Final Program

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Program
Nanomechanical Testing in Materials Research and Development V
October 4-9, 2015
Albufeira, Portugal
Conference Chair
Dr. Marc Legros
CEMES-CNRS
France
Grande Real Santa Eulalia Resort & Hotel Spa
Praia de Santa Eulalia
(Secondary road from Albufeira town to Olhos D'Agua village)
8200-916 Albufeira
Algarve / Portugal
Telephone +351 289 598 020
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October 9 – 15, 2005
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*Conference Chairs:*
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Carl McHargue, University of Tennessee, USA

**Nanomechanical Testing in Materials Research & Development II**
October 11 - 16, 2009
Barga, Italy
*Conference Chair:*
Mathias Goken, University Erlangen-Nurnberg, Germany

**Nanomechanical Testing in Materials Research & Development III**
October 9 – 14, 2011
Lanzarote, Canary Islands, Spain
*Conference Chair:*
Dr. Gerhard Dehm, University of Leoben, Austria

**Nanomechanical Testing in Materials Research & Development IV**
October 6 - 11, 2013
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*Conference Chair:*
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(Left) Surface of a lithium/polymer battery cathode; grid identifies indentation sites. (Right) Elastic modulus, in GPa, obtained via Express Test.
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**Nanoscale 3D X-ray microscopy from ZEISS.**

Compressive loading of a porous elastomer: Uncompressed (left), compressed (center), decompressed (right)

Scan here to download our tech note "*In Situ Observation of Mechanical Testing at the Nanoscale*” and get details on relevant conference talks.

www.zeiss.com/microscopy
Sunday, October 4, 2015

14:00 - 15:30  **Short Course: Digital Image Correlation**
Chris Eberl, Karlsruhe Institute of Technology and Marco Sebastiani, Roma TRE University, Italy

16:30 - 18:00  **Short Course: Fracture and adhesion - An introduction (with comments on size effects)**
Etienne Barthel, SIMM/ESPCI, France

17:00 - 19:00  Conference check-in

18:15 - 18:30  **Opening Remarks**
Conference Chair, Marc Legros, CEMES-CNRS, France, and ECI Technical Liaison, Ram Darolia

18:30 - 19:00  **Invited**
Measuring surface dislocation nucleation in defect-scarce nanostructures
Daniel S. Gianola, University of Pennsylvania, USA

19:00 - 20:00  Welcome Reception

20:00 - 21:30  Dinner

**NOTES**

- Technical Sessions will be held in Sala Real.
- Poster Sessions will be held in the Real Foyer.
- Most meals will be in the Restaurante do Real. Changes will be announced.
- The conference banquet on Thursday will be held in the Restaurante Santa Eulalia.
- Audiotaping, videotaping and photography of presentations are prohibited.
- Speakers – Please leave at least 5 minutes for questions and discussion.
- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.
- After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.
- Please do not smoke at any conference functions.
- Please write your name in the front of this program booklet so it can be returned if misplaced.
Monday, October 5, 2015

07:30 - 09:00 Breakfast Buffet

Invited

09:00 - 09:30 Grain size strengthening – Just another length-scale effect?  
Andy Bushby, Queen Mary University of London, United Kingdom

Session 1 - Chair M. Legros

09:30 - 09:50 Mechanical scaling behavior of nanoporous gold based on 3D structural analysis and indentation-based testing  
Erica T. Lilleodden, Helmholtz-Zentrum Geesthacht, Germany

09:50 - 10:10 A comprehensive study on the deformation behavior of ultra-fine grained and ultra-fine porous Au at elevated temperatures  
Alexander Leitner, Montanuniversität Leoben, Austria

10:10 - 10:30 Size effect on fracture toughness of gold thin films studied by bulge testing  
Eva Preiß, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany

10:30 - 11:00 Coffee Break / Networking

Invited

11:00 - 11:30 Probing grain boundary mechanisms by in-situ TEM  
Frédéric Mompiou, CEMES-CNRS, France

Session 2 - Chair K. Hemker

11:30 - 11:50 Interface fracture resistance of thin films at elevated temperatures  
Rafael Soler, Max-Planck-Institut für Eisenforschung, Germany

11:50 - 12:10 Characterization of mechanical behavior of nanocrystalline layer induced by SMAT using micro-pillar compression technique coupled with finite element analysis  
Yangcan Wu, University of Technology of Troyes, France

12:10 - 12:30 Fracture strength testing at the micron-scale on an ultra-fine grained W-Cr_10-Ti_2 alloy  
Moritz Lessmann, University of Manchester/Culham Centre for Fusion Energy, United Kingdom

12:30 - 12:50 High temperature mechanical properties of Ni-base superalloy and diffusion aluminide bond coating: An in-situ SEM nanoindentation study  
Sanjit Bhowmick, Hysitron, Inc., USA
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>13:00 - 14:30</td>
<td>Lunch Buffet</td>
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<tr>
<td>14:30 - 16:00</td>
<td>Free time / ad hoc sessions</td>
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<tr>
<td>16:00 - 16:30</td>
<td>Afternoon coffee / Networking</td>
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**Invited**

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<th>Time</th>
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<tr>
<td>16:30 - 17:00</td>
<td>Deformation mechanisms of twinned nanoparticles and nanowires</td>
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<tr>
<td></td>
<td>Erik Bitzek, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany</td>
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**Session 3 – Chair S. Van Petegem**

<table>
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<tr>
<th>Time</th>
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<tr>
<td>17:00 - 17:20</td>
<td>Free energy function of dislocation densities by large scale atomistic simulations</td>
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<td>Christoph Begau, Ruhr-Universität Bochum, Germany</td>
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<td>17:20 - 17:40</td>
<td>Size-dependent mechanical properties of crystalline nanoparticles</td>
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<td>Dan Mordehai, Technion, Israel</td>
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<td>17:40 - 18:10</td>
<td>Coffee Break / Networking</td>
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<tr>
<td>18:10 – 18:30</td>
<td>In-situ nanomechanical testing using X-ray microscopy</td>
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<td>William M. Harris, Carl Zeiss X-ray Microscopy, Inc., USA</td>
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**Invited**

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<th>Time</th>
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<tr>
<td>18:30 - 19:00</td>
<td>Insights into dislocation grain-boundary interaction by X-ray μLaue diffraction</td>
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<td>Christoph Kirchlechner, Max-Planck-Institute für Eisenforschung, Germany</td>
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<tr>
<td>19:00 - 19:30</td>
<td>Poster Preview 1 – Chairs: V. Maier, G. Pharr</td>
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<tr>
<td>19:45 - 21:00</td>
<td>Dinner</td>
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<tr>
<td>21:00 - 23:00</td>
<td>Poster Session and Social Hour</td>
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Tuesday, October 6, 2015

07:30 - 09:00  Breakfast Buffet

*Invited*

09:00 - 09:30  Thermally activated processes in materials probed by nanoindentation - challenges, solutions, and insights
Verena Maier, Austrian Academy of Sciences, Austria

*Session 4 – Chair C. Tromas*

09:30 - 09:50  Revealing dislocation structure around and underneath indentations in (001) strontium titanate single crystals at room temperature and 350° C
Karsten Durst, Technical University of Darmstadt, Germany

09:50 - 10:10  High temperature indentation creep and nanoindentation testing of superalloys and TiAl alloys
Mathias Göken, Friedrich-Alexander-University Erlangen-Nürnberg (FAU), Germany

10:10 - 10:30  Nanoindentation cartography in Al/Al-Cu-Fe composites: Correlation between chemical heterogeneities and mechanical properties
Christophe Tromas, Institut Pprime - Université de Poitiers, France

10:30 - 11:00  Coffee Break / Networking

*Invited*

11:00 - 11:30  About the plastic response of silicate glasses at the micronscale
Guillaume Kermouche, Ecole des Mines de Saint-Etienne, France

*Session 5 – Chair J. Molina-Aldareguia*

11:30 - 11:50  High-temperature small-scale fracture mechanics and plasticity of a hard-coating system
James P. Best, EMPA, Switzerland

11:50 - 12:10  Size effects and deformation mechanisms in diamond and silicon
Jeffrey M. Wheeler, ETH Zurich, Switzerland

12:10 - 12:30  Toward the understanding of the brittle to ductile transition at low size in silicon: Experiments and simulations
Sandrine Brochard, Institut Pprime, France

12:30 - 12:50  Variable temperature ultra-nanoindentation system: Elevated and cryogenic temperature measurements
Marcello Conte, Anton Paar TriTec SA/EMPA, Switzerland

12:50 - 14:30  Lunch Buffet

14:30 - 16:00  Free time / ad hoc sessions
16:00 - 16:30  Afternoon Coffee / Networking

**Invited**

16:30 - 17:00  From micro-cantilever testing to deformation patterning in HCP polycrystals
Angus Wilkinson, University of Oxford, United Kingdom

**Session 6 – Chair F. Mompiou**

17:00 - 17:20  Boundary motion coupled with tensile and compressive deformation: TEM observation of twinning-like lattice reorientation in Mg micropillars
Evan Ma, Johns Hopkins University, USA

17:20 - 17:40  Understanding rate sensitivity in dual phase titanium alloys – a combined experimental and computational micro-pillar study
Tea-Sung (Terry) Jun, Imperial College London, United Kingdom

17:40 - 18:10  Coffee Break / Networking

18:10 – 18:30  Mechanisms of plastic deformation of magnesium matrix nanocomposites elaborated by friction stir processing
Camila Mallmann, SIMAP-GPM2, France

**Invited**

18:30 - 19:00  Multiscale characterization of the micromechanics of pure Mg
Jon Molina-Aldareguia, IMDEA Materials Institute, Spain

19:00-19:30  An improved micromechanical method for investigating the mechanical properties of poly-silicon membranes
Krish Narain, Keysight Technologies, Böblingen, Germany

20:00  Dinner on your own
Wednesday, October 7, 2015

07:30 - 09:00  Breakfast Buffet

Session 7 – Chair E. Ma

09:30 - 09:50  Importance of dynamics in small scale mechanical testing: Fast constant strain rate and ballistic testing
   Warren Oliver, Nanomechanics, Inc., USA

09:50 - 10:10  Effect of hydrogen on the nucleation and motion of dislocations
   Mohammad Zamanzade, Saarland University, Germany

10:10 - 10:30  Effect of hydriding on nanoscale plasticity mechanisms in nanocrystalline palladium thin films
   Behnam Aminahmadi, University of Antwerp- EMAT, Belgium

10:30 - 11:00  Coffee Break / Networking

Invited

11:00 - 11:30  In-situ observation of the onset of plastic deformation by prismatic loop emission
   Sang Ho Oh, POSTECH, South Korea

Session 8 – Chair A. Bushby

11:30 - 11:50  In-situ micropillar compression of bone shows remarkable strength and ductility but no damage
   Jakob Schwiedrzik, EMPA Swiss Federal Laboratory for Materials Science and Technology, Switzerland

11:50 - 12:10  Nanoindentation-based mechanical spectroscopy of wood cell walls
   Joseph Jakes, USDA Forest Service, USA

12:10 - 12:30  How to perform nanoindentation in difficult conditions? Applications to ultra soft materials and temperature environment
   Michel Fajfrowski, Michalex, France

12:30 - 12:50  Performance of a single interface in a biocomposite structure measured using microcantilever modulation experiment
   Igor Zlotnikov, Max Planck Institute of Colloids and Interfaces, Germany

13:00 - 19:00  Boxed Lunch and excursion

19:00 - 20:00  Poster Preview 2 – Chairs: V. Maier, G. Pharr

20:00 - 21:30  Dinner

21:30 - 23:30  Poster Session and Social Hour
Thursday, October 8, 2015

07:30 - 09:00  Breakfast Buffet

Invited

09:00 - 09:30  Mechanical properties of lithiated silicon: A candidate electrode for lithium ion batteries
William D. Nix, Stanford University, USA

Session 9 – Chair D. Gianola

09:30 - 09:50  Nanoindentation induced deformation anisotropy in WC, β-Si₃N₄ and ZrB₂ crystals
Tamás Csanádi, Slovak Academy of Sciences, Slovakia

09:50 - 10:10  Hydrogen effects on nanoindentation behavior of metallic glass ribbons
Yakai Zhao, Hanyang University, South Korea

10:10 - 10:30  In-situ strain softening and strain hardening of natural geomaterials on the microscale
Younane Abousleiman, University of Oklahoma, USA

10:30 - 11:00  Coffee Break / Networking

Invited

11:00 - 11:30  Probing the initial stages of plasticity with nanoindentation
Easo George, Ruhr University Bochum, Germany

Session 10 – Chair J. Michler

11:30 - 11:50  Underpinning and benchmarking multi-scale models with micro- and nano-scale experiments
Kevin Hemker, Johns Hopkins University, USA

11:50 - 12:10  Anisotropy of ultrafine-lamellar and nanolamellar pearlitic structures revealed by in-situ micro compression testing
Marlene Kapp, Erich Schmid Institute of Materials Science, Austria

12:10 - 12:30  Nano-scale behavior of irradiated nano-structured alloys
David E.J Armstrong, University of Oxford, United Kingdom

12:30 - 12:50  Probing nanoscale damage gradients in irradiated materials with spherical nanoindentation
Nathan Mara, Los Alamos National Laboratory, USA
Thursday, October 8, 2015 (continued)

13:00 - 14:30  Lunch Buffet

14:30 - 16:00  Free time / ad hoc sessions

**Invited**

16:30 - 17:00  **Length-scale dependent deformation behavior of nanolayered Cu-based micropillars**
               Gang Liu, Xi'an Jiaotong University, China

**Session 11 - Chair C. Kirchlechner**

17:00 - 17:20  **Transition in plastic deformation of nanolayered thin films: Role of interfaces and temperature**
               Rejin Raghavan, Max-Planck-Institut für Eisenforschung, Germany

17:20 – 17:50  Coffee Break / Networking

17:50 - 18:10  **How residual stresses affect the fracture properties of layered thin films**
               Daniel Kiener, Montanuniversität Leoben, Austria

18:10 - 18:30  **In-situ nano-mechanical tests in the light of μLaue diffraction**
               Thomas W. Cornelius, CNRS, IM2NP (UMR 7334), France

**Invited**

18:30 - 19:00  **In-situ mechanical testing at the synchrotron**
               Steven Van Petegem, PSI, Switzerland

20:00 - 22:00  Conference Banquet
07:30 - 09:00 Breakfast Buffet

Invited
09:00 - 09:30 Cracking in brittle materials during nanoindentation: New insights gained from cohesive zone finite element modeling
George M. Pharr, University of Tennessee and Oak Ridge National Laboratory, USA

Session 12 - Chair E. George
09:30 - 09:50 Extraction of crystal plasticity parameters of IN718 using high temperature micro-compression
Bin Gan, IMDEA Materials Institute, Spain

09:50 - 10:10 Fracture toughness measurement with microscopic chevron-notched specimens
Goran Zagar, École Polytechnique Fédérale de Lausanne, Switzerland

10:10 - 10:30 In-situ fracture tests of brittle materials at the microscale
Giorgio Sernicola, Imperial College London, United Kingdom

10:30 - 11:00 Coffee Break / Networking

Invited
11:00 - 11:30 Some recent advances in nanomechanical testing: High strain rates, variable temperatures, fatigue and stress relaxation, combinatorial experimentation
Johann Michler, EMPA, Switzerland

Session 13 – Chair G. Liu
11:30 - 11:50 Limits of determining stress states by FIB method due to Ga implantation
Diana Courty, ETH Zurich, Switzerland

11:50 - 12:10 Studying fatigue damage evolution at grain boundaries using micro mechanical test methods
Christian Motz, Saarland University, Germany

12:10 - 12:30 Accessing the phase transformation and deformation behavior of metastable stainless steels through cyclic nanoindentation
Ina Sapezanskaia, UPC, Spain

12:30 - 12:50 Thermo-mechanical characterization of polymer samples using nanoindentation - From bulk characterization to thin film properties
Dennis Bedorf, SURFACE, Germany

13:00 - 14:00 Lunch Buffet and departures
1. **A new dynamic module for in-situ nanomechanical testing at high strain rate**  
Gaylord Guillonneau, Ecole Centrale de Lyon/EMPA, Switzerland

2. **High temperature nanoindentation testing of amorphous silicon carbonitride thin films**  
Radim Ctvrtlik, Palacky University, Czech Republic

3. **Deformation behavior of bulk metallic glasses produced via Severe Plastic Deformation and the influence of a second phase**  
Lisa Kraemer, Austrian Academy of Sciences, Austria

4. **The measurement of viscosity of ultrathin polymer films.**  
Dariusz Jarząbek, Institute of Fundamental Technological Research, Poland

5. **The measurement of the adhesion force between ceramic particles and metal matrix in ceramic reinforced-metal matrix composites.**  
Dariusz Jarząbek, Institute of Fundamental Technological Research, Poland

6. **Using in-situ microLaue diffraction to understand plasticity in MgO**  
Ayan Bhowmik, Imperial College London, United Kingdom

7. **A comparison of nanotribology and nanoindentation**  
Steffen Brinckmann, Max-Planck-Institut für Eisenforschung, Germany

8. **Orientation dependence of dislocation transmission through twin-boundaries studied by in situ µLaue diffraction**  
Nataliya Malyar, Max-Planck-Institut für Eisenforschung GmbH, Germany

9. **Fracture behavior of high strength pearlitic steel wires**  
Bernhard Völker, Montanuniversität Leoben, Austria

10. **Quantification of mechanical properties gradient by nano-indentation and micro-compression testing on mechanically-induced transformed surfaces**  
David Tumbajoy Spinel, Ecole des Mines de Saint-Etienne, LGF UMR5307 CNRS, France

11. **Dislocation dipoles and the nucleation of cracks in silicon nanopillars**  
Jacques Rabier, DPMM, Institut P’, CNRS-Université de Poitiers-ENSMA, France

12. **Combining in situ tensile testing and orientation microscopy in the SEM: A MEMS based setup for studying time dependent deformation of thin films by TKD and STEM**  
Jan Philipp Liebig, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

13. **Development and application of an in-situ nanoindenter coupled with electrical measurements**  
Solène Comby, University of Grenoble Alpes/SIMaP lab, France
14. Comparison of in situ micromechanical time dependent plasticity techniques: micropillar compression, nanoindentation and micro-tensile tests
   Juri Wehrs, EMPA, Switzerland

15. EBSD investigation of microstructure refinement from impact-based surface treatments
   Xavier Maeder, EMPA, Swiss Federal Laboratories for Materials Science and Technology, Switzerland

16. Investigating the plastic deformation of Molybdenum from -196°C to 950°C using nano- and micro-indentation
   Katherine Plummer, Oxford University, United Kingdom

17. Ultra small scale high cycle fatigue testing by micro-cantilevers
   Jicheng Gong, University of Oxford, United Kingdom

18. A direct comparison of high temperature nanoindentation and tensile creep measurements for aluminum
   Warren Oliver, Nanomechanics Inc., USA

19. Nanoindentation, micropillar compression and nanoscratch testing of ZrB2 grains
   Ján Dusza, Slovak Academy of Sciences, Slovakia

20. Study of sub-surface ion-implanted hardened layers with depth-sensing indentation
    Alexey Useinov, Technological Institute for Superhard and Novel Carbon Materials, Russia

21. An Improved method for point deflection measurements on rectangular membranes
    Benoit Merle, University Erlangen-Nürnberg (FAU), Germany

22. Annealing effect on coherent-incoherent interface tri-component nanoscale metallic multilayer thin films
    Aidan A. Taylor, EMPA, Switzerland

23. Obtaining mechanical properties of superelastic materials from microindentation data
    Dmitry Zhuk, National Research Nuclear University «MEPhI», Russia

24. Mechanical response of face-centered cubic metallic nanospheres under uniaxial compression
    Selim Bel Haj Salah, Institut Pprime, France

25. Micromechanical behavior of thermal barrier coatings after isothermal oxidation
    Carlos Serna, Universidad Nacional de Colombia, Colombia

26. Effects of lithiation on the fracture toughness and mechanical properties of LiMn2O4 cathode battery materials
    Marco Sebastiani, Roma TRE University, Italy

27. Chemomechanical effects in thin film and bulk oxides
    Steve Bull, Newcastle University, United Kingdom
28. Influence of temperature on the deformation behavior of single-and bi-crystal microbending beams
   Jorge Rafael Velayarce, Saarland University, Germany

29. Irradiation-induced ductilization in the Zr-based metallic glasses
   Jaewon Heo, Korea Advanced Institute of Science and Technology, South Korea

30. Nanomechanical testing of ODS steels irradiated with 1 MeV/amu heavy ions
   Katerina Kornieieva, Joint Institute for Nuclear Research (JINR), Russia

31. Can it be measured - Fracture Toughness from Repetitive Nano-impacts Test?
   Emilio Frutos Torres, Czech Technical University Prague, Czech Republic

32. Environmentally controlled modulus mapping of biocomposite materials employing the concept of effective mass
   Bernd Bayerlein, Max Planck Institute of Colloids and Interfaces, Germany

33. Elevated temperature microcompression transient testing of nanocrystalline materials: Creep, stress relaxation and strain rate jump tests
   Gaurav Mohanty, EMPA, Switzerland

34. Combining nanoindentation with complementary techniques for mechanical and structural characterization of ultra uow-k (ULK) thin films
   André Clausner, Fraunhofer IKTS-MD, Germany

35. A new technique to measure the true contact area using nanoindentation testing
   Gaylord Guillonneau, Ecole Centrale de Lyon/EMPA, Switzerland

36. Nanotwin governed toughening mechanism in hierarchically structured materials
   Sungmin Moon, POSTECH, South Korea

37. Fracture behavior of brittle ceramics at the nanoscale
   Dahye Shin, KAIST, South Korea

38. Numerical simulations of twin formation and extension in thin face-centred cubic metallic films
   Sandrine Brochard, Institut Pprime, France

39. Layer orientation and size effects on micropillar compression of Al/SiC nanolaminates
   Lingwei Yang, IMDEA Materials Institute, Spain

40. Microscopic three-point bending test to probe plate-like silicon particles from AlSi alloys
   Martin G. Mueller, École Polytechnique Fédérale de Lausanne, Switzerland

41. Measuring the fracture toughness of Titanium Carbide reinforcements at the micron-scale
   Lionel Michelet, École Polytechnique Fédérale de Lausanne, Switzerland
42. **Size dependent deformation of beta brass**  
Oscar Torrents Abad, INM - Leibniz Institute for New Materials, Germany

43. **A universal characterization method on viscous materials using depth sensing indentation**  
Abdul Shah, University Of Central Lancashire, United Kingdom

44. **Thermally activated deformation in cast aluminium microwires**  
Suzanne Verheyden, Ecole Polytechnique Fédérale de Lausanne, Switzerland

45. **Measuring the strength of brittle microscopic spheres by means of compression tests**  
Václav Pejchal, École Polytechnique Fédérale de Lausanne, Switzerland

46. **Indentation behavior of superelastic hard carbon**  
Olga Chernogorova, Baikov Institute of Metallurgy and Materials Science (IMET), Russia

47. **Micromechanical testing of ion-irradiated ferritic/martensitic steels**  
Anna Kareer, University of Oxford, United Kingdom

48. **Orientation-depedent mechanical behaviour of electrodeposited copper with nanoscale twins**  
Maxime Mieszala, EMPA, Swiss Federal Laboratories for Materials Science and Technology, Switzerland

49. **Deformation and fatigue behavior measurement of thin films undergoing thermo-mechanical loading at high strain rates – A novel test setup**  
Johannes Zechner, KAI GmbH, Austria

50. **Length-scale enabled quantification of surface damage by indentation: A case study separating the components of contact response due to indentation size, residual stress, and damage caused by surface machining and grinding**  
Nigel Jennett, Coventry University, United Kingdom

51. **High-temperature fracture test using chevron-notched tungsten microcantilevers**  
Bo-Shiuan Li, University of Oxford, United Kingdom

52. **Fundamental nanomechanic investigations using combinatorial deposition techniques**  
Rachel Schoeppner, EMPA, Switzerland

53. **Diffusion-based deformation in elevated temperature micropillar compression of Mg-Nb multilayers**  
Keith B. Thomas, EMPA, Switzerland

54. **Mechanical and optical properties of silicon nitride thin films on glass**  
Lukas Simurka, ŞIŞECAM Science and Technology Center, Turkey

55. **Pushing the envelope for high temperature nanoindentation measurements**  
Marcello Conte, Anton Paar/EMPA, Switzerland
56. **A new designed 1200 °C high temperature instrumented nano indentation probe to investigate the mechanical behavior of materials**
   Michel Fajrowski, Michalex, France

57. **Identification of in situ lignin strength based on micropillar compression and micromechanical modeling of wood cell walls**
   Johann Jakob Schwiedrzik, EMPA Swiss Federal Laboratories for Materials Science and Technology, Switzerland

58. **In situ high temperature TEM tensile testing of pseudo single crystalline Si for PhotoVoltaic applications**
   Arthur Lantreibecq, CEMES-CNRS, France

59. **High-temperature nano-impact testing of a hard-coating system**
   James P. Best, EMPA, Switzerland

60. **Testing of nanostructure within active carbons particles**
   Bronislaw Buczek, AGH-University of Science and Technology, Poland