

Program

Nanomechanical Testing in Materials Research and Development IX

October 6-11, 2024

Giardini Naxos, Messina
Sicily, Italy

Conference Chair

Marco Sebastiani, Università degli studi Roma Tre, Italy



Engineering
Conferences
International

Engineering Conferences International
369 Lexington Avenue, 3rd Floor #389, New York, NY 10017, USA
www.engconfintl.org – info@engconfintl.org

UNAHotel Naxos Beach

Via Recanati

98035 Giardini Naxos ME, Italy

Tel. +39 0942 6611

Engineering Conferences International (ECI) is a not-for-profit global engineering conferences program, originally established in 1962, that provides opportunities for the exploration of problems and issues of concern to engineers and scientists from many disciplines.

ECI BOARD MEMBERS

Eugene Schaefer, Chairman
Paula Alves
Mike Betenbaugh
Joye Bramble
Barry C. Buckland
Nick Clesceri
Chetan Goudar
Peter Gray
Michael King

Chair of ECI Conferences Committee: Nick Clesceri

ECI Executive Director: Barbara K. Hickernell

ECI Associate Director: Kevin M. Korpics

ECI Conferences Manager: Tressa D'Ottavio

ECI Conferences Registration Manager: Renee Smith

Steering Committee

Gerhard Dehm, Planck Institute for Iron Research, Germany

Karsten Durst, Technical University Darmstadt, Germany

Mathias Göken, University Erlangen-Nurnberg, Germany

Sandra Korte-Kerzel, RWTH Aachen University, Germany

Marc Legros, CEMES-CNRS, France

Johann Michler, EMPA, Switzerland

Jon Molina-Aldareguia, IMDEA Materials Institute, Spain

George M. Pharr, Texas A&M University, USA

Previous conferences in this series

***Instrumented Indentation Testing in
Materials Research & Development***

October 9 – 15, 2005

Crete, Greece

Conference Chairs:

George M. Pharr, University of Tennessee, USA

Carl McHargue, University of Tennessee, USA

Nanomechanical Testing in Materials Research & Development II

October 11 - 16, 2009

Barga, Italy

Conference Chair:

Mathias Göken, University Erlangen-Nurnberg, Germany

Nanomechanical Testing in Materials Research & Development III

October 9 – 14, 2011

Lanzarote, Canary Islands, Spain

Conference Chair:

Gerhard Dehm, University of Leoben, Austria

Nanomechanical Testing in Materials Research & Development IV

October 6 - 11, 2013

Albufeira, Portugal

Conference Chair:

Johann Michler, EMPA, Switzerland

Nanomechanical Testing in Materials Research & Development V

October 4-9, 2015

Albufeira, Portugal

Conference Chair:

Marc Legros, CEMES-CNRS, France

Nanomechanical Testing in Materials Research & Development VI

October 1-6, 2017

Dubrovnik, Croatia

Conference Chair:

Karsten Durst, Technical University of Darmstadt, Germany

Nanomechanical Testing in Materials Research & Development VII

September 29 – October 4, 2019

Torremolinos/Malaga, Spain

Conference Chair:

Jon Molina-Aldareguia, IMDEA Materials Institute, Spain

Previous conferences in this series

Nanomechanical Testing in Materials Research & Development VIII

October 2-7, 2022

Split, Croatia

Conference Chair:

Sandra Korte-Kerzel, RWTH Aachen University, Germany

Conference Sponsors

Alemnis

Bruker Nano GmbH

FemtoTools AG

KLA Corporation

SURFACE nanometrology

Thermo Fisher Scientific

NOTES

- *Technical sessions will be in the Conference Center. Poster sessions will be in the Lampedusa Room.*
- *Locations for meals and breaks are listed in the program.*
- *Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, watches) is strictly prohibited during the technical sessions, unless the author and ECI have granted prior permission.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 3 minutes for questions.*
- *Please do not smoke at any conference functions.*
- *Turn your cellular telephones to vibrate or off during technical sessions.*
- *After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.*
- *We will distribute an electronic evaluation late in the week that both the current and future chairs rely upon for planning purposes. Input on topics to be discussed is vital and participation in organizing future conferences is very welcome.*

Sunday, October 6, 2024

- 09:30 – 10:00 Check-in for Optional Tutorial Session ([UNA Hotel Lobby](#))
- 10:00 – 13:00 **MecaNano Tutorial Session** ([Congress Center](#))
- Nanomechanical testing: A lot more than simple small-scale testing - advances and challenges**
Verena Maier-Kiener, Montanuniversität Leoben, Leoben, Austria
- Advanced nanomechanical testing protocols: High-speed nanoindentation and machine learning for big data analysis**
Edoardo Rossi, Università degli studi Roma Tre, Rome, Italy
- 13:00 - 14:30 Lunch on your own
- 14:30 – 15:45 Conference Check-In ([UNA Hotel Lobby](#))
- 15:45 – 16:00 Conference Welcome Remarks ([Congress Center](#))
- 16:00 – 16:50 **Plenary Talk 1**
Three-dimensional interfaces in metallic nanolaminates
Irene J. Beyerlein, University of California, Santa Barbara, USA
- Session 1A**
Novel nanoindentation and nanomechanical testing methods
Moderator: Prof. Sandra Korte-Kerzel, RWTH Aachen University, Germany
- 16:50 – 17:10 **Spherical nanoindentation – A further step towards accelerated materials development**
Verena Maier-Kiener, Montanuniversität Leoben, Austria
- 17:10 – 17:30 **A framework for nanoindentation of soft biomaterials and polymers**
Donna M. Ebenstein, Biomedical Engineering Department, Bucknell University, Lewisburg, USA
- 17:30 – 17:50 **Updated HTSI method: Characterizing CaF₂ properties from RT to 800°C**
Gabrielle Tiphéne, IMAP, IMMC, UCLouvain, Louvain-la-Neuve, Belgium
- 17:50 – 18:10 **Lateral nanoindentation: Energy dissipation and static friction**
John B. Pethica, Trinity College Dublin, Ireland
- 18:10 – 18:30 **Insights into the origins of friction from two-axis nanoindentation**
George M. Pharr, Department of Materials Science and Engineering, Texas A&M University, Texas, USA
- 19:00 – 21:30 Opening reception ([Garden](#)) and dinner (Buffet in [Oasys Restaurant-ECI reserved section](#))

Monday, October 7, 2024

07:00 – 08:30

Breakfast buffet ([Oasys Restaurant](#))

Session 1B

Novel nanoindentation and nanomechanical testing methods

Moderator: Prof. Karsten Durst, TU Darmstadt, Germany

08:30 – 09:00

Invited Talk

High strain rate nanoindentation testing: recent advancements, challenges, and opportunities

Sudharshan Phani Pardhasaradhi, ARCI, Hyderabad, India

09:00 – 09:20

A new controller specifically designed for very high speed nanoindentation

Warren Oliver, KLA Corporation, Instruments group, Oak Ridge, USA

09:20 – 09:40

Slip statistics from high-data-acquisition rate nanoindentation of a metallic glass

Wendelin J. Wright, Bucknell University, Lewisburg, Pennsylvania, USA

09:40 – 10:00

Constant Strain Rate Nanoindentation up to 10,000/s Strain Rate for Reliable Extraction of Mechanical Properties and Deformation Activation Parameters

Gaurav Mohanty, Materials Science and Environmental Engineering, Tampere University, Finland

10:00 – 10:20

Strategies to mitigate the effect of FIB damage during micro fracture testing

Christoph Kirchlechner, Institute for Applied Materials, Karlsruhe Institute of Technology, Karlsruhe, Germany

10:20 – 10:50

Coffee break ([Olympic pool terrace](#))

10:50 – 11:00

Communications for the day

Session 2A

Multiscale deformation mechanisms (from atomic to meso-scale)

Moderator: Graham Cross, Trinity College Dublin, Ireland

11:00 – 11:30

Invited Talk

Nanomechanics serving polymer-based composite research

Thomas Pardoën, Institute of Mechanics, Materials and Civil Engineering (IMMC), UC Louvain, Belgium and WEL Research Institute, Belgium

11:30 – 11:50

Solute effects on the migration of a single twin boundary in magnesium

Henry Ovri, Helmholtz-Zentrum Hereon, Institute of Materials Mechanics, Geesthacht, Germany

11:50 – 12:10

Nanoindentation study at single grain boundaries of oxide ceramics

Hiroshi Masuda, The University of Tokyo, Japan

12:10 – 12:30

Room-temperature multiscale dislocation plasticity in oxides

Xufei Fang, Institute for Applied Materials, KIT, Karlsruhe, Germany

Monday, October 27, 2024 (continued)

- 12:30 – 13:00 **Invited Talk**
Developing multiscale toughened ceramics: the role of nano- and micromechanical testing
Diletta Giuntini, Dept. of Mechanical Engineering, Eindhoven University of Technology, Eindhoven, The Netherlands
- 13:00 – 14:30 Lunch buffet
- 14:30 – 15:30 Networking time
- Session 3A - In-situ and operando nanomechanics**
Moderator: Prof. Christoph Kirchlechner, Karlsruhe Institute of Technology, Germany
- 15:30 – 16:00 **Invited Talk**
Dislocation pathways in and interstitial engineering of BCC refractory multi-principal element alloys
Daniel S. Gianola, Materials Department, University of California Santa Barbara, USA
- 16:00 – 16:20 **Investigation of the deformation mechanisms of MoS₂ fullerenes by in situ mechanical tests in environmental transmission electron microscopy**
Karine Masenelli-Varlot, INSA Lyon, Universite Claude Bernard Lyon 1, CNRS, MATEIS, UMR5510, Villeurbanne, France
- 16:20 – 16:40 **Martensitic transformation in Ce-doped zirconia: In-situ X-ray diffraction during mechanical testing or annealing on synchrotron beamlines**
Marcelo D. Magalhães, INSA Lyon – MATEIS, Villeurbanne, France
- 16:40 – 17:00 **Physical, chemical and architectural metal-ceramic nanolaminate design for enhanced mechanical Properties**
Xavier Maeder, Empa, Swiss Federal Laboratories for Materials Science and Technology, Thun, Switzerland
- 17:00 – 17:30 **Invited Talk**
Micro- and nanomechanical in situ experiments to address fracture processes
Daniel Kiener, Montanuniversität Leoben, Austria
- 17:30 – 18:00 Coffee break
- 18:00 – 19:15 **Poster Preview Session (odd-numbered posters)**
Moderators: Prof. Verena Maier-Kiener and Prof. Benoit Merle (one minute each speaker)
- 19:15 – 21:00 Buffet dinner
- 21:00 – 23:00 Poster session with social time

Tuesday, October 8, 2024

07:00 – 08:30

Breakfast buffet

Session 4A - Nanomechanics in extreme conditions

Moderator: Prof. Verena Maier-Kiener, Montanuniversität Leoben, Austria

08:30 – 09:00

Invited Talk

Nanoindentation tests for understanding the effect of light environment on dislocations behavior in compound semiconductors

Atsutomo Nakamura, Department of Mechanical Science and Bioengineering, Graduate School of Engineering Science, Osaka University, Japan

09:00 – 09:20

From heat to hardness: Probing phase changes in pd-based alloy with high-temperature nanoindentation

Lea A. Lumpfer, Montanuniversität Leoben, Leoben, Austria

09:20 – 09:40

Electron irradiation induced crack suppression in oxide glasses

Sebastian Bruns, Physical Metallurgy, Technical University of Darmstadt, Darmstadt, Germany

09:40 – 10:00

Microscale additively manufactured 3D metal-ceramic nanocomposites with improved strength and thermal stability

Jakob Schwiedrzik, Laboratory for Mechanics of Materials and Nanostructures, Empa, Switzerland

10:00 – 10:20

In-situ environmental TEM study of the effect of hydrogen on crack propagation in steel

Lin Tian, Institute of Materials Physics, University of Göttingen, Germany

10:20 – 10:50

Coffee break

10:50 – 11:00

Communications for the day

Session 4B - Nanomechanics in extreme conditions

Moderator: Prof. Erik G. Herbert, Oak Ridge National Labs, USA

11:00 – 11:30

Invited Talk

High strain rate persistence of the strength anomaly in a L12 intermetallic compound evidenced by nanoindentation at combined high strain rates and high temperatures

Benoit Merle, Institute of Materials Engineering, University of Kassel, Germany

11:30 – 11:50

What can we expect from high strain rate micropillar compression of metals at the grain scale?

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

11:50 – 12:10

High strain rate nanoindentation of fused silica, silicon, and nanocrystalline nickel

Lalith Kumar Bhaskar, Max-Planck-Institut für Nachhaltige Materialien GmbH, Germany

Tuesday, October 8, 2024 (continued)

- | | |
|---------------|--|
| 12:10 – 12:30 | A new approach for in-situ electrochemical nanoindentation: side charging as a promising alternative
Stefan Zeiler, Department of Materials Science, Montanuniversität Leoben, Leoben, Austria |
| 12:30 – 13:00 | <u>Invited Talk</u>
Uncovering extreme dynamic responses in microscale mechanical metamaterials
Carlos M. Portela, Department of Mechanical Engineering, MIT, USA |
| 13:00 – 14:30 | Lunch buffet |
| 14:45 – 15:00 | Board buses for excursion |
| 15:00 – 22:30 | Excursion to Taormina (guided tour including dinner) |

Wednesday, October 9, 2024

07:00 – 08:30

Breakfast buffet

Session 2B

Multiscale deformation mechanisms (from atomic to meso scale)

Moderator: Prof. Ralph Spolenak, ETH Zurich, Switzerland

08:30 – 09:20

Plenary Talk 2

Effects of grain boundary structure and chemistry on plasticity in metals

Gerhard Dehm, MPI for Sustainable Materials, Düsseldorf, Germany

09:20 – 09:40

Relationship between sliding direction and crystal rotation under tribological loading

Christian Greiner, Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

09:40 – 10:00

Mechanical response of varying non-equilibrium grain boundary states in nanocrystalline iron-chromium

Markus Alfreider, Department Materials Science, Montanuniversität Leoben, Leoben, Austria

10:00 – 10:20

Shear induced amorphization: A new deformation mechanism for silicates

Patrick Cordier, University of Lille, Lille, France and Institut Universitaire de France, Paris, France

10:20 – 10:50

Coffee break

10:50 – 11:00

Communications for the day

Session 5A

Complex strain measurement methods and advanced data analysis

Moderator: Prof. Wendy Wright

11:00 – 11:30

Invited Talk

From the study of plastic strain localization to the study of discrete localized plastic deformation events in metals

Jean-Charles Stinville, Materials Science and Engineering Department, University of Illinois at Urbana-Champaign, USA

11:30 – 11:50

Evolution of nanoscopic stress and strain concentrations across notched microcantilevers during in situ bending

Michael Meindlhumer, Department Materials Science, Montanuniversität Leoben, Leoben, Austria

11:50 – 12:10

Micromechanics of thin films with digital image correlation: Three case studies

Oleksandr Glushko, Department of Materials Science, Montanuniversität Leoben, Leoben, Austria

12:10 – 12:30

Advanced TEM techniques for measuring nanoscale stress fields during micromechanical testing of non-equilibrium materials

Christoph Gammer, Erich Schmid Institute of Materials Science, Austrian Academy of Sciences, Austria

Wednesday, October 9, 2024 (continued)

- 12:30 – 13:00 **Invited Talk**
Process-structure-property relationship in 3D printed metals
Steven Van Petegem, Photon Science Division, Paul Scherrer Institute,
Forschungsstrasse, Switzerland
- 13:00 – 14:30 Lunch buffet
- 14:30 – 15:30 Networking time
- Session 6A**
Integrated modelling and characterization
Moderator: Prof. Nate Mara, UMN-CSE - University of Minnesota, USA
- 15:30 – 16:00 **Invited Talk**
Solute strengthening in FCC High Entropy Alloys: From modeling to alloy design
Céline Varvenne, MatéIS, INSA Lyon, France
- 16:00 – 16:20 **Relating the distribution of stochastic nanomechanical properties to microstructural mechanisms using molecular dynamics simulations**
Dan Mordehai, Faculty of Mechanical Engineering, Technion, Israel
- 16:20 – 16:40 **The effect of twin boundaries on nucleation-controlled plasticity of metal nanoparticles**
Eugen Rabkin, Department of Materials Science and Engineering, Technion, Haifa, Israel
- 16:40 – 17:00 **Finite element and microplane Modelling of WC-Co composites based on tomography meshes, nanoindentation and microsample testing**
Emilio Jiménez-Piqué, Universitat Politecnica de Catalunya, Campus Diagonal Besòs, Edifici A (EEBE) Barcelona, Spain
- 17:00 – 17:30 **Invited Talk**
Unraveling the origins of fracture toughness by integrating micromechanical testing and atomistic simulations
Erik Bitzek, Max Planck Institute for Sustainable Materials, Germany
- 17:30 – 18:00 Coffee break
- 18:00 – 19:15 **Poster Preview Session (even-numbered posters)**
Moderators: Prof. Verena Maier-Kiener and Prof. Benoit Merle (one minute each speaker)
- 19:15 – 21:00 Buffet dinner
- 21:00 – 23:00 Poster session with social time

Thursday, October 10, 2024

- 07:00 – 08:30 Breakfast buffet
- Session 8A**
Correlative mechanical microscopy
Moderator: Prof. Guillaume Kermouche, Ecole des Mines de Saint-Etienne, France
- 08:30 – 09:00 **Invited Talk**
Operando correlative mechanical microscopy
Jeffrey M. Wheeler, Femto Tools AG and ETH Zurich, Switzerland
- 09:00 – 09:20 **Oxygen, a strengthening and embrittling element for titanium inherited from high temperature oxidation: A multimodal framework using high speed nanoindentation mapping and micropillar compression**
Damien Texier, Institut Clément Ader (ICA), CNRS, Albi, France
- 09:20 – 09:40 **Atomic scale characterization of deformation and fracture phenomena using a MEMS-based in situ STEM loading system**
Eita Tochigi, Institute of Industrial Science, University of Tokyo, Japan
- 09:40 – 10:00 **In situ micromechanical characterization of multi-layered thin films: Strain rate, size and microstructure related experiments**
Szilvia Kalácska, CNRS LGF, Mines St. Etienne, France
- 10:00 – 10:30 **Invited Talk**
Physical micrometallurgy: Localized electrodeposition based additive approach
Rajaprakash Ramachandramoorthy, Max-Planck-Institut für Nachhaltige Materialien GmbH, Düsseldorf, Germany
- 10:30 – 11:00 Coffee break
- Session 9A**
Application of nanomechanics to industrially relevant materials and devices
Moderator: Prof. Damien Texier, Institut Clément Ader, CNRS, France
- 11:00 – 11:30 **Invited Talk**
In situ tensile testing of nanocomposite thin films on flexible polymer substrates
Barbara Putz, Empa, Thun, Switzerland
- 11:30 – 11:50 **Insights into micropillar compression during hydrogen charging**
Maria Jazmin Duarte Correa, Max-Planck-Institut für Nachhaltige Materialien GmbH, Germany
- 11:50 – 12:10 **In situ electrical resistance in metallic films under cyclic loading reveals mechanical damage mechanisms**
Megan J. Cordill, Erich Schmid Institute of Materials Science, Austrian Academy of Sciences Leoben, Austria
- 12:10 – 12:30 **Local Deformation Along the Iron Ore Reduction Cascade**
James P. Best, Max-Planck-Institut für Nachhaltige Materialien GmbH, Germany
- 12:30 – 12:50 **Deciphering the puzzle of plastic deformation in cubic c15 laves phases: Surprising insights and future paths**
Sandra Korte-Kerzel, Institut für Metallkunde und Materialphysik, RWTH Aachen University, Germany

Thursday, October 10, 2024 (continued)

12:50 – 14:30 Lunch buffet

14:30 – 15:30 Networking Time

Session 7A

Artificial Intelligence for nanomechanics

Moderator: Prof. Edoardo Bemporad

15:30 – 16:00

Invited Talk

Artificial Intelligence for micro- and nanomechanics

Ulrich Kerzel, RWTH Aachen University

16:00 – 16:20

Combinatorial and high-throughput discovery of metal alloy thin films with outstanding mechanical properties

Johann Michler, Empa, Swiss Federal Laboratories for Materials Science and Technology, Thun, Switzerland

16:20 – 16:40

Employing grain boundary segregation engineering for improved mechanical performance of nanostructured tungsten

Julius F. Keckes, Department Materials Science, Chair of Materials Physics, Montanuniversität Leoben, Austria

16:40 – 17:10

Invited Talk

Combinatorial and high-throughput investigation of nanoindentation techniques in the era of AI

Andrea M. Hodge, University of Southern California, USA

17:10 – 17:40

Coffee Break

Session 9B

Application of nanomechanics to industrially relevant materials and devices

Moderator: Prof. Megan J. Cordill, Erich Schmid Institute of Materials Science, Austrian Academy of Sciences Leoben, Austria

17:40 – 18:50

High throughput assessment of creep behavior of advanced nuclear reactor alloys by nanoindentation

Nathan A. Mara, University of Minnesota-Twin Cities, USA

18:00 – 18:20

Tailoring microstructural heterogeneities in thin film metallic glasses and crystal/glass ultra-fine nanolaminates to enhance their mechanical properties

Matteo Ghidelli, Laboratoire des Sciences des Procédés et des Matériaux (LSPM), CNRS, France

18:20 – 18:40

Investigating enhancements in fracture reliability of 3D-printed micro-ceramics via ALD coatings

Edoardo Rossi, Department of Civil, Computer Science and Aeronautical Technologies Engineering, Rome Tre University, Italy

18:40 – 19:00

The mechanics of solid-state battery materials: The hidden surprise of lithium metal and amorphous separators

Erik G. Herbert, Oak Ridge National Laboratory, TN, USA

20:00 – 22:30

Conference Banquet

Friday, October 11, 2024

07:00 – 09:00

Breakfast and departures

Poster Presentations

- 1. Complementary contributions of nanoindentation and nanomechanical mapping by atomic force microscopy to characterize the elastic properties of a semi-crystalline polymer from micro to nano scale**
Christophe Tromas, Pprime Institute, University of Poitiers, France
- 2. Identifying characteristic features for the mechanical behavior of aperiodic ceramic nanomultilayers**
Danielle White, University of Southern California, USA
- 3. High temperature scanning indentation: Latest results on materials**
Fatima-Zahra Moul-el-ksour, LTDS, UMR CNRS 5513, ECL, France
- 4. In-situ crack initiation and propagation of 3rd generation medium MN steel: Microtensile tests and micromechanical characterization**
Nuria Cuadrado Lafoz, Eurecat, Technological Center of Catalonia, Unit of Metallic and Ceramic Materials, Spain
- 5. Comprehensive micro-scale investigation of deformation mechanisms in superplastic biodegradable Zn alloys**
Wiktor Bednarczyk, Warsaw University of Technology, Poland
- 6. Evolution of dislocation substructures in metals via high strain rate nanoindentation**
Yuwei Zhang, Department of Material Science and Engineering, Texas A&M University; College Station, Texas, 77840, USA
- 7. Micro-beam bending combined with AFM and FEM for matrix-reinforcement interfacial strength analysis**
Piotr Jenczyk, Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland
- 8. Plasticity in BCC bi-crystals with high angle grain boundary at cryogenic condition by micropillar compression**
Chunhua Tian, Empa, Swiss Federal Laboratories for Materials Science and Technology, Laboratory for Mechanics of Materials and Nanostructures, Switzerland
- 9. Promotion of the plastic deformability of high-strength $\text{Al}_2\text{O}_3\text{-GdAlO}_3$ ceramics through refined eutectic microstructure**
Yuta Aoki, The University of Tokyo, Japan
- 10. Electrically induced viscous flow in oxide glasses at room temperature: electrical-nanoindentation tests vs e-beam effect**
Morgan Rusinowicz, Mines Saint-Etienne, CNRS, UMR5307 LGF, Centre SMS
- 11. Correlative mechanical microscopy to assess processing and environmental damage in titanium thin foils**
Valerio Savo, Roma Tre University, Rome (IT), Department of Civil, Computer and Aeronautical Engineering
- 12. Understanding anisotropic hardening in ferrite**
Angelica Medina, Institute for Applied Materials, Karlsruhe Institute of Technology, Germany
- 13. Unraveling the void strengthening effect in electrodeposited zinc**
Maria Watroba, Empa Swiss Federal Laboratory for Materials Science and Technology, Switzerland
- 14. Additive manufacturing of polymer-derived ceramics with multiscale architectures (AM-PDCs)**
Jiongjie Liu, Mechanical Engineering, Eindhoven University of Technology, Netherlands

- 15. Size effects and strain rate sensitivity in nanocrystalline high entropy alloys studied by nanoindentation and micropillars compression.**
Mateusz Włoczewski, Faculty of Material Science and Engineering, Warsaw University of Technology, Poland
- 16. Hydrogen-induced hardening effect and the diffusion behavior in bcc FeCr alloys by in situ nanoindentation**
Jing Rao, Max-Planck-Institut für Nachhaltige Materialien GmbH, Germany
- 17. Mechanistic insights into strengthening via precipitate assemblies using in situ micropillar compression of Ni-Cr-Al-Nb alloys**
Ujjval Bansal, Institute of Applied Materials, Karlsruhe Institute of Technology, Germany
- 18. Grain orientation dependence on the micromechanical properties of multimetal carbides**
Nidhin George Mathews, Tampere University, Finland
- 19. Investigation of intermetallic-mg interface strength using in situ microshear testing**
Anwsha Kanjilal, Department of Structure and Nano-/Micromechanics of Materials, Max-Planck-Institut für Nachhaltige Materialien GmbH, Germany
- 20. High speed nanoindentation: An innovative method for the correction of errors resulting from pile-up**
Daniele Duranti, Roma Tre University, Rome (IT), Department of Civil, Computer and Aeronautical Engineering
- 21. Transition from static to sliding friction in few-layer graphene lubricated, high pressure shearing of mesoscale contacts**
Ahmed Uluca, AMBER/CRANN Institute, School of Physics, Trinity College Dublin, Ireland
- 22. Room temperature migration of a $\sigma 5$ copper grain boundary during micropillar compression**
Mohammed Kamran Bhat, Max-Planck-Institut für Nachhaltige Materialien GmbH, Germany
- 23. Nanoengineered high entropy alloys thin films with large and tunable mechanical properties**
Davide Vacirca, LSPM-CNRS, Villeteuse, France
- 24. Understanding the plasticity of silicon at high temperatures and small length scales**
Gerald J. K. Schaffar, Department Materials Science, Montanuniversität Leoben, Austria
- 25. Fabrication of single crystal copper micro-tensile specimens using the femtosecond-laser and plasma-FIB**
Laurent Tôñ-Thât, Research Institute of Hydro-Quebec, Varennes, Canada
- 26. Microscale mechanical and viscoelastic properties of bone affected by osteogenesis imperfecta**
Michael Wurmshuber, FAU Erlangen-Nürnberg, Germany
- 27. Exceptional plastic behavior of amorphous oxide films**
Nidhin George Mathews, Tampere University, Finland
- 28. High temperature fracture mechanics of ternary and quaternary diboride**
Anna Hirle, Christian Doppler Laboratory for Surface Engineering of High-performance Components, TU Wien, Austria
- 29. Study of strain localization and crystal reorientation at the early stage of plastic deformation using laser scanning confocal microscopy, HR-EBSD and DCT-6d**
Damien Texier, Institut Clement Ader (ICA) - UMR CNRS 5312, France
- 30. Comparative analysis of nanomechanics and microstructure of rat and cat vibrissae to inform the design of bioinspired whiskers**
Donna M. Ebenstein, Biomedical Engineering Department, Bucknell University, Lewisburg, Pennsylvania, USA

31. **High strain rate nanoindentation on a low angle grain boundary in copper**
Hendrik Holz, Max Planck Institute for Sustainable Materials, Germany
32. **Determination of stress-strain curves by indentation tests with spherical indenters and analysis of the measurement data using inverse analysis strategies**
Kian Tadayon, Fraunhofer Institute for Ceramic Technologies and Systems IKTS, Germany
33. **Characterization of a multiphase rock mapped at different temperatures**
Wolfgang Stein, SURFACE, Germany
34. **Exploring slip behavior of graphene under uniaxial strain via analysis of G-mode Raman spectroscopy**
Haowei Zhang, School of Physical and Chemical Sciences, Queen Mary University of London, London, UK
35. **High-temperature micropillar compression of hematite: Insights and experimental challenges**
Shreehard Sahu, Max Planck Institute for Sustainable Materials, Germany
36. **Multi-scale mechanical characterization of Zr-2.5Nb pressure tube alloy**
Vineet Bhakhri, Canadian Nuclear Laboratories (CNL), Reactor Fleet Sustainability Directorate, Ontario, Canada
37. **Measuring thin film elastic constants using combined X-ray microdiffraction and micromechanical testing**
Rainer Hahn, Christian Doppler Laboratory for Surface Engineering of high-performance Components, TU Wien, AT
38. **Nanoindentation methods for analysis of thermally activated processes at elevated temperatures**
Marcel Sos, Technical University Darmstadt, Physical Metallurgy, Darmstadt, Germany
39. **Deformation twinning unraveled in A-titanium through micropillars compression loading over a wide range of strain rate**
Kamila Hamulka, EMPA, Thun, Switzerland
40. **Copper micro-honeycomb architectures: Fabrication, characterization and high strain rate testing**
Kuan Ding, Max-Planck-Institut für Nachhaltige Materialien GmbH, Düsseldorf, Germany
41. **3D mapping of local stress by n3D-XRD-CT**
Thomas Edward James Edwards, NIMS, Tsukuba, Japan
42. **Study of thermo-mechanical fatigue of metallizations using correlative in situ methodologies**
Sebastian Moser, KAI Kompetenzzentrum Automobil- und Industrieelektronik GmbH, Villach, Austria
43. **A nanomechanical approach for efficient substitution of cobalt in high-entropy alloys and hard metals for thermal sprayed coatings**
Giulia Gigante, Roma Tre University, Department of Civil, Computer Science and Aeronautical Engineering, Rome, Italy
44. **Nanoscale evaluation of light illumination influence on the basal slip in GaN single crystals**
Ryosuke Kinoshita, Department of Mechanical Science and Bioengineering, Osaka University, Japan
45. **Defects nucleation and stability in Pt nanoparticles using Bragg coherent X-ray diffraction**
Abdelrahman Zakaria, Aix-Marseille University, IM2NP, Marseille, France
46. **Toward high strain rate spherical nanoindentation testing**
Mohammed Tahir Abba, University of Kassel, Institute of Materials Engineering, Hessen Germany
47. **Nanomechanical testing of nitrided and nitrogen ion implanted high entropy alloys**
Dariusz M. Jarząbek, Institute of Fundamental Technological Research PAS, Warsaw, Poland

- 48. Enhanced analysis of high-speed nanoindentation data using skew-normal mixture methodology: Insights from WC-base cemented carbides**
Laia Ortiz-Membrado, Department of Materials Science and Engineering, EEBE, Universitat Politècnica de Catalunya, Barcelona, Spain
- 49. In situ laue micro-diffraction during micro-pillar testing: Investigating a magnetic Heusler alloy**
S. Comby-Dassonneville, Aix Marseille Univ, Univ Toulon, CNRS, IM2NP UMR 7334, Marseille, France
- 50. Correlative AFM-SEM microscopy of bacteria-diamond-metal nanocomposite**
Jaroslav Čech, Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, Prague, Czech Republic
- 51. Tailor-made non-silicon AFM probes for nanomechanical and nanotribological testing**
Hanna Konopacka, Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland, Faculty of Mechatronics, Warsaw University of Technology, Warsaw, Poland
- 52. Mechanical properties of performance-critical regions in hard ceramic thin films correlated with nanoscale gradients of residual stresses and microstructure**
Kevin Kutlesa, Chair of Materials Physics, Montanuniversität Leoben, Austria
- 53. Investigation of strain rate sensitivities of body centered cubic single crystals using high strain rate nanoindentation up to $10,000 \text{ s}^{-1}$**
Rahul Cherukuri, Materials Science and Environmental Engineering, Tampere University, Finland
- 54. Understanding the grain boundary sliding behavior in Ni bicrystal via in situ high temperature pillar compression**
Divya Sri Bandla, Institute for Applied Materials, Karlsruhe Institute of Technology, Germany
- 55. Mechanical and electrical properties of nanostructured thin film metallic glasses for flexible electronic applications**
Marco Ezequiel, Laboratoire des Sciences des Procédés et des Matériaux (LSPM), CNRS, France
- 56. Understanding transient plasticity through indentation creep tests using different indenter geometries**
Suprit Bhusare, Engineering Materials Science, Tampere University, Finland
- 57. High temperature scanning indentation: Applications, limitations and perspectives**
Gaylord Guillonéau, ECL, CNRS, LTDS, UMR5513, Ecully, France
- 58. Effects of the topologically close-packed (TCP) phase in the Ni-based superalloy**
Subin Lee, Institute for Applied Materials, Karlsruhe Institute of Technology, Germany
- 59. Mechanical properties of sinterless 3D printed silica glass: A multi-technique comparative study**
Wenjuan Cheng, Roma Tre University, Dept. of Civil, Computer and Aeronautical Engineering Rome, Italy
- 60. Use of nanocrystalline nickel microforce sensors in practice**
Wojciech Dera, Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland
- 61. High strain rate mechanical behavior of materials treated by surface mechanical attrition (SMAT)**
Mona Stoll, University of Kassel, Institute of Materials Engineering, Kassel, Hessen, Germany
- 62. Micromechanical investigation of lead-free soft solder by in-situ microcompression experiments and advanced nanoindentation**
Nadine Buchebner, Department Materials Science, Montanuniversität Leoben, Austria
- 63. Effect of defects on the dynamic compression of strontium titanate micropillars**
Rajaprakash Ramachandramoorthy, Max-Planck-Institut für Nachhaltige Materialien GmbH, Germany
- 64. Deformation of silicon oxides under electron-beam irradiation and its atomistic mechanisms**
Sung-Gyu Kang, Gyeongsang National University, Korea

65. **Study of the mechanical properties and plasticity of the C14 laves and μ -phase in the Ta-Fe(-Al) system**
Christina Gasper, RWTH Aachen University, Germany
66. **Analyzing the effect of cyclic loading on microstructural changes using micro-cantilever and indentation Fatigue in NC and SC Ni**
Jutta Luksch, Materials Science and Methods, Saarland University, Saarbrücken, Germany
67. **Nanomechanical properties of superconducting Nb₃Sn-based wires measured by nanoindentation**
Aleksandra Bartkowska, CERN, Switzerland
68. **Surface integrity of Ti₆Al₄V alloy as a function of AM workpiece vibration**
Giselle Ramirez, CIEFMA – Department of Materials Science and Engineering, EEBE Campus Diagonal Besòs, Universitat Politècnica de Catalunya, Barcelona, Spain
69. **Exploring micromechanical behavior of additively manufactured multi-layered medium-entropy alloy**
Zhe Gao, Division of Materials Science and Engineering, Hanyang University, Seoul, Republic of Korea
70. **Graphene rupture and nucleation of auto-Kirigami graphene pleats by 2-dimensional nanoindentation**
Pierce Sinnott, AMBER/CRANN Institute and School of Physics, Trinity College Dublin, Ireland
71. **Doping-regulated room-temperature dislocation plasticity in SrTiO₃: A multiscale approach**
Chukwudalu Okafor Department of Materials and Earth Sciences, Technical University of Darmstadt, Germany
72. **Assessment of nanomechanical properties and residual stresses in multilayer TiW-Au-TiW thin films of MEMS micro-structure**
Saqib Rashid, Roma Tre University, Dept. of Civil, Computer and Aeronautical Engineering, Rome, Italy
73. **Incipient plasticity in bulk metallic glasses: insights from statistical nanoindentation at ambient and elevated temperatures**
Silvia Pomes, Research Center for Structural Materials, National Institute for Materials Science, Japan
74. **Plasticity of Ca-Mg-Al laves phases and its temperature and chemistry dependence**
Martina Freund, Institut für Metallkunde und Materialphysik, RWTH Aachen University, Germany
75. **Tribological stress field model validation by using deformation twins as probes**
Antje Dollmann, Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
76. **Sol-Gel nanocoatings for anti-microbial applications: A nano-mechanical study**
Ilaria Favuzzi, Roma Tre University, Dept. of Civil, Computer and Aeronautical Engineering, Rome, Italy
77. **Residual stress-based improvement of the fatigue life of TiAlN coated Ti-6Al-4V**
Arno Gitschthaler, CDL SEC, TU Wien, Austria
78. **Mechanical properties of B₂FeAl as a function of composition using targeted nanoindentation on diffusion couples**
Jung Soo Lee, Max-Planck Institute for Sustainable Materials, Germany
79. **Multi scale micromechanical testing for new polymer core solder ball (PCSB) interconnections reliability in operating conditions**
Sergio Sao-Joao, Mines Saint-Etienne, Laboratoire Georges Friedel, CNRS, Saint Etienne, France
80. **The influence of microstructure on fracture toughness of tungsten and doped tungsten fine wire**
Hannah Luise Lichtenegger, Department Materials Physics, Montanuniversität Leoben, Austria
81. **Thermal activation in yielding of single crystalline tungsten**
Florian Tropper, National Institute for Materials Science, Japan

- 82. Residual stress measurement with global method FIB-DIC on thin coatings**
Paul Saby, Manutech USD, Mines Saint-Etienne, LGF UMR5307 CNRS, France
- 83. The origins of enhanced strength in nanoporous silver made via nanoscale additively manufactured**
Rebecca Anne Gallivan, ETH Zurich, Switzerland
- 84. Plastic deformation behavior of structurally related intermetallic Phases of the binary samarium-cobalt system**
Tobias Stollenwerk, Institut für Metallkunde und Materialphysik, RWTH Aachen University, Germany
- 85. In situ SEM nanomechanical testing of graphene sheet**
Jaroslav Lukes, Bruker Nano Surfaces & Metrology, Prague, Czech Republic
- 86. High throughput analysis of irradiation hardening in reduced activation ferritic-martensitic steels for future fusion applications**
James S.K-L. Gibson, United Kingdom Atomic Energy Authority, Culham Centre for Fusion Energy, Culham Science Centre, Abingdon, Oxon, UK
- 87. Nanoindentation characterization of local mechanical properties of Cu-Ag wires**
Hanane Idrir, Institut Pprime, UPR 3346 CNRS-Université de Poitiers-ENSMA, France
- 88. Nanoindentation meets APT, XRD, and EBSD: Multiphysical characterization of white etching layers in pearlitic rails**
Oleksandr Glushko, Department of Materials Science, Montanuniversität Leoben, Leoben, Austria
- 89. Micromechanical properties of lamellar ovine bone at quasi-physiological conditions and high strain rates**
Christian Minnert, Laboratory for Mechanics of Materials and Nanostructures, Empa, Switzerland
- 90. Compressive strength as a mechanical indicator of long-range order in L10 Fe-Pd nanoparticles**
Yarden Flash, Technion - Israel Institute of Technology, Technion City, Haifa, Israel
- 91. Micromechanical assessment of fracture properties of austenitic stainless-steel grain boundaries oxidized in a pressurized water reactor environment**
Marc Legros, CEMES-CNRS, Toulouse, France
- 92. Temperature dependent indentation size effect in silicon iron single crystal**
Petr Haušild, Czech Technical University in Prague, Faculty of Nuclear Sciences and Physical Engineering, Department of Materials, Praha, Czech Republic
- 93. Optimizing FIB applications through tailored ion species selection**
Nousha Kheradmand, Daniel Phifer, Min Wu, and Herman Lemmens, Materials & Structural Analysis, Thermo Fisher Scientific, Norway
- 94. PEGDE cross-linked graphene oxide-chitosan as robust and high gas barrier coatings**
Alessia Cabrini, Institute of Polymers, Composites, and Biomaterials, CNR, Lecco, Italy
- 95. Enriching nanoindentation with in situ electrical measurements and SEM observations**
Johann Jakob Schwiedrzik, Empa Swiss Federal Laboratories for Materials Science and Technology, Switzerland
- 96. Deformation mechanisms in novel thick copper films**
Liz Karanja, CEMES - CNRS, Toulouse, France