*Program*

# Nanomechanical Testing in Materials Research and Development VII

**September 29 – October 4, 2019**

**Melia Costa Del Sol**
**Torremolinos/Malaga, Spain**

**Conference Chair**
**Jon Molina-Aldareguia**
IMDEA Materials Institute, Spain

**Engineering Conferences International**
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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.

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Gerhard Dehm, Planck Institute for Iron Research, Germany
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# ***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:*
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**October 9 – 14, 2011**
**Lanzarote, Canary Islands, Spain**
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***Nanomechanical Testing in Materials Research & Development IV***
**October 6 - 11, 2013**
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***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

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**Sunday, September 29, 2019**

| | |
|---|---|
| 09:30 – 10:00 | Check-in for Optional Tutorial Session (Reception Lobby-Conference Center) |
| 10:00 – 13:00 | **Tutorial Session** (Salon Málaga – Level -1) |
| | **Experimental fracture mechanics at the micron scale: Fundamentals, challenges and pitfalls**<br>Christoph Kirchlechner, MPIE, Germany |
| | **Nanoscale residual stress and adhesion assessment**<br>Edoardo Bemporad, Università degli studi Roma Tre, Italy |
| 13:00 – 14:00 | Lunch (on your own) |
| 15:00 – 16:30 | Check-in for Conference (Reception Lobby – Conference Center) |
| 16:30 – 16:40 | Conference Welcome<br>Conference Chair: Jon Molina-Aldareguia<br>ECI Technical Liaison: Larry Kabacoff |

***Room locations and notes***

- General Sessions will be held in the (Salon Málaga – Level -1)
- Poster Sessions will be in the Salon Torremolinos.
- The opening reception will be at the Central Pool

  The cocktail dinner will be on the Roof.
- Meals will be in the Buffet Restaurant. Coffee breaks will be in the Salon Torremolinos
- Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, PDAs, watches) is strictly prohibited during the technical sessions, unless the author and ECI have granted prior permission.
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**Sunday, September 29, 2019 (continued)**

**Session I: In-Situ Micro and Nanomechanical Testing**
Chair: Jon Molina-Aldareguia, IMDEA Materials Institute, Spain

16:40 – 17:20 **Opening lecture**
**New electron microscopy techniques for determination of local structural features during plastic deformation**
Andrew Minor, University of California Berkeley, USA

17:20 – 17:50 **(Highlight) Recent progresses in in-situ and 3D HR-EBSD techniques to assess deformation mechanism of materials at small scale**
Xavier Maeder, EMPA, Switzerland

17:50 – 18:10 **TEM in-situ deformation of magnesium-ytrium alloys**
Yu-Lung Chiu, University of Birmingham, United Kingdom

18:10 – 18:30 **In situ nanoindentation of Au crystals imaged by Bragg coherent X-ray diffraction**
Thomas Cornelius, CNRS, France

18:30 – 18:50 **TEM observation and in situ compression tests of transition alumina prepared by high pressure compaction at room temperature**
Karine Masenelli-Varlot, University of Lyon, INSA-Lyon, MATEIS, France

19:00 - 20:00 Welcome Reception (Central Pool)

20:00 - 21:30 Dinner (Roof)

**Monday, September 30, 2019**

| | |
|---|---|
| 07:30 – 09:00 | Breakfast buffet |
| | **Session II: Plasticity at Small Scales I**<br>Chairs: Gerhard Dehm, Max Planck Institute for Iron Research, Germany<br>Javier Llorca, IMDEA Materials Institute, Spain |
| 09:00 – 09:40 | **Keynote**<br>**Determination of precipitate strengthening in Al-Cu alloys through micropillar compression: Experiments and multiscale simulations**<br>Javier Llorca, IMDEA Materials Institute, Spain |
| 09:40 – 10:10 | **(Highlight) Effect of sample size and grain boundaries on dislocation structures and damage evolution in small-scale samples: A micro-fatigue investigation**<br>Christian Motz, Saarland University, Germany |
| 10:10 – 10:40 | **(Highlight) The influence of 3-D interfacial structure and morphology on the mechanical behavior of nanocomposites**<br>Nathan Mara, University of Minnesota, USA |
| 10:40 – 11:00 | **On microstructural constraints for slip transfer in nanotwinned silver**<br>Maya Katapadi Kini, MPIE, Germany |
| 11:00 – 11:30 | Coffee Break |
| 11:30 – 12:00 | **(Highlight) Twin boundaries: Obstacles for or sources of dislocations?**<br>Christoph Kirchlechner, MPIE, Germany |
| 12:00 – 12:30 | **(Highlight) Probing grain boundary relaxation in ultra-fine grained tantalum by micromechanical spectroscopy in an SEM**<br>Daniel Kiener, Montanuniversität Leoben, Austria |
| 12:30 – 12:50 | **Grain-scale investigation of the anisotropy of PLC-type plastic instability**<br>Henry Ovri, Helmholtz Zentrum Geesthacht, Germany |
| 13:00 – 14:30 | Lunch |
| 14:30 – 16:30 | Networking / Time for *ad hoc* discussions |
| | **Session III: Plasticity at Small Scales II**<br>Chair: Marc Legros, CNRS, France |
| 16:30 – 17:10 | **Keynote**<br>**Nano-mechanical behavior of bcc irons characterized through nanoindentation and TEM In-situ straining**<br>Takahito Ohmura, Kyushu University, Japan |
| 17:10 – 17:30 | **Nanomechanical testing of bcc micropillars – power laws and lattice resistance correlations**<br>Brian Derby, University of Manchester, United Kingdom |
| 17:30 – 17:50 | **Size effect in polymer-supported ultrathin metallic glass films**<br>Oleksandr Glushko, Erich Schmid Institute, Austria |

**Monday, September 30, 2019 (continued)**

| | |
|---|---|
| 17:50 – 18:10 | **Suppressing damage in dual phase steel: Insights from micromechanics**<br>Chunhua Tian, MPIE, Germany |
| 18:10 – 18:30 | **Compression of gold sub-micron crystallites: Method and experiments**<br>Marc Verdier, CNRS, France |
| 18:30 – 18:50 | **Direct observation of dislocation plasticity in FeCrCoMnNi high-entropy alloys**<br>Subin Lee, MPIE, Germany |
| 19:00 – 20:00 | Poster Preview I<br>Poster Chairs: Benoit Merle (University Erlangen-Nürnberg, Germany) and Verena Maier-Kiener (Montanuniversität Leoben, Austria) |
| 20:00 – 21:30 | Dinner |
| 21:30 – 23:00 | **Poster Session I** |

**Tuesday, October 1, 2019**

| | |
|---|---|
| 07:30 – 08:30 | Breakfast buffet |
| | **Session IV: Hard Materials**<br>Chair: Johann Michler, EMPA, Switzerland |
| 08:30 – 09:00 | **(Highlight) Dislocations in Laves phases – Phantastical beasts and how to understand them**<br>Sandra Korte-Kerzel, RWTH Aachen University, Germany |
| 09:00 – 09:30 | **(Highlight) Nanomechanical testing study of the elementary deformation mechanisms in the $Ti_2AlN$ and $Cr_2AlC$ MAX phases**<br>Christophe Tromas, Institut Pprime - Université de Poitiers, France |
| 09:30 – 09:50 | **Superelasticity of $ThCr_2Si_2$-structured intermetallic compounds at the micrometer scale**<br>Seok-Woo Lee, University of Connecticut, USA |
| 09:50 – 10:10 | **Small-scale mechanical response of cemented carbides: Correlation between mechanical properties and microstructure**<br>Joan Josep Roa, Universidad Politecnica de Cataluña, Spain |
| 10:10 – 10:30 | **Nanomechanical behavior of individual phases and size effect in WC-Co by means of high temperature nanoindentation and electron microscopy: A study from ambient to high temperature**<br>Francois De Luca, National Physical Laboratory, United Kingdom |
| 10:30 – 11:00 | Coffee break |
| | **Session V: Fracture and Fatigue at Small Scales**<br>Chair: Daniel Kiener, Montanuniversität Leoben, Austria |
| 11:00 – 11:30 | **(Highlight) Fracture toughness determination of arc-PVD and HiPIMS hard coatings by micro-cantilever and pillar splitting tests**<br>Johannes Ast, Innovation Centre of Nanotechnology and Correlative Microscopy, Germany |
| 11:30 – 11:50 | **The fracture behavior of $Cr_2AlC$ coatings**<br>Bernhard Völker, RWTH Aachen University, Germany |
| 11:50 – 12:10 | **Strain Evolution around corrosion pits under fatigue loading using digital image correlation**<br>Robert Akid, University of Manchester, United Kingdom |
| 12:10 – 12:30 | **Mechanical characterization of a tribollayer created by high temperature fretting wear in a ceramic/metal alloy contact**<br>Gaylord Guillonneau, Universtité de Lyon, France |
| 12:50 – 13:00 | Meet up at the front lobby of the hotel for the excursion. |
| | **Buses leave promptly at 13:00** |

**Tuesday, October 1, 2019 (continued)**

13:00 – 18:30 Excursion – Lunch boxes on bus

Guided tour of Malaga*, ending with drinks/snacks at El Palmeral Restaurant and transfer back to hotel

*When the group arrives in Malaga, the guides will divide the group into smaller groups of 25. Some groups will start at the Museo Picasso and others at the Alcazaba. At 16:30, all groups will arrive at the El Palmeral Restaurant where they will enjoy a cocktail and a variety of canapés. The buses returning the group to the hotel will be waiting at the pick-up point (to be announced) to return the group to the conference hotel.

**Session VI: High Throughput Testing**
Chair: Karsten Durst, Technische Universität Darmstadt, Germany

18:45 – 19:15 **(Highlight) Deformation and fracture mechanisms in nanocomposite and nanolaminate thin films revealed through combinatorial design and nanomechanical testing**
Johann Michler, EMPA, Switzerland

19:15 – 19:45 **(Highlight) Mechanical phase mapping of meteorites: Combining EDX and nanoindentation**
Jeffrey Wheeler, ETH Zurich, Switzerland

19:45 – 20:05 **Nanoindentation: A powerful tool to explore the wide chemical space of high entropy alloys**
Mathilde Laurent-Brocq, Université Paris-Est (UPE), France

20:15 – 22:00 Dinner

**Wednesday, October 2, 2019**

| | |
|---|---|
| 07:30 – 09:00 | Breakfast buffet |
| | **Session VII: In Operando/Extreme Conditions**<br>Chairs: Mathias Göken, University Erlangen-Nurnberg, Germany<br>David Armstrong, University Of Oxford, United Kingdom |
| 09:00 – 09:30 | **(Highlight) Effects of temperature and irradiation damage on fracture around nanoindents**<br>David Armstrong, University Of Oxford, United Kingdom |
| 09:30 – 09:50 | **Micropillar compression study of Fe-irradiated 304L steel**<br>Marc Legros, CNRS, France |
| 09:50 – 10:10 | **Localized mechanical properties of SiC-SiC fiber composites in extreme environments – a micromechanical study**<br>Yevhen Zayachuk, University of Oxford, United Kingdom |
| 10:10 – 10:30 | **Evaluation of the environmental degradation of interphases in Ceramic Matrix Composites (CMCs) via in-situ SEM micromechanical testing**<br>Oriol Gavalda Diaz, Imperial College London, United Kingdom |
| 10:30 – 10:50 | **Elevated temperature nanoindentation and in-situ SEM mechanical testing of uranium fuels**<br>David Frazer, Los Alamos National Laboratory, USA |
| 10:50 – 11:20 | Coffee break |
| 11:20 – 11:50 | **(Highlight) Measuring nanoindentation hardness at high sustained strain-rates**<br>Benoit Merle, University Erlangen-Nürnberg (FAU), Germany |
| 11:50 – 12:20 | **(Highlight) Impact of temperature and hydrogen on the nanomechanical properties of a highly deformed high entropy alloy**<br>Verena Maier-Kiener, Montanuniversität Leoben, Austria |
| 12:20 – 12:40 | **Studying deformation mechanisms of nanocrystalline nickel by thermal activation analysis at subambient temperatures and high strain rates**<br>Johann Jakob Schwiedrzik, EMPA, Switzerland |
| 12:40 – 13:00 | **Hydrogen-microstructure interactions by novel back-side hydrogen charging during in situ nanoindentation**<br>Jazmin Maria Duarte Correa, MPIE, Germany |
| 13:00 – 14:30 | Lunch |
| 14:30 – 16:30 | Networking / Time for *ad hoc* discussions |
| | **Session VIII: Novel Methodologies**<br>Chair: George Pharr, Texas A&M University, USA |
| 16:30 – 17:00 | **(Highlight) A new nanoindentation creep technique using constant contact pressure**<br>Karsten Durst, Technische Universität Darmstadt, Germany |

**Wednesday, October 2, 2019 (continued)**

| | |
|---|---|
| 17:00 – 17:20 | **Indentation creep testing of superalloys**<br>Mathias Göken, University Erlangen-Nurnberg, Germany |
| 17:20 – 17:40 | **Measurement of the creep behavior of thin ZrNi metallic glass films – a comparison between nanoindentation relaxation, nanoindentation creep and lab-on-chips experiments**<br>Guillaume Kermouche, CNRS, France |
| 17:40 – 18:00 | **Direct observation of yield in films by flat punch indentation**<br>John Pethica, Trinity College Dublin, Ireland |
| 18:00 – 18:20 | **Measurement of hardness and elastic modulus by depth sensing indentation: Further advances in understanding and refinements in methodology**<br>Sudharshan Phani Pardhasaradhi, International Advanced Research Centre for Powder Metallurgy and New Materials, India |
| 18:20 – 18:40 | **A new approach to evaluate residual stress using instrumented indentation testing at nano scale**<br>Dongil Kwon, Seoul National University, South Korea |
| 19:00 – 20:00 | Poster Preview II<br>Poster Chairs: Benoit Merle (University Erlangen-Nürnberg, Germany) and Verena Maier-Kiener (Montanuniversität Leoben, Austria) |
| 20:00 – 21:30 | Dinner |
| 21:30 – 23:00 | **Poster Session II** |

**Thursday, October 3, 2019**

| | |
|---|---|
| 07:30 – 09:00 | Breakfast |
| | **Session IX: Biological Materials**<br>Chair: Sandra Korte-Kerzel, RWTH Aachen University, Germany |
| 09:00 – 09:40 | **Keynote**<br>**Passive and active mechanics of Banksia seed pods**<br>Michaela Eder, Max-Planck-Institute of Colloids and Interfaces, Germany |
| 09:40 – 10:10 | **(Highlight) Small scale fracture of bone to understand the effect of fibrillar organization on toughness**<br>Finn Giuliani, Imperial College London, United Kingdom |
| 10:10 – 10:30 | **Microtensile properties and failure mechanisms of bone on the lamellar level**<br>Daniele Casari, EMPA Thun, Switzerland |
| 10:30 – 10:50 | **Correlation of ultra-fine real-geometry FEM models of diatoms derived from nano-X-ray tomography with in-situ nanomechanical testing**<br>André Clausner, Fraunhofer IKTS, Germany |
| 10:50 – 11:20 | Coffee break |
| | **Session X: Novel Instrumentation**<br>Chair: Jeffrey Wheeler, ETH Zurich, Switzerland |
| 11:20 – 11:40 | **High strain rate plasticity in microscale glass**<br>Rajaprakash Ramachandramoorthy, EMPA, Switzerland |
| 11:40 – 12:00 | **High-resolution strain-mapping during in-situ nanoindentation of CVD thin films**<br>Gudrun Lotze, MAX IV Laboratory, Sweden |
| 12:00 – 12:20 | **Correlative in situ total and elastic strain mapping on micromechanical test pieces by DIC and HR-EBSD**<br>Thomas E.J. Edwards, EMPA, Switzerland |
| 12:20 – 12:40 | **In-situ microcompression high cycle fatigue tests: Up to 1 kHz frequencies and 10 million oscillation cycles**<br>Gaurav Mohanty, Tampere University, Finland |
| 12:40 – 13:00 | **Surface acoustic wave spectroscopy versus nanoindentation: Potentials and limits for coating characterization**<br>Martin Zawischa, Fraunhofer Institute for Material and Beam Technology IWS, Germany |
| 13:00 – 14:30 | Lunch |
| 14:30 – 16:30 | Networking / Time for *ad hoc* discussions |

**Thursday, October 3, 2019 (continued)**

**Session XI: Novel Applications**
Chairs: Jon Molina-Aldareguia, IMDEA Materials Institute, Spain
Ralph Spolenak, ETH Zurich, Switzerland

16:30 – 17:00 **(Highlight) Multi-metal electrohydrodynamic redox 3d printing at the submicron scale: Microstructure – geometrical gradients – chemical gradients and the resulting mechanical properties**
Ralph Spolenak, ETH Zurich, Switzerland

17:00 – 17:20 **Understanding fracture in laser additive manufactured bulk metallic glass through small-scale mechanical measurement**
James P. Best, CSIRO, Australia

17:20 – 17:40 **Micromechanical testing at high strain rates and varying temperatures of 3D-printed polymer structures**
Nadia Rohbeck, EMPA, Switzerland

17:40 – 18:00 **Small scale mechanical testing of nanoporous tungsten tailored by reverse phase dissolution**
Mingyue Zhao, Montanuniversität Leoben, Austria

18:00 – 18:20 Refreshments

18:20 – 18:50 **(Highlight) Mechanical and electrical failure of transparent nanowire Electrodes**
Erdmann Spiecker, Institute of Micro- and Nanostructure Research & Center for Nanoanalysis and Electron Microscopy (CENEM), Germany

18:50 – 19:10 **Nanomechanical characterization of high pressure torsion processed HfNbTaTiZr high entropy alloy**
Petr Haušild, Czech Technical University in Prague, Czech Republic

19:10 – 19:30 **Electroplastic deformation studies of an Al-Cu eutectic alloy using nanoindentation**
Doreen Andre, Institute of Physical Metallurgy and Metal Physics, Germany

19:30 – 19:50 **Characterization of particle distribution in a black carbon-filled elastomer via nanoindentation**
Paul Baral, LTDS, France

20:30 – 22:30 Conference Dinner

**Friday, October 4, 2019**

07:30 – 09:00 Breakfast and Departures

*Posters*

# Nanomechanical Testing in Materials Research and Development VII

**September 29 – October 4, 2019**

**Melia Costa Del Sol**
**Torremolinos/Malaga, Spain**

**Engineering Conferences International**

## Poster Presentations

**Monday, September 30, 2019**

M1 **Local fatigue characterisation of ARB processed copper sheets by dynamic micropillar compression**
Sebastian Krauß, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany

M2 **Effect of lamellar orientation and width on the strength and operating deformation mechanisms of fully lamellar TiAl alloys determined by micropillar compression**
Cristina Gutiérrez-García, Imdea Materials, Spain

M3 **Nanomechanical behavior of optically optimized AlN/SiO2 and AlN/Ag nanomultilayers**
Chelsea Appleget, University of Southern California, USA

M4 **Investigating thermally activated deformation mechanisms by high temperature nanoindentation – A Study on W-Re alloys**
Johann Kappacher, Montanuniversitaet Leoben, Austria

M5 **Mechanical characterisation of the protective Al2O3 scale in Cr2AlC MAX phases**
James S.K-L. Gibson, RWTH Aachen University, Germany

M6 **Nanomechanical testing for crystal plasticity constitutive framework identification at high strain rates**
Simon Breumier, Ecole des Mines de Saint-Etienne, France

M7 **Measurement of enhanced ductility in nanolayered ceramics via micro-compression testing and digital image correlation**
Julia T. Pürstl, University of Cambridge, United Kingdom

M8 **In-situ deformation monitoring of thin electrochemically deposited copper lines during thermo-mechanical pulsing**
Manuel Kleinbichler, Kompetenzzentrum Automobil- und Industrieelektronik GmbH, Austria

M9 **Tension-compression strength asymmetry of bone extracellular matrix**
Daniele Casari, EMPA Thun, Switzerland

M10 **3D-Laue micro diffraction to characterize fatigue damage in bi-crystalline micro cantilevers**
Jean-Baptiste Molin, Max-Planck-Institut für Eisenforschung GmbH, Germany

M11 **Strength and hardness enhancement and slip behaviour of high-entropy carbide grains during micro-compression and nanoindentation**
Tamás Csanádi, Slovak Academy of Sciences, Slovakia

M12 **In situ ultrafine force measurement with nanowire based cantilevers in SEM**
Erdmann Spiecker, Friedrich-Alexander University Erlangen-Nuremberg, Germany

M13 **Nanoindentation testing conditions - Controlling temperature and humidity?**
Wolfgang Stein, SURFACE, Germany

M14 **Effect of impurity doping on mechanical performance and microstructure in ultra-fine grained tungsten processed by HPT**
Michael Wurmshuber, Montanuniversitaet Leoben, Austria

M15 **Probing the limits of strength in diamonds: From single- and nano-crystalline to diamond-like-carbon (DLC)**
Ming Chen, Laboratory for Nanometallurgy, ETH Zurich, Switzerland

M16 **In-situ TEM straining experiments in Cantor's alloy at room and LN2 temperatures**
Daniela Oliveros, CEMES-CNRS, France

M17 **Small scale fracture of multi metal carbide coatings**
Hariprasad Gopalan, MPIE, Düsseldorf, Germany

M18 **Micro-mechanical testing of ceramic matrix composites; Extraction of critical interface properties and impact on composite optimization**
Joey Kabel, University of California, Berkeley, USA

M19 **Deep-learning assisted damage observations on the microscale – A new viewpoint on microstructural deformation, fracture and decohesion processes**
Carl F. Kusche, RWTH Aachen, Germany

M20 **A fully integrated in-situ solution for materials testing in SEM**
Fang Zhou, Carl Zeiss Microscopy GmbH, Germany

M21 **In-situ bending tests of penta-twinned Ag NWs and their structure analyses**
Hu Zhao, University of Manchester, United Kingdom

M22 **Machine learning based characterization of nanoindentation induced acoustic events**
Antanas Daugela, Nanometronix LLC, USA

M23 **Micromechanical characterization of single-crystalline niobium at low temperature**
Gyuho Song, University of Connecticut, USA

M24 **Subcritical crack growth in freestanding silicon nitride and silicon dioxide thin films using residual stress-induced crack on-chip testing technique**
Sahar Jaddi, Université catholique de Louvain, Belgium

M25 **Tensile behavior of amorphous alumina thin films deposited by plasma enhanced atomic layer deposition (PEALD)**
Jeong-Hyun Woo, UNIST, South Korea

M26 **Characterization of mechanically alloyed FeAlSi intermetallic powders**
Jaroslav Čech, Czech Technical University in Prague, Czech Republic

M27 **Improved burst pressure of LPCVD Si3N4 membranes by nanometer thick compressive adlayers**
Airat Shafikov, University of Twente, Netherlands

M28 **Enhanced strength and ductility of multilayers made by Electrolytic Additive Manufacturing**
Naresh Radaliyagoda, Coventry University, United Kingdom

M29 **Nanoindentation properties of shock-compressed single crystal Magnesium**
Tyler J. Flanagan, University of Connecticut, USA

M30 **Nanomechanical testing of freestanding polymer thin films**
Nathan R. Velez, University of California, Berkeley, USA

M31 **Increase in stretchability of thermally grown silicon dioxide film**
Na-Hyang Kim, UNIST, South Korea

M32 **Micro-mechanical testing by fibre pushout of the BN interlayer in SiCf/SiC composites for aero-propulsion**
Robin De Meyere, University of Oxford, United Kingdom

M33 **Advanced adhesion evaluation for brittle coating materials using the scratch test method**
Martin Zawischa, Fraunhofer Institute for Material and Beam Technology IWS, Germany

M34 **Micromechanisms of compressive failure of fibre reinforced polymers**
Finn Giuliani, Imperial College London, United Kingdom

M35 **Significance of the interconnectivity of intermetallic Laves phases on the mechanical behavior of Mg-Al-Ca alloys**
Muhammad Zubair, Institut für Metallkunde und Metallphysik (IMM), RWTH Aachen, Germany

M36 **Evaluation of tensile properties using instrumented indentation technique for small scale testing**
Jongho Won, Seoul National University, South Korea

M37 **Measuring the fracture energy of WC grain boundaries**
Max Emmanuel, Imperial College London, United Kingdom

M38 **Wear mechanism of olivine at the small-scale: An in situ TEM study**
Ude Hangen, Bruker, Germany

M39 **On the use of nano-indentation for tensile property correlation of ferrous metals**
Ana Ruiz Moreno, Joint Research Centre. European Commission, Netherlands

M40 **Addressing the impact of fracture during indentation of molecular crystals**
Alexandra C. Burch, Purdue University, USA

M41 **Gallium-free micromechanical sample preparation from ECAPed alluminium**
Hana Tesařová, Tescan Orsay Holding, Czech Republic

**Wednesday, October 2, 2019**

W1 **The influence of pre-deformation on the fracture toughness of chromium, studied by microcantilever bending**
Stefan Gabel, Friedrich-Alexander University Erlangen-Nuremberg, Germany

W2 **Deformation and failure of microscale mechanical metamaterials**
Chantal Miriam Kurpiers, Karlsruhe Institute of Technology, Germany

W3 **In situ fragmentation analysis of ALD-PVD multilayers on flexible substrates**
Barbara Putz, EMPA Thun, Switzerland

W4 **Exploring the mechanical character of molybdenum grain boundaries via nanoindentation and three-point-bending**
Severin Jakob, Montanuniversitaet Leoben, Austria

W5 **Investigation of a high angle grain boundary in Fe2.4wt.%Si BCC micropillars**
Martin Heller, Institute of Physical Metallurgy and Metal Physics RWTH Aachen, Germany

W6 **Multi-mechanical in situ testing for automotive industry DLC/interlayer/M2-Steel coatings**
Sergio Sao Joao, Mines Saint-Etienne, LGF UMR5307 CNRS, France

W7 **Role of film microstructure on interface stability: in-situ and ex-situ investigations**
Alice Lassnig, Erich Schmid Institute of Materials Science, Austria

W8 **High frequency acoustic emission monitoring in nano-impact of bulk ceramics**
Ben D. Beake, Micro Materials Ltd, United Kingdom

W9 **Microscale fracture of chromia scales**
Anand H. S. Iyer, Chalmers University of Technology, Sweden

W10 **Ni-P: Microstructure and micro-compression**
Chaowei Du, Max-Planck-Institut für Eisenforschung GmbH, Germany

W11 **Influence of transition metals on the solid solution strengthening and creep behavior of Nickel studied by ultra-high temperature nanoindentation testing**
Christian Minnert, Technische Universität Darmstadt, Germany

W12 **Microstructure and high temperature mechanical properties of hard TaSiN coatings**
Miguel A. Monclus, IMDEA Materials Institute, Spain

W13 **Influence of alloying elements on the mechanical properties, especially fracture toughness, of the WB2-z base system**
Rainer Hahn, CDL-SEC, Technische Universitaet Wien, Austria

W14 **Stress-strain curves and derived mechanical parameters of P91 steel from spherical nanoindentation at a range of temperatures**
Ana Ruiz Moreno, Joint Research Centre. European Commission, Netherlands

W15 **Grain boundary-based plasticity mechanisms in nanostructured metals**
Romain Gautier, CEMES-CNRS, France

W16 **The influence of surface roughness on elastic nanoindentation measurements**
Wieland Heyn, Fraunhofer IKTS, Germany

W17 **The smallest macroscale tensile test - a model to describe constrained flow at the microscale**
Hi T. Vo, University of California, Berkeley, USA

W18 **New instrumentation and analysis methodology for nano-impact testing**
Mario Rueda-Ruiz, IMDEA Materials Institute, Spain

W19 **Modulus and hardness determination using instrumented nanoindentation tests – How reliable are the results?**
Dennis Bedorf, SURFACE, Germany

W20 **Quantitative percussion diagnostics for detecting ultrafine cracks**
James Earthman, University of California, Irvine, USA

W21 **DMA Dynamic characterization of viscoelastic solids by AFM: The nano DMA mode**
Ude Hangen, Bruker, Germany

W22 **One million indents, a hardness (and modulus) story**
Ude Dirk Hangen, Bruker BNS, Germany

W23 **Fatigue damage in Ag nanowire networks**
Chongguan Liu, University of Manchester, United Kingdom

W24 **Graphene effect on mechanical response of copper film**
Farzaneh Bahrami, Université catholique de Louvain, IMMC,IMAP, Belgium

W25 **Hydrogen effects on nanomechanical behavior of additively manufactured 316L stainless steels**
Jeong-Min Park, Hanyang University, South Korea

W26 **Influence of annealing temperature on the mechanical properties of carbon supersaturated TaW coatings**
Stefan Fritze, Uppsala University, Sweden

W27 **Micro-nano scale characterization of thermally treated single basalt fibres**
Edoardo Rossi, Roma Tre University, Italy

W28 **The influence of reinforcing nano-particles on indentation size effect and microhardness of metallic materials**
Miriam Kupková, Slovak Academy of Sciences, Slovakia

W29 **Exploring size effects in copper-chromium-zirconium using indentation techniques and in-situ micro-pillar compression**
Alexandra J. Cackett, UKAEA, United Kingdom

W30 **In situ nanocompression tests in an environmental TEM to study plasticity of cerium oxides**
Rongrong Zhang, University of Lyon, INSA-Lyon, France

W31 **Highly-stretchable and water impermeable thermally-grown silicon dioxide thin film with wavy structures**
Na-Hyang Kim, UNIST, South Korea

W32 **Effect of anisotropic elasticity on dislocation pile-ups at grain boundaries**
Xiaolei Chen, Université de Lorraine, CNRS, Arts et Métiers ParisTech, France

W33 **Nano-mechanical behavior of ultra-stable amorphous metallic thin films**
Jeong-Hyun Woo, UNIST, South Korea

W34 **The impact of twin boundary migration on mechanical performance of magnesium**
Mohammadhadi Maghsoudi, Helmholtz-Zentrum Geesthacht, Germany

W35 **Effect on Nanoindentation in La2O3-reinforced W and W–V alloys produced by hot isostatic pressing**
Javier Martínez-Gómez, Universidad Internacional SEK, Spain

W36 **From mirco-mechanical properties to tribological performance**
Jona Engel, ETH Zurich, Switzerland

W37 **Influence of densification on the indentation cracking behaviour**
Karsten Durst, Technical University of Darmstadt, Germany

W38 **Identification of residual stress directionality using anisotropic indenter in instrumented indentation testing**
JunSang Lee, Seoul National University, South Korea

W39 **Measurement of Young's modulus of thin SmS films by Nanoindentation and surface acoustic wave**
Francois De-Luca, National Physical Laboratory, United Kingdom

W40 **Atomic arrangement and mechanical properties of chemical vapor deposited amorphous boron**
Jessica M. Maita, University of Connecticut, USA