

Michael Meindlhumer, Montanuniversität Leoben, Austria

13:10 – 13:30

From brittle to metal-like plasticity in transition metal nitrides probed by in-situ micropillar compression

Rainer Hahn, TU Wien, Austria

13:30 – 14:30	Lunch buffet
14:30 – 15:30	Networking time
	<u>Session 3A: Beyond the Scratch: New Frontiers in Small-Scale Tribology</u> Moderator: Ruth Schwaiger, FZ Jülich, Germany
15:30 – 16:15	<u>Keynote Talk</u> Scratching across grains & boundaries: a hunt for design guidelines Cem Tasan, MIT, USA
16:15 – 16:35	Beyond just scratching the surface: dislocation engineering regulated tribological responses in oxides Oliver Preuss, Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
16:35 – 16:55	Tribological behavior of graphene-reinforced ceramic composites - nanofriction experiments under water vapor in environmental transmission electron microscopy Karine Masenelli-Varlot, INSA Lyon, Universite Claude Bernard Lyon 1, CNRS, France
16:55 – 17:30	Coffee Break
17:30 – 18:00	<u>Highlight Talk 5</u> A Predictive Framework Linking Surface Topography to Friction in Nano to Meso Contacts Christian Greiner, Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
18:15 – 19:15	Poster Preview Session (odd-numbered posters) Moderators: Megan Cordill and Benoit Merle (40 seconds each speaker)
19:15 – 21:00	Buffet dinner
21:00 – 23:00	Poster session with social time

Tuesday, October 6, 2026

07:30 – 09:00 Breakfast buffet

Session 4A: Designing Energy Materials through Nanomechanics

Moderator: Christoph Kirchlechner, KIT, Germany

09:00 – 09:30

Highlight Talk 6

Mechanics of Materials for Rechargeable Batteries

Matt Pharr, Texas A&M, USA

09:30 – 09:50

Nanomechanics of functional nanostructures: from Kirkendall-based thermal insulators to reactive multilayers

Ralph Spolenak, ETH Zurich, Switzerland

09:50 – 10:10

Effect of oxygen on the deformation mechanism of inorganic fullerenes studied by TM in situ approaches

Lucile Joly-Pottuz, University of Lyon, France

10:10 – 10:40

Highlight Talk 7

Nanomechanical testing as the rate-limiting step in solid-state battery development

Ruth Schwaiger, Forschungszentrum Jülich, Germany

10:40 – 11:00

Elastic strain engineering applied to enhance the electrocatalytic activity of intermetallic compounds for the hydrogen evolution reaction

Jon Molina, IMDEA-Materials Institute, Spain

11:00 – 11:30

Coffee break

Session 4B: Beyond Failure: Understanding and Controlling Degradation Pathways

Moderator: Jon Molina, IMDEA Madrid, Spain

11:30 – 12:00

Highlight Talk 8

Measuring adhesion energies of critical interfaces in aerospace

Megan Cordill, Austrian Academy of Sciences, Erich-Schmid-Institute Leoben, Austria

12:00 – 12:20

Plastic flow and fracture of chromium-coating deposited on a Zr-based nuclear fuel cladding

Guillaume Kermouche, Mines Saint-Etienne, Laboratoire Georges Friedel, CNRS UMR 5307, France

12:20 – 12:50

Highlight Talk 9

Tritium-based Micromechanics (TRITIME) for a Mechanistic Understanding of Hydrogen Embrittlement

Christoph Kirchlechner, Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

12:50 – 13:10	Advancing hydrogen resistance using innovative ECO/polymer composite coatings Maria Jazmin Duarte Correa, Max Planck for Sustainable Materials, Düsseldorf, Germany
13:10 – 13:30	Circularity by design: nanomechanical pathways to understand and control residual effects in martensitic steels Eloho Okotete, Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
13:30 – 14:30	Lunch buffet
14:45 – 15:00	Board buses for excursion
15:00 – 22:30	Excursion to Rhodes City (dinner on your own)

Wednesday, October 7, 2024

07:30 – 09:00 Breakfast buffet

Session 5A: Blueprints of Nature: Mechanics Across Biological and Geological Scales

Moderator: Ralph Spolenak, ETH Zürich, Switzerland

09:00 – 09:30

Highlight Talk 10

Investigating structure-property relationships of bone and the effects of metabolic diseases using experimental micromechanics

Jakob Schwiedrzik, EMPA Dübendorf, Switzerland

09:30 – 09:50

Nature's Blueprints: Nanomechanical Insights From Bone, Teeth and Shells

Michael Wurmshuber, FAU Erlangen, Germany

09:50 – 10:10

Deformation mechanisms of talc: insights from nanomechanical testing and numerical modelling

Patrick Cordier, Université de Lille, France

10:10 – 10:40

Highlight Talk 11

Bridging planetary science and materials physics: micromechanics of meteorites

Szilvia Kalacska, CNRS LGF, Mines St. Etienne, France

10:40 – 11:00

Investigation of sapphire strength across the scales

Sylvain Meille, INSA Lyon, France

11:00 – 11:30

Coffee break

Session 5B: Capturing Plasticity in the Fast Lane

Moderator: Guillaume Kermouche, Mines St Etienne, France

11:30 – 12:00

Highlight Talk 12

Microparticle impact as a window on dislocation-drag plasticity

Luciano Borasi, Northwestern University, USA

12:00 – 12:20

Acoustic Signatures of High-Strain-Rate Microcompression in Zn Single Crystals

Peter Ispanovity, ELTE Eötvös Loránd University, Hungary

12:20 – 12:40

Constant Strain Rate Nanoindentation at High Strain Rates: How Do You Know the Hardness Is Right?

Benoit Merle, University of Kassel, Germany

12:40 – 13:00

Do strain rate sensitivity exponents and deformation mechanisms change in constant strain rate nanoindentation between 10^3 and 10^4 s⁻¹?

Gaurav Mohanty, Tampere University, Finland

13:00 – 13:20

Nanoindentation Under Cryogenic Conditions at Extreme Strain Rates

Hendrik Holz, Max Planck for Sustainable Materials, Düsseldorf, Germany

13:20 – 14:30	Lunch buffet
14:30 – 15:30	Networking time
	<u>Session 6A: Seeing Deformation: Correlative Electron Microscopy in Nanomechanics</u> Moderator: Jeff Wheeler, EMPA, Switzerland & Tim Rupert John Hopkins University, USA
15:30 – 16:00	<u>Highlight Talk 13</u> Revealing deformation mechanisms in nanocrystalline thin films using 4D STEM Christoph Gammer, Austrian Academy of Sciences, Erich-Schmid-Institute Leoben, Austria
16:00 – 16:20	Expanding the capabilities of the scanning electron microscope: Diffraction, imaging, and in-situ Dan Gianola, University of California, Santa Barbara
16:20 – 16:40	Correlative analysis of the elementary deformation mechanisms in metallic thin films by lab-on-chip, nano-dic and aco-tem Hosni Idrissi, Université catholique de Louvain, Belgium
16:40 – 17:00	High-throughput analysis of material libraries: Analysis of chemical composition, microstructure, mechanical, optical and electrical properties in a single benchtop instrument Johann Michler, EMPA Thun, Switzerland
17:00 – 17:30	Coffee Break
17:30 – 17:50	From Dislocation Structure to Local Strength: A Correlative ECCI–Micropillar Study in Ferritic Steel Subin Lee, Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
17:50 – 18:10	Microscale tension–torsion coupled testing of additively manufactured metallic microarchitectures Rajaprakash Ramachandramoorthy, Max Planck for Sustainable Materials, Düsseldorf, Germany
18:10 – 18:30	3D Printed Metal Micro- and Nanomechanical Testing Platforms Lalith Kumar Bhaskar, Max Planck for Sustainable Materials, Düsseldorf, Germany
18:30 – 19:30	Poster Preview Session (even-numbered posters) Moderators: Megan Cordill and Benoit Merle (40 seconds each speaker)
19:30 – 21:00	Buffet dinner
21:00 – 23:00	Poster session with social time

Thursday, October 8, 2026

- 07:30 – 09:00 Breakfast buffet
- Session 7A: From Complexions to Plasticity: Grain Boundary-Mediated Deformation**
Moderator: Dan Gianola, UC Santa Barbara, USA
- 09:00 – 09:30 **Highlight Talk 14**
Micromechanical Testing to Probe Plasticity and Failure of Grain Boundary and Dislocation Complexions
Timothy Rupert, Johns Hopkins University, USA
- 09:30 – 09:50 **Tailoring grain boundary states in severely deformed Ti-Nb based nanocrystalline systems**
Markus Alfreider, Montanuniversität Leoben, Austria
- 09:50 – 10:10 **Grain Boundary hardening vs. softening in nanocrystalline Cu-X Solid Solutions: A multi-method nanomechanical investigation from RT to 300°C**
Karsten Durst, Technical University of Darmstadt, Germany
- 10:10 – 10:30 **Enhancing strength and deformability in nanocomposites via thick 3-D bimetallic interfaces**
Nathan Mara, University of Minnesota, USA
- 10:30 – 11:00 **Highlight Talk 15**
Nanoindentation pop-ins revisited: recrystallization and twinning in molybdenum at room temperature
Eugen Rabkin, Technion Haifa, Israel
- 11:00 – 11:30 Coffee break
- Session 7B: Decoding Complex Materials through Micromechanics and Modeling**
Moderator: Mathias Göken, FAU Erlangen-Nürnberg, Germany
- 11:30 – 12:00 **Highlight Talk 16**
Determination of material parameters using inverse analysis of indentation results
Alexander Hartmaier, ICAMS, RUB, Germany
- 12:00 – 12:20 **Transformation-induced misfit strains and their impact on micromechanical response in ti-al-nb lamellar colonies**
Henri Ovri, Hereon, Hamburg, Germany
- 12:20 – 12:40 **Nanomechanics of coupled defects in Laves intermetallics**
Sandra Korte-Kerzel, Institut für Metallkunde und Materialphysik, RWTH Aachen University, Germany
- 12:40 – 13:00 **From the nucleation of prismatic dislocation loops to basal: various aspects of small scale plasticity in Cr₂AlC MAX phase revealed by micromechanical testing**
Christoph Tromas, Pprime Institute, University of Poitiers, France
- 13:00 – 13:20 **Nanoindentation Mapping of cemented carbides as complex biphasic materials: From Surface Statistics to Volumetric Mechanical Correlation by FEM simulation and tomography**
Emilio Jimenez Pique, Spain

13:20 – 14:30 Lunch buffet

14:30 – 15:30 Networking Time

Session 8A: Tracking Failure: From Crack Initiation to Final Fracture

Moderator: Marco Sebastiani, Roma Tre, Italy

15:30 – 15:50 **Assessing local cyclic failure of materials: From threshold to final fracture**

Daniel Kiener, Department Materials Science, Chair of Materials Physics,
Montanuniversität Leoben, Austria

15:50 – 16:10 **Small-scale fatigue crack growth: a versatile tool - from characterizing material properties to elucidating deformation mechanisms and beyond**

Jutta Luksch, Saarland University, Saarbrücken, Germany

16:10 – 16:30 **Cantilever bending coupled to DIC to obtain constitutive laws for deformation under constant strain rate and stress: experiments and instrument development**

Vikram Jayaram, Indian Institute of Science, India

16:30 – 16:50 **Understanding the grain boundary sliding mechanism via in situ high temperature pillar compression**

Divya Sri Badla, Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

16:50 – 17:20 Coffee Break

Session 8B: Twinning and Size Effects in Thin Films and Crystalline Materials

Moderator: Andrea Hodge, USC, USA

17:20 – 17:50 **Highlight Talk 17**

Understanding the deformation of single-crystalline gold thin films with nanotwins: contribution of atomic-scale simulations

Sandrine Brochard, Pprime Institute, University of Poitiers, France

17:50 – 18:10 **The fracture toughness and thickness dependence of thin films**

Mathias Göken, FAU Erlangen, Germany

18:10 – 18:30 **Influence of sample size, strain rate and temperature on deformation of an Fe-2.4 wt.% Si bi-crystal and its paired single crystals**

Chunhua Tian, Institut für Metallkunde und Materialphysik, RWTH Aachen University, Germany

18:30 – 18:50 **In situ TKD coupled with DIC for investigating twinning mechanisms in HCP metals**

Xavier Maeder, EMPA Thun, Switzerland

20:00 – 22:30 Conference Banquet

Friday, October 09, 2024

07:30 – 09:00 Breakfast and departures