# Nanomechanical Testing in Materials Research and Development IX
## Giardini Naxos October 6th – October 11th 2024

**Sunday, October 6, 2024**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>09:30 – 10:00</td>
<td>Check-in for Optional Tutorial Session <em>(UNA Hotel Lobby)</em></td>
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<tr>
<td>10:00 – 13:00</td>
<td><strong>MecaNano Tutorial Session</strong> <em>(Congress Center)</em></td>
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**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

<table>
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<tr>
<td>13:00 - 14:30</td>
<td>Lunch on own</td>
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<tr>
<td>14:30 – 15:45</td>
<td>Conference Check-In <em>(UNA Hotel Lobby)</em></td>
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<tr>
<td>15:50 – 16:00</td>
<td>Conference Welcome Remarks <em>(Congress Center)</em></td>
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<tr>
<td>16:00 – 16:50</td>
<td><strong>Plenary Talk 1</strong></td>
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**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

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<tr>
<td>16:50 – 17:10</td>
<td>Spherical Nanoindentation – a Further Step towards Accelerated Materials Development</td>
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<td>Verena Maier-Kiener, Montanuniversität Leoben, Department Materials Science, Leoben, Austria</td>
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<tr>
<td>17:10 – 17:30</td>
<td>A Framework for Nanoindentation of Soft Biomaterials and Polymers</td>
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<td>Donna M. Ebenstein, Biomedical Engineering Department, Bucknell University, Lewisburg, USA</td>
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<td>17:30 – 17:50</td>
<td>Updated HTSI Method: Characterizing CaF2 Properties from TR to 800°C</td>
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<td>Gabrielle Tiphéne, IMAP, iMMC, UCLouvain, Louvain-la-Neuve, Belgium</td>
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<tr>
<td>17:50 – 18:10</td>
<td>Lateral Nanoindentation: Energy Dissipation and Static Friction</td>
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<td>John B. Pethica, Trinity College Dublin, Ireland</td>
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<td>18:10 – 18:30</td>
<td>Insights into the Origins of Friction from Two-axis Nanoindentation</td>
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<td>George M. Pharr, Department of Materials Science and Engineering, Texas A&amp;M University, Texas, USA</td>
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<tr>
<td>19:00 – 21:30</td>
<td>Opening reception <em>(Garden)</em> and dinner <em>(Buffet in Oasys Restaurant)</em></td>
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Monday, October 7, 2023

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

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 Pardoen, Institute of Mechanics, Materials and Civil Engineering (IMMC), UC Louvain, B-1348, Louvain-la-Neuve, Belgium and WEL Research Institute, avenue Pasteur 6, 1300 Wavre, Belgium

11:30 – 11:50  Solute Effects on the Migration a of Single Twin Boundary in Magnesium
Henry Ovri, Helmholtz-Zentrum Hereon, Institute of Materials Mechanics, 21502 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
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

Local Deformation Along the Iron Ore Reduction Cascade
James P. Best, Max-Planck-Institut für Eisenforschung GmbH, Germany

16:40 – 17:10

Coffee Break

**Session 3B - In-situ and Operando Nanomechanics**

Moderator: Prof. Mathias Goeken, FAU Erlangen-Nuremberg University, Germany

17:10 – 17:30

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

17:30 – 17:50

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

17:50 – 18:20

**Invited Talk**

Micro- and Nanomechanical in Situ Experiments to Address Fracture Processes
Daniel Kiener, Montanuniversität Leoben, Austria

18:45 – 20:00

**Poster Preview Session (odd-numbered posters)**

Moderators: Prof. Verena Maier-Kiener and prof. Benoit Merle (one minute each speaker)

20:00 – 21:30

Buffet dinner

21:30 – 23:00

Poster session with social time
Tuesday, October 8, 2023

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
In Situ Micromechanical Characterization of Multi-Layered Thin Films: Strain Rate, Size and Microstructure Related Experiments
Szilvia Kalácska, CNRS LGF, Mines St. Etienne, France

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
From Heat to Hardness: Probing Phase Changes in Pd-based Alloy with High-Temperature Nanoindentation
Lea A. Lumper, Montanuniversität Leoben, Leoben, Austria
12:10 – 12:30  Effect of Defects on the Dynamic Compression of Strontium Titanate Micropillars  Bárbara Bellón, Max-Planck-Institut für Eisenforschung, Germany

12:30 – 12:50  A new approach for in-situ electrochemical nanoindentation: side charging as a promising alternative  Stefan Zeiler, Department of Materials Science, Montanuniversität Leoben, Leoben, Austria

12:50 – 13:20  Invited Talk  Uncovering Extreme Dynamic Responses in Microscale Mechanical Metamaterials  Carlos M. Portela, Department of Mechanical Engineering, MIT, USA

13:20 – 14:45  Lunch buffet

15:00 – 22:30  Excursion (including dinner)
Wednesday, October 9, 2023

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, Univ. Lille, F-59000 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
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 Bitzke, 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 – 20:45  
Buffet dinner

20:45 – 22:30  
Poster session with social time
Thursday, October 10, 2023

07:00 – 08:30  Breakfast buffet

**Session 7A**
Artificial Intelligence for nanomechanics
Moderator: Prof. Edoardo Bemporad

08:30 – 09:00  **Invited Talk**
Artificial Intelligence for Micro- and Nanomechanics
Ulrich Kerzel, RWTH Aachen University

09:00 – 09:20  Using data-based methods for microstructure characterization
Ashish Chauniyal, ICAMS, Ruhr University Bochum, Germany

09:20 – 09:40  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

09:40 – 10:00  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

10:00 – 10:30  **Invited Talk**
Combinatorial and high-throughput investigation of nanoindentation techniques in the era of AI
Andrea M. Hodge, University of Southern California, USA

10:30 – 11:00  Coffee break

**Session 8A**
Correlative mechanical microscopy
Moderator: Prof. Guillaume Kermouche, Ecole des Mines de Saint-Etienne, France

11:00 – 11:30  **Invited Talk**
Operando Correlative Mechanical Microscopy
Jeffrey M. Wheeler, FemtoTools AG and ETH Zurich, Switzerland

Damien Texier, Institut Clement Ader (ICA) - CNRS, Albi, France

11:50 – 12:10  Micro-scale Strain Partitioning Studies in Heterogeneous Microstructures
Soudip Basu, Department of Metallurgical Engineering and Materials Science, Indian Institute of Technology, Bombay, India

12:10 – 12:30  Atomic Scale Characterization of Deformation and Fracture Phenomena Using a MEMS-based in Situ STEM Loading System
Eita Tochigi, Institute of Industrial Science, The University of Tokyo, Japan
12:30 – 13:00  **Invited Talk**  
Physical Micrometallurgy: Localized Electrodeposition Based Additive Approach  
Rajaprakash Ramachandramoorthy, Max-Planck-Institute für Eisenforschung (MPIE), Düsseldorf, Germany

13:00 – 14:30  Lunch buffet

14:30 – 15:30  Networking Time

**Session 9A**  
Application of nanomechanics to industrially relevant materials and devices  
Moderator: Prof. Damien Texier, Institut Clément Ader – CNRS, France

15:30 – 16:00  **Invited Talk**  
In situ tensile testing of nanocomposite thin films on flexible polymer substrates  
Barbara Putz, Empa, Thun, Switzerland

16:00 – 16:20  Insights into micropillar compression during hydrogen charging  
Maria Jazmin Duarte Correa, Max-Planck-Institut für Eisenforschung, Germany

16:20 – 16:40  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

16:40 – 17:00  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

17:00 – 17:20  High throughput assessment of creep behavior of advanced nuclear reactor alloys by nanoindentation  
Nathan A. Mara, University of Minnesota-Twin Cities, USA

17:20 – 17:50  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

17:50 – 18:10  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

18:10 – 18:30  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
18:30 – 18:50  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, 2023

07:00 – 09:00  Breakfast and departures.
Poster presentations

1. Length Scale Effects on Power Law Creep of Materials: Cases of Uniform and Graded Stress Fields
   Praveen Kumar, Indian Institute of Science, India

2. High temperature scanning indentation: latest results on materials
   Fatima-Zahra Moul-el-ksour, LTDS, UMR CNRS 5513, ECL, France

3. 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

4. Comprehensive micro-scale investigation of deformation mechanisms in superplastic biodegradable Zn alloys
   Wiktor Bednarczyk, Warsaw University of Technology, Poland

5. 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.

6. 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

7. 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

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 Al2O3-GdAlO3 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. Understanding Anisotropic Hardening in Ferrite
    Angelica Medina, Institute for Applied Materials, Karlsruhe Institute of Technology, Germany

12. Unraveling the Void Strengthening Effect in Electrodeposited Zinc
    Maria Watroba, Empa Swiss Federal Laboratory for Materials Science and Technology, Switzerland

13. Correlative Mechanical Microscopy to Assess Processing and Environmental Damage in Titanium Thin Foils
    Valerio Savo, Department of Civil, Computer Science and Aeronautical Technologies Engineering, University of Roma Tre, Rome, Italy

14. Additive manufacturing of polymer-derived ceramics with multiscale architectures (AM-PDCs)
    Jiongjie Liu, Mechanical Engineering, Eindhoven University of Technology (TU/e)

15. In-situ superelastic nano-compression tests in arrays of pillars
    Jose M. San Juan, Dept. of Physics, University of the Basque Country, UPV/EHU, Spain

16. Identifying Characteristic Features for the Mechanical Behavior of Aperiodic Ceramic Nanomultilayers
    Danielle White, University of Southern California, USA
17. Enriching nanoindentation with in situ electrical measurements and SEM observations
   Fabien Volpi, Université Grenoble Alpes, Grenoble-INP, CNRS, SIMaP, France

18. 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

19. Micromechanical testing of silicon using mems stage: modeling and characterization
   Muhammad Muzammil, Computational Sciences and Engineering Program, Koç University,
   Rumelifeneri Yolu, Turkey

20. Hydrogen-induced hardening effect and the diffusion behavior in bcc FeCr alloys by in situ
    nanoindentation
   Jing Rao, Max-Planck-Institut für Eisenforschung, Germany

21. Identifying Characteristic Features for the Mechanical Behavior of Aperiodic Ceramic Nanomultilayers
    Ujvale Bansal, Institute of Applied Materials, Karlsruhe Institute of Technology, Germany

22. Investigation of intermetallic-mg interface strength using in situ microshear testing
    Anwesha Kanjilal, Department of Structure and Nano-/Micromechanics of Materials, Max-Planck
    Institut für Eisenforschung GmbH, Germany

23. Grain Orientation Dependence on the Micromechanical Properties of Multimetal Carbides
    Nidhin George Mathews, Tampere University, Finland

24. Transition from static to sliding friction in few-layer graphene lubricated, high pressure shearing of
    mesoscopic contacts
    Ahmed Uluca, AMBER/CRANN Institute, School of Physics, Trinity College Dublin, Ireland

25. High Speed Nanoindentation: An Innovative Method for the Correction of Errors Resulting from Pile-Up
    Daniele Duranti, Department of Civil, Computer Science and Aeronautical Technologies Engineering,
    University of Roma Tre, Rome, Italy

26. Room temperature migration of a σ5 copper grain boundary during micropillar compression
    Mohammed Kamran Bhat, Max-Planck-Institut für Eisenforschung GmbH, Germany

27. Towards data-driven in-situ materials testing in SEM
    Fang Zhou, Carl Zeiss Microscopy GmbH, Carl-Zeiss-Strasse 22, 73447 Oberkochen, Germany

28. Nanoengineered high entropy alloys thin films with large and tunable mechanical properties
    Davide Vacirca, LSPM-CNRS, 99 Av. Jean Baptiste Clément, 93430 Villetaneuse, France

29. Measuring failure of coatings by nanoscratch testing
    Hannah Zhang, National Physical Laboratory

30. Understanding the plasticity of silicon at high temperatures and small length scales
    Gerald J. K. Schaffar, Department Materials Science, Montanuniversität Leoben

31. Fabrication of single crystal copper micro-tensile specimens using the femtosecond-laser and plasma-
    focused ion beam
    Laurent Tôn-Thât, Research Institute of Hydro-Quebec, Varennes QC J3X 1S1, Canada

32. Microscale mechanical and viscoelastic properties of bone affected by osteogenesis imperfecta
    Michael Wurmshuber, FAU Erlangen-Nürnberg, Germany

33. Exceptional plastic behavior of amorphous oxide films
    Nidhin George Mathews, Tampere University, Finland

34. High temperature fracture mechanics of ternary and quaternary diboride
    Anna Hirle, Christian Doppler Laboratory for Surface Engineering of High-performance Components,
    TU Wien, Austria
35. 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

36. 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 PA USA

37. High Strain Rate Nanoindentation on a Low Angle Grain Boundary in Copper
   Hendrik Holz, Max Planck Institute for Sustainable Materials, Germany

38. 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

39. Characterization of a Multiphase Rock Mapped at Different Temperatures
   Wolfgang Stein, SURFACE

40. 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

41. Fatigue Damage Mechanisms in Freestanding Gold Thin Films and Their Dependence on Film Microstructure and Temperature
   Anna Krapf, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

42. Randomised Impact Testing at >800 °C to Simulate High Temperature Erosion
   Ben Beake, Micro Materials Ltd., UK

43. High-temperature micropillar compression of hematite: Insights and experimental challenges
   Shreehard Sahu, Max Planck Institute for Sustainable Materials, Germany

44. Multi-scale Mechanical Characterization of Zr-2.5Nb Pressure Tube Alloy
   Vineet Bhakhri, Canadian Nuclear Laboratories (CNL), Reactor Fleet Sustainability Directorate, Chalk River, Ontario, Canada

45. 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, Austria

46. Mechanical Damping at the Nanoscale in Cu-Based Shape Memory Alloys
   Jose F. Gómez-Cortés, Dept. of Physics, University of the Basque Country UPV/EHU, Spain

47. Nanoindentation Methods for Analysis of Thermally Activated Processes at Elevated Temperatures
   Marcel Sos, Technical University Darmstadt, Physical Metallurgy, Darmstadt, Germany

48. Grain Boundary Segregation in Magnesium Alloys: From Infinitesimally Diluted Solid Solutions to Synergistic Effects
   Zhuocheng Xie, Institut für Metallkunde und Materialphysik, RWTH Aachen, Germany

49. Deformation Twinning Unraveled in Α-Titanium through Micropillars Compression Loading over a Wide Range of Strain Rate
   Kamila Hamulka, EMPA, Thun, Switzerland

50. Copper Micro-honeycomb Architectures: Fabrication, Characterization and High Strain Rate Testing
    Kuan Ding, Max-Planck-Institut für Eisenforschung GmbH, Max-Planck-Straße 1, 40237 Düsseldorf, Germany

51. 3D Mapping of Local Stress By n3D-XRD-CT
    Thomas Edward James Edwards, NIMS, 1-2-1 Sengen, Tsukuba, 305-0047, Japan
52. In Situ Cyclic Micro Deformation of NiMnGa Ferromagnetic Shape-memory Alloy with Concurrent AE Detection
   Dávid Ugi, Department of Materials Physics, ELTE Eötvös Loránd University, Pázmány Péter sétány 1/a, 1117 Budapest, Hungary.

53. A Nanomechanical Approach for Efficient Substitution of Cobalt In High-Entropy Alloys and Hardmetals for Thermal Sprayed Coatings
   Giulia Gigante, Department of Civil, Computer Science and Aeronautical Technologies Engineering, Roma Tre University, Rome, Italy

54. Study of Thermo-Mechanical Fatigue of Metallizations Using Correlative in-Situ Methodologies
   Sebastian Moser, KAI Kompetenzzentrum Automobil- und Industrielektronik GmbH, Europastrasse 8, 9524 Villach, Austria

   Ryosuke Kinoshita, Department of Mechanical Science and Bioengineering, Osaka University, Japan

56. Defects Nucleation and Stability in Pt Nanoparticles Using Bragg Coherent X-Ray Diffraction
   Abdelrahman Zakaria, Aix-Marseille University, IM2NP, Marseille, France

57. Toward High Strain Rate Spherical Nanoindentation Testing
   Mohammed Tahir Abba, University of Kassel, Institute of Materials Engineering, 34125 Kassel, Hessen Germany

58. Nanomechanical Testing of Nitrieded and Nitrogen Ion Implanted High Entropy Alloys
   Dariusz M. Jarząbek, Institute of Fundamental Technological Research PAS, Warsaw, Poland

59. 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

60. 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, 13397 Marseille, France

61. A Setup for Nanoindentation with In-Situ X-Ray Nanodiffraction
   Christina Krywka, Helmholtz-Zentrum Hereon, Outstation at DESY, D-22607 Hamburg, Germany

62. The Onset of Plasticity in Pt Sub-Micron Particles Revealed by Bragg Coherent X-Ray Diffraction Imaging during Nano-Indentation
   Stephane Labat, Aix Marseille Univ., CNRS, IM2NP, Marseille, France

63. Multi-Scale Analysis Of Toughening Mechanisms In Ceria-Stabilized Zirconia Ceramics
   Edoardo Bemporad, Department of Civil, Computer Science and Aeronautical Technology Engineering, Università degli studi Roma Tre, Rome, Italy

64. 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

65. Design and Development of Micromechanical Testing Stages for Cantilever Bending
   Sina Zare Pakzad, Department of Mechanical Engineering, Koç University, Rumelifeneri Yolu, 34450, Istanbul, Turkey

66. 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

   Kevin Kutlesa, Chair of Materials Physics, Montanuniversität Leoben, Austria
68. Investigation of Strain Rate Sensitivities of Body Centered Cubic Single Crystals Using High Strain Rate Nanoindentation up to 10,000 s^-1
   Rahul Cherukuri, Materials Science and Environmental Engineering, Tampere University, Finland

69. 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

70. 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

71. Tribochemistry of DLC Coatings with Gas Phase Lubricant Additives: Characterization with Electronic Spectroscopies
   Aslıhan Sayılan, Université de Lyon, Ecole Centrale de Lyon, CNRS, ENTPE, LTDS, UMR5513, Ecully, France

72. Understanding Transient Plasticity Through Indentation Creep Tests Using Different Indenter Geometries
   Suprit Bhusare, Engineering Materials Science, Tampere University, Finland

73. High Temperature Scanning Indentation: Applications, Limitations and Perspectives
   Gaylord Guillonneau, ECL, CNRS, LTDS, UMR5513, 69130 Ecully, France

74. Effects of the Topologically Close-Packed (TCP) Phase in the Ni-Based Superalloy
   Subin Lee, Institute for Applied Materials, Karlsruhe Institute of Technology, Germany

75. Mechanical Properties of Sinterless 3D Printed Silica Glass: A Multi-Technique Comparative Study
   Wenjuan Cheng, Department of Civil, Computer Science and Aeronautical Technologies Engineering, Roma Tre University, Rome, Italy

76. Use of Nanocrystalline Nickel Microforce Sensors in Practice
   Wojciech Dera, Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland

77. High Strain Rate Mechanical Behavior of Materials Treated by Surface Mechanical Attrition (SMAT)
   Mona Stoll, University of Kassel, Institute of Materials Engineering, 34125 Kassel, Hessen, Germany

78. Micromechanical Investigation of Lead-Free Soft Solder by in-Situ Microcompression Experiments and Advanced Nanoindentation
   Nadine Buchebner, Department Materials Science, Montanuniversität Leoben, Austria

79. Probing Stress Distribution in Silicon Nanowires: Integrating Resonance Testing and Raman Spectroscopy
   Basit Ali, Department of Mechanical Engineering, Koç University, Rumelifeneri Yolu, Istanbul, Turkey

80. Scratching the Surface: a GND Based Analysis of the Lateral Size Effect
   Anna Kareer, Department of Materials, University of Oxford, UK

81. High Strain Rate Nanoindentation of Fused Silica, Silicon, and Nanocrystalline Nickel
   Lalith Kumar Bhaskar, a Max-Planck-Institut für Eisenforschung GmbH, Department of Structure and Micro-/Nano- Mechanics of Materials, Max Planck-Strasse 1, 40237 Düsseldorf, Germany

82. An Ontology and Metadata for Nanomechanical Testing
   Pierluigi Del Nostro, Goldbeck Consulting Limited

83. Deformation of Silicon Oxides under Electron-beam Irradiation and its Atomistic Mechanisms
   Sung-Gyu Kang, Gyeongsang National University, Korea

84. 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
85. 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, Saarbruecken, 66123, Germany

86. Nanomechanical Properties of Superconducting Nb3Sn–Based Wires Measured by Nanoindentation
    Aleksandra Bartkowska, CERN, Switzerland

87. 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, 08019 Barcelona, Spain

88. Exploring Micromechanical Behavior of Additively Manufactured Multi-Layered Medium-Entropy Alloy
    Zhe Gao, Division of Materials Science and Engineering, Hanyang University, Seoul 04763, Republic of Korea

89. 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

90. Doping-Regulated Room-Temperature Dislocation Plasticity in SRTIO3: A Multiscale Approach
    Chukwudalu Okafor Department of Materials and Earth Sciences, Technical University of Darmstadt, Darmstadt, Germany.

91. Assessment of Nanomechanical Properties and Residual Stresses in Multilayer TiW-Au-TiW Thin Films of MEMS Micro-Structure
    Saqib Rashid, Department of Civil, Computer Science and Aeronautical Technologies Engineering, University of Roma Tre, Rome, Italy

92. 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

93. Plasticity of Ca-Mg-Al Laves Phases and its Temperature and Chemistry Dependence
    Martina Freund, Institut für Metallkunde und Materialphysik, RWTH Aachen University

94. Stability Investigation of Nanocrystalline Silicon Carbide under the Extreme Conditions
    Elchin M. Huseynov, Institute of Radiation Problems of Ministry of Science and Education, 9 B.Vahabzade, Baku AZ 1143, Azerbaijan

95. Effect of Silver Addition on Micro- and Nanohardness of the Cu-10Al-7Ag Shape Memory Alloy
    Lovro Liverić, University of Rijeka, Faculty of Engineering & Centre for Micro- and Nanosciences and Technologies, Vukovarska 58, 51 000 Rijeka, Croatia

96. Tribological Stress Field Model Validation by Using Deformation Twins as Probes
    Antje Dollmann, Institute for Applied Materials (IAM), Karlsruhe Institute of Technology (KIT), Kaiserstrasse 12, 76131 Karlsruhe, Germany

97. Residual Stress-based Improvement of the Fatigue Life of TiAIN Coated Ti-6Al-4V
    Arno Gitschthaler, CDL SEC, TU Wien, Austria

98. Mechanical Properties of B2 FeAl as a Function of Composition Using Targeted Nanoindentation on Diffusion Couples
    Jung Soo Lee, Max-Planck Institute for Sustainable Materials, Germany

99. Nanoindentation Assisted Acoustic Measurements
    Antanas Daugela, Nanometronix LLC, 7400 Bush Lake Dr., Minneapolis, MN 55438, USA

100. Borate Cross-linked Graphene Oxide–Chitosan as Robust and High Gas Barrier Coatings
    Alessia Cabrini, Institute of Polymers, Composites, and Biomaterials, CNR, Lecco, Italy

101. Sol-Gel Nano-coatings for Anti-microbial Applications: a Nano-mechanical Study
    Ilaria Favuzzi, Department of Civil, Computer and Aeronautical Engineering, Roma Tre University (IT)
Hannah Zhang, National Physical Laboratory, UK

103. 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

104. The Influence of Microstructure on Fracture Toughness of Tungsten and Doped Tungsten Fine Wire
Hannah Luise Lichtenegger, Department Materials Physics, Montanuniversität Leoben, Austria

105. Thermal Activation in Yielding of Single Crystalline Tungsten
Florian Tropper, National Institute for Materials Science, Japan

106. Residual Stress Measurement with Global Method FIB-DIC on Thin Coatings
Paul Saby, Manutech USD, Mines Saint-Etienne, LGF UMR5307 CNRS, France

107. The Origins of Enhanced Strength in Nanoporous Silver Made via Nanoscale Additively Manufactured
Rebecca Anne Gallivan, ETH Zurich, Switzerland

108. Plastic Deformation Behaviour of Structurally Related Intermetallic Phases of the Binary Samarium-
Cobalt System
Tobias Stollenwerk, Institut für Metallkunde und Materialphysik, RWTH Aachen University, Germany

109. In-Situ SEM Nanomechanical Testing of Graphene Sheet
Jaroslav Lukes, Bruker Nano Surfaces & Metrology, Prague, Czech Republic

110. Impact of Shape and Size on Mechanical Properties of Metallic Nanoparticles
Riccardo Gatti, Université Paris-Saclay, ONERA, CNRS, Laboratoire d'étude des microstructures, 92322 Châtillon, France

111. 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, OX14 3DB, UK

112. Nanoindentation Characterization of Local Mechanical Properties of Cu-Ag Wires
Hanane Idrir, Institut Pprime, UPR 3346 CNRS-Université de Poitiers-ENSMA, France

113. 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

114. 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

115. 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 3200003 – Israel

116. Micromechanical Assessment of Fracture Properties of Austenitic Stainless Steel Grain Boundaries
Oxidized in a Pressurized Water Reactor Environment
Marc Legros, CEMES-CNRS, Toulouse, France

117. 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, Trojanova 13, 120 00 Praha 2, Czech Republic

118. Optimizing FIB applications through tailored ion species selection
Herman Lemmens and Pauline Huang, Materials & Structural Analysis, Thermo Fisher Scientific