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

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 own
14:30 – 15:45	Conference Check-In (UNA Hotel Lobby)
15:50 – 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, Department Materials Science, 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 TR 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)

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 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 – 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
11:30 – 11:50	**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 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 Eisenforschuing, 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 initation 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**
Ujjval 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 Dependance 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 mesoscale 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. **Nanoengieered 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 naoscratch 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 A-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 sétany 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 Industrieelektronik GmbH, Europastrasse 8, 9524 Villach, Austria

55. 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

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 Nitrided 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

67. 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

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**
Aslihan Sayilan, Universite 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 $SRTIO_3$: 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 TiAlN 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)

102. Instrumented Indentaiton Testing on Engineering Materials: Effect Of Temperature
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, Japen

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