Program

Nanomechanical Testing in Materials Research and Development IV

October 6-11, 2013
Olhão (Algarve), Portugal

Conference Chair:
Dr. Johann Michler
Mechanics of Materials and Nanostructures Laboratory, EMPA - Materials Science & Technology, Thun, Switzerland
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Synton-MDP Inc.
**Sunday, October 6, 2013**

16:00 – 18:30 Check-in (Lobby Praias)

18:30 – 19:30 Opening Reception

19:30 – 19:45 Welcome
   Conference Chair: Johann Michler
   ECI Technical Liaison: Ram Darolia

19:45 – 20:15 Plenary:
   *In situ* TEM and small-scale mechanical testing: The perfect combination?
   Marc Legros
   CEMES-CNRS, France

20:30 Dinner

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**NOTES**

- Audiotaping, videotaping and photography of presentations are strictly prohibited.
- Please do not smoke at any conference functions.
- Turn your mobile phones to vibrate or off during technical sessions.
- The ECI office will be located in the Executive Lounge.
- Be sure to check your contact information on the Participant List in this program and make any corrections to your name/contact information online. A corrected copy will be sent to all participants after the conference.
- Speakers – Please leave at least 5 minutes for questions and discussion. Be available for discussion during meals and social periods.
Monday, October 7, 2013

07:30 – 09:00 Breakfast buffet

09:00 – 13:20 **In-situ Testing**
Chair: Rejin Raghavan, EMPA, Switzerland and Max-Planck-Institute for Iron Research, Germany

09:00 – 09:30 **Invited:** In situ mechanical testing in electron microscopes to study small scale deformation mechanisms
Daniel Kiener, University of Leoben, Austria

09:30 – 09:50 **X-ray µLaue: A novel view on fatigue damage at the micron scale**
Christoph Kirchlechner, Max-Planck-Institute for Iron Research, Germany

09:50 – 10:10 **Flaw-driven failure in nanocrystalline Pt nanostructures**
Wendy Gu, California Institute of Technology, USA

10:10 – 10:30 Critical-temperature/ Peierls-stress dependent size effects in body centered cubic nanopillars
Seung Min Han, Korea Advanced Institute of Science and Technology, South Korea

10:30 – 11:00 Coffee break

11:00 – 11:20 **In-situ squared: Multi property thin film measurements during straining**
Megan Cordill, Erich Schmid Institute, Austria

11:20 – 11:50 **Invited:** Probing deformation phenomena at small length scales
Gerhard Dehm, Max-Planck-Institut für Eisenforschung, Germany

11:50 – 12:10 **Synchrotron-based in situ mechanical testing of nanocrystalline metals and alloys**
Patric A. Gruber, Karlsruhe Institute of Technology, Germany

12:10 – 12:30 **Ex-situ and in-situ study of the plastic deformation of InSb micropillars under coherent x-rays**
Ludovic Thilly, University of Poitiers, France

13:00 – 14:00 Lunch

14:00 – 16:00 Free time /ad hoc sessions

16:00 – 16:30 Afternoon coffee and snacks
### Monday, October 7, 2013 (continued)

<table>
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<th>Event</th>
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<tr>
<td>16:30 – 19:00</td>
<td><strong>In-situ / Small Scale Testing</strong>&lt;br&gt;Chair: Daniel Kiener, University of Leoben, Austria</td>
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<td>16:30 – 17:00</td>
<td><strong>Invited:</strong> Dislocation-nucleation mediated deformation in single crystal gold nanowires&lt;br&gt;Cynthia A. Volkert, University of Göttingen, Germany</td>
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<td>17:00 – 17:20</td>
<td><strong>TEM and AFM study of the elementary deformation mechanisms induced by nanoindentation in the MAX phase Ti₃AlC₂</strong>&lt;br&gt;Christophe Tromas, Institut Pprime – University of Poitiers, France</td>
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<td>17:20 – 17:50</td>
<td><strong>Invited:</strong> In-situ Laue diffraction during micro-compression: slip in bcc metals&lt;br&gt;Helena Van Swygenhoven, Paul Scherrer Institute / EPFL, Switzerland</td>
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<td>17:50 – 18:10</td>
<td><strong>Deformation localization and strain hardening during micro shear experiments on gold in the scanning electron microscope</strong>&lt;br&gt;Steffen Brinckmann, Max Planck Institute for Iron Research, Germany</td>
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<tr>
<td>18:10 – 18:30</td>
<td><strong>Using small scale testing to extract the impact of structural defects on plasticity mechanisms</strong>&lt;br&gt;David Bahr, Purdue University, USA</td>
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<td>19:00 – 19:30</td>
<td><strong>Poster Session I: Preview</strong>&lt;br&gt;Chair: George Pharr</td>
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<td>19:30 – 20:45</td>
<td>Dinner</td>
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<td>20:45 – 23:30</td>
<td><strong>Poster Session I</strong></td>
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Tuesday, October 8, 2013

07:30 – 09:00 Breakfast buffet

09:00 – 13:20 **Variable temperature testing and Indentation**  
Chair: Bill Clegg, University of Cambridge, UK

09:00 – 09:30 **Invited:** *In situ* micro-thermomechanical testing: A general tool for investigating plasticity  
Jeffrey Wheeler, EMPA - Materials Science & Technology, Switzerland

09:30 – 09:50 Strain-rate sensitivity in bcc-metals temperature and microstructural influences  
Verena Maier, University of Leoben, Austria / FAU Erlangen-Nürnberg, Germany

09:50 – 10:20 **Invited:** High temperature mechanical behavior of nanoscale multilayers  
Jon Molina, IMDEA Materials Institute, Spain

10:20 – 10:50 **Invited:** Nano and micro-mechanical testing of reactive metals in vacuum  
David Armstrong, University of Oxford, UK

10:50 – 11:20 Coffee break

11:20 – 11:50 **Invited:** Extracting elastic properties of coatings on stiff and compliant substrates by nanoindentation  
Steve Bull, Newcastle University, UK

11:50 – 12:10 Plasticity size effects: when is a micro-pillar like a nanoindentation?  
Andy Bushby, Queen Mary University of London, UK

12:10 – 12:40 **Invited:** Temperature and strain-rate dependent dislocation nucleation in Pd nanowhiskers  
Dan Gianola, University of Pennsylvania, USA

12:40 – 13:00 Critical appraisal of a procedure for extracting primary and secondary creep parameters from nanoindentation data  
Bill Clyne, University of Cambridge, UK

13:00 – 13:20 **Orientation informed indentation of magnesium on different length scales**  
Claudio Zambaldi, Max-Planck-Institute for Iron Research, Germany

13:30 – 14:00 Lunch

14:00 – 16:00 Free time /ad hoc sessions

16:00 – 16:30 Afternoon coffee with snacks
<table>
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<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker(s)</th>
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<tr>
<td>16:30 – 20:10</td>
<td>New Instrumentations and Developments</td>
<td>Chair: Johann Michler, EMPA, Switzerland</td>
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<td>16:30 – 16:50</td>
<td>New Directions at Nanomechanics Inc.</td>
<td>Warren Oliver, Nanomechanics, Inc., USA</td>
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<td>16:50 – 17:10</td>
<td>Measuring Adhesion, Compression, and Tensile Forces in the SEM</td>
<td>Stephan Kleindiek, Kleindiek Nanotechnik GmbH, Germany</td>
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<tr>
<td>17:10 – 17:30</td>
<td>The right nanoindenter tip design</td>
<td>Simon Hostettler, Synton-MDP LTD, Switzerland</td>
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<td>17:30 – 17:50</td>
<td>Evaluation of temperature changes in the periphery of nanoindenter measurements - Stabilization measures and strategies</td>
<td>Dennis Bedorf, Surface &amp; Surface systems+technology GmbH &amp; Co. KG, Germany</td>
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<tr>
<td>17:50 – 18:10</td>
<td>Instrumentation for displacement controlled, cyclic, elevated temperature, nanomechanical testing</td>
<td>Jean-Marc Breguet, Alemnis GmbH / EMPA, Switzerland</td>
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<tr>
<td>18:10 – 18:30</td>
<td>Nanoindentation “Made in Germany” The Helmut Fischer Group</td>
<td>Dr. Tanja Haas, Helmut Fischer GmbH, Germany</td>
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<td>18:30 – 18:50</td>
<td>Recent developments on 1000 °C indentation machine</td>
<td>Michel Fajfrowski, Michalex, France</td>
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<td>18:50 – 19:10</td>
<td>Vacuum nanomechanics – progress towards 1000 degrees C</td>
<td>Ben Beake, MicroMaterials Ltd., UK</td>
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<tr>
<td>19:10 – 19:30</td>
<td>Evolution of instrumentation for nano mechanical testing: Indentation and scratch testers, new bioindenter</td>
<td>Philippe Kempe, CSM Instruments SA, Switzerland</td>
</tr>
<tr>
<td>19:30 – 19:50</td>
<td>Express test: Evaluation and application of a novel technique for rapid acquisition and mapping of accurate mechanical properties</td>
<td>Holger Pfaff, Agilent Technologies GmbH, Germany</td>
</tr>
<tr>
<td>19:50 – 20:10</td>
<td>Innovations for nanoindentation in challenging environments</td>
<td>Douglas Stauffer, Hysitron, USA</td>
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**Free evening / Dinner on your own**
**Wednesday, October 9, 2013**

07:30 – 09:00  Breakfast buffet

09:00 – 13:00  **Mechanics of plasticity and fracture**
Chair: Mathias Göken, University Erlangen-Nürnberg, Germany

09:00 – 09:30  **Invited: Fracture and fatigue testing at the nano-scale**
Oliver Kraft, Karlsruhe Institute of Technology, Germany

09:30 – 09:50  **Understanding low temperature plasticity in brittle intermetallics - Insights from nanomechanical testing**
Sandra Korte, RWTH Aachen University / FAU Erlangen-Nürnberg, Germany

09:50 – 10:20  **Invited: Deformation of complex crystals**
Bill Clegg, University of Cambridge, UK

10:20 – 10:50  Coffee break

10:50 – 11:20  **Invited: A more unified view on size effects in plasticity**
Erica Lilleodden, Helmholtz-Zentrum Geesthacht, Germany

11:20 – 11:40  **Plasticity of silica at the micron-scale: from nanomechanical testing to multiscale modeling**
Guillaume Kermouche, CNRS, France

11:40 – 12:10  **Invited: Strength of small materials under vibrations**
Alfonso Ngan, University of Hong Kong, P. R. China

12:10 – 12:30  **Small scale plasticity: Insights into displacement jump velocities**
Robert Maass, University of Göttingen, Germany

12:30 – 12:50  **Mechanical properties of FCC metallic nanowires: A comparative simulation study of single-crystalline and fivefold-twinned structures**
Erik Bitzek, FAU Erlangen-Nürnberg, Germany

12:50 – 13:10  **Crystal plasticity modeling of nanoindentation near a grain boundary in alpha-titanium**
David Mercier, Max-Planck-Institute for Iron Research, Germany

13:10 – 18:30  Boxed lunch and excursion

18:45 – 19:15  **Poster Session II: Preview**
Chair: George Pharr

19:15 – 20:30  Dinner

21:00 – 23:30  **Poster Session II and Social Hour**
Thursday, October 10, 2013

07:30 – 09:00  Breakfast buffet

09:00 – 12:50  **Mechanics of Thin Films**
Chair: David Bahr, Purdue University, USA

09:00 – 09:30  **Invited: Mechanical and thermal stability of nanotwinned Alloys**
Andrea Hodge, University of Southern California, USA

09:30 – 09:50  From telephone cord buckles to branches the relation between adhesion, residual stresses and morphology in thin film instabilities
Etienne Barthel, CNRS / Saint-Gobain UMR125, France

09:50 – 10:20  **Invited: Micro-cantilever tests as tools to support the development of high temperature materials and coatings**
Mathias Göken, FAU Erlangen-Nürnberg, Germany

10:20 – 10:40  **A new method to investigate fracture toughness in thin ceramic films**
Marco Sebastiani, University of Rome "Roma TRE", Italy

10:40 – 11:10  Coffee break

11:10 – 11:40  **Invited: In-situ fracture testing of graded Pt-Ni-Al bond coats in a stable clamped beam geometry**
Vikram Jayaram, Indian Institute of Science, India

11:40 – 12:00  **A micro double cantilever beam method to measure the fracture toughness of hard coatings**
Shiyu Liu, University of Cambridge, UK

12:00 – 12:20  **The deformation and fracture mechanisms of thin freestanding gold films studied by bulge tests**
Benoit Merle, FAU Erlangen-Nürnberg, Germany

12:20 – 12:50  **Invited: New methods to obtained better data from indentations measurements**
Jean-Luc Loubet, CNRS, France

13:00 – 14:00  Lunch

14:00 – 16:00  Free time /ad hoc sessions

16:00 – 16:30  Afternoon coffee and snacks
Thursday, October 10, 2013 (continued)

16:30 – 18:40 **Deformation mechanisms**
Chair: Cynthia Volkert, University of Göttingen, Germany

16:30 – 17:00 Invited: **Size effect or no size effect - that is the question?**
Ralph Spolenak, ETH, Switzerland

17:00 – 17:20 Study by AFM and EBSD of plastic deformation mechanisms induced by nanoindentation in a hardmetal binder-like cobalt allot
Joan Josep Roa, CIEFMA-Polytechnic University of Catalunya, Spain

17:20 – 17:50 Invited: **Plasticity in small dimensions and the influence of defect structure, boundaries and environment**
Christian Motz, Saarland University, Germany

17:50 – 18:20 Invited: **New indentation testing approaches for studying deformation mechanism in SX and nanocrystalline materials**
Karsten Durst, University of Erlangen-Nürnberg, Germany

18:20 – 19:00 Short Break

19:00 – 20:00 Reception

20:00 – 23:30 Conference Banquet
Friday, October 11, 2013

07:30 – 09:00 Breakfast buffet

09:00 – 11:20 **Combinatorial synthesis, Analysis and Architectural design of materials**
Chair: Ralph Spolenak, ETH, Switzerland

09:00 – 09:30 **Invited: Mechanics and physics of nano-solids: from strength and fracture to hierarchical design of architected materials through in-situ experiments**
Julia Greer, California Institute of Technology, USA

09:30 – 09:50 **Approaches to strengthen bulk metallic glasses**
Oliver Franke, University of Southern California, USA

09:50 – 10:20 **Invited: SEM-in situ testing of nanolaminates**
William Mook, Los Alamos National Laboratory, USA

10:20 – 10:50 Coffee break

10:50 – 11:10 **Integrated in-situ experiments full field crystal plasticity simulations to analyze stress strain partitioning in multi-phase alloys**
Cemal Cem Tasan, Max-Planck Institute for Iron Research, Germany

11:10 – 11:30 **Time-dependent mechanical-electrical coupled behavior of single crystal ZnO nanorods**
Yong-Jae Kim, Hanyang University, Korea

11:30 – 11:50 **Super-plastic flow of confined nanocrystalline Cu**
Rejin Raghavan, EMPA

11:50 – 13:00 General Discussion (Optional)

13:00 – 14:30 Lunch and Departure
Poster List

1. **Express test- evaluation and application of a novel technique for rapid acquisition and mapping of accurate mechanical properties**  
   Holger Pfaff, Agilent Technologies

2. **Mechanical properties of silicon oxide coatings deposited by plasma enhanced CVD and assessed by instrumented nanoindentation**  
   Jon Arrikaberri, Asociación de la Industria de Navarra

3. **Fabrication and deformation of three-dimensional biomimetic ceramic nano-architected materials**  
   Lucas R. Meza, California Institute of Technology

4. **Limitations of a common method for extraction of the creep stress exponent from indentation data**  
   James Dean, Cambridge University

5. **Hardness of finely dispersed carbides in iron-based hard alloys**  
   Alexandra Yulinova, Chemnitz University of Technology

6. **New method for mechanical characterization of viscoelastic materials using a modified spherical nanoindenter**  
   Philippe Kempe, CSM Instruments

7. **Hydrogen effect on dislocation nucleation in a ferritic alloy Fe-15Cr as observed per nanoindentation**  
   Guillaume Kermouche, Ecole Des Mines de Saint-Etienne

8. **Measuring the stress-strain curves of materials using repeated micro-impact testing**  
   G. Kermouche, Ecole Des Mines de Saint-Etienne

9. **A new method to measure the mechanical properties of very thin top layers by nanoindentation**  
   Gaylord Guillonneau, Ecole Nationale d'Ingénieurs de Saint-Etienne

10. **Cast aluminium microwires**  
    Jérôme Krebs, Ecole Polytechnique Fédérale de Lausanne

11. **Combinatorial experimentation for nanomechanical characterization: Elevated temperature nanoindentation testing of composition gradients**  
    Gaurav Mohanty, EMPA

12. **In situ compression testing of miniaturized Cu samples with grain boundaries**  
    Peter J. Imrich, Erich Schmid Institute of Materials Science

13. **Alloy development of TI-based thin films for microstructural stability mechanical properties and microstructural analysis**  
    Diana Courty, ETH Zurich

14. **Size-dependent plasticity in ionic crystal systems: The influence of temperature, orientation and doping level**  
    Yu Zou, ETH Zurich
15. **Pillar compression testing of low stacking fault energy FCC alloys**
Matthias Schamel, ETH Zurich

16. **Nanoindentation and deformation of γ-Mg17Al12 at high temperatures**
Harshal Mathur, FAU Erlangen-Nürnberg

17. **Investigation of the temperature dependence of polymeric materials with nanoindentation**
Tanja Haas, Helmut Fischer GmbH Institut für Elektronik und Messtechnik

18. **Long-term creep behaviour with the instrumented indentation test**
Gottfried Bosch, Helmut Fischer GmbH Institut für Elektronik und Messtechnik

19. **Thermal expansion and steady state creep study in a TSV-structure**
Jaroslav Lukes, Hysitron, Inc.

20. **In situ electromechanical study of nanowires**
Douglas Stauffer, Hysitron, Inc.

21. **High-temporal-resolution analysis of nanoindentation-induced pop-ins in metals**
Douglas Stauffer, Hysitron, Inc.

22. **Time and temperature dependent mechanical properties of materials at nanometer length scale**
Douglas Stauffer, Hysitron, Inc.

23. **Indenter dependent behavior of the Zr-based bulk metallic glass**
Hu Huang, Jilin University

24. **In situ characterization of stress-coupled grain boundary migration in nanocrystalline metals**
Paul Rottmann, Johns Hopkins University

25. **Nanoindentation and compression testing of silver nanowires on substrate**
Jae Hyun Kim, KAIST

26. **Methodology of stress measurement in copper and silicon around through-silicon via by using nanoindentation and micro raman spectroscopy for advanced semiconductor interconnects**
Jae Hyun Kim, KAIST

27. **Size and orientation dependent deformation behavior of a dual phase steel**
Moritz Wenk, Karlsruhe Institute of Technology

28. **Deformation behavior of copper thin films during nanoimprinting**
Anke Schachtsiek, Karlsruhe Institute of Technology

29. **Mechanical and electrical integrity of printed and evaporated silver films on compliant substrates**
Thomas Haas, Karlsruhe Institute of Technology

30. **Mechanical testing of the interface between different metallization layers on annealed borophosphosilicate glass**
Bernhard Völker, Kompetenzzentrum Automobil- und Industrie-Elektronik GmbH
31. **Influence of microstructure on thermo-mechanical fatigue of Cu films on substrates**
   Walther Heinz, Kompetenzzentrum Automobil- und Industrie-Elektronik GmbH

32. **Elastic modulus mapping of multilayered bouligand chitin structure**
   Igor Zlotnikov, Max Planck Institute of Colloids and Interfaces

33. **Nanomechanical characterization of the prismatic layer in the mollusc shell pinna nobilis**
   Bernd Bayerlein, Max Planck Institute of Colloids and Interfaces

34. **Dislocation emission from short penny-shaped cracks: A study using a multiscale model of atomistic and dislocation dynamics**
   Steffen Brinckmann, Max-Planck-Institut für Eisenforschung GmbH

35. **The mechanical and adhesion behavior of a Cr interlayer between Cu and polyimide**
   Vera M. Marx, Max-Planck-Institut für Eisenforschung GmbH

36. **Combining micromechanics with microstructural evolution in lead-free solder**
   Bastian Philipp, Max-Planck-Institut für Eisenforschung GmbH & Materials Center Leoben GmbH

37. **The influence of humidity and temperature on the time-dependent response of viscoelastic materials during nanoindentation**
   Ben D. Beake, Micro Materials Ltd

38. **Durability under severe mechanical contact: Predicting performance with nano-impact testing**
   Ben D. Beake, Micro Materials Ltd

39. **In situ AFM and SEM investigation of Cu single crystals during microbending tests**
   Josef Kreith, Montanuniversität Leoben

40. **Improving the accuracy and precision of nanoindentation results**
    Warren Oliver, Nanomechanics Inc.

41. **Nanoindentation assisted acoustic measurements**
    Antanas Daugela, Nanometronix LLC

42. **Dynamic mechanical properties and long-term deformation behaviour of viscous materials (MeProVisc)**
    Xiaodong Hou, National Physical Laboratory

43. **Probing the interaction of plasticity size effects with dislocation mobility and stacking fault energy**
    Nigel Jennett, National Physical Laboratory

44. **Thermal design and time-dependent dimensional drift behaviour of sensors, materials and structures (T3D)**
    Xiaodong Hou, National Physical Laboratory

45. **Extracting mechanical properties of porous coatings using nanoindentation techniques**
    Noushin Moharrami, Newcastle University

46. **Steels revisited by nanomechanical testing**
    Bjørn Rune Sørås Rogne, Norwegian University of Science and Technology
47. A study of the micro-cantilever size effect for single slip in alpha zirconium  
   Jicheng Gong, Oxford University

48. Plasticity in W6%Re revealed by in situ Laue diffraction  
   Ainara Irastorza-Landa, Paul Scherrer Institute (PSI) - Ecole polytechnique fédérale de  
   Lausanne (EPFL)

49. Electromechanical performance and environmental resistance of laser-fabricated oxides  
   on metals  
   Samantha K. Lawrence, Purdue University

50. Grain-size dependence of the strength of metals the hall-petch effect does not scale as  
   the inverse-square-root of grain size  
   Andrew Bushby, Queen Mary University of London

51. The bauschinger effect at microstrain observed in long thin wires in torsion  
   Dong Dong, Queen Mary University of London

52. Indentation size effects in restricted volumes of material  
   Temur Ahmad, Queen Mary University of London

53. Flat punch nanoindentation methods for time-dependent materials  
   Tanya Ekers, Queen Mary University of London

54. Does surface roughness influence the measured hardness?  
   Peter M. Nagy, RCNS-HAS

55. Mechanical property measurements of heterogeneous materials by selective  
   nanoindentation: Application to battery composites.  
   Hugues-Yanis Amanieu, Robert Bosch GmbH

56. Small scale deformation behavior of lithiated silicon  
   Lucas A. Berla, Stanford University

57. Long term creep experiments using nanoindentation - Analysis of creep in metals  
   Dennis Bedorf, SURFACE

58. The right nanoindentertip design  
   Simon Hostettler, Synton-MDP

59. Mapping the mechanical properties of magnetic gradient materials  
   Alexey Useinov, Technological Institute for Superhard and Novel Carbon Materials

60. On the measurement of energy dissipation using geometrically similar nanoindentation  
    and the continuous stiffness measurement technique  
    Erik G. Herbert, The University of Tennessee

61. Advances in measuring power-law creep parameters from instrumented indentation  
    Erik G. Herbert, The University of Tennessee

62. Size effects and nanomechanics in soft matter materials  
    Johann de Silva, Trinity College Dublin

63. Methodology for prevents high temperature oxidation during nanoindentation in metallic  
    materials  
    Edgar Garcia-Sanchez, Universidad Autonoma de Nuevo León
64. **Size dependent mechanics of thin ZrNi metallic glass films**  
Matteo Ghidelli, Université catholique de Louvain

65. **Influence of microalloying on the mechanical properties of molybdenum disilicide**  
Carolin Puscholt, University Erlangen-Nürnberg

66. **A study of the substrate effect during indentation**  
Joseph Lodwick Reed, University of Cambridge

67. **Implementing high-resolution digital image correlation in small-scale testing**  
Fabio Di Gioacchino, University of Cambridge

68. **Dislocation nucleation in the Peierls model**  
Philip R. Howie, University of Cambridge

69. **Study of the fracture properties of NiAl by micro-cantilever tests**  
Johannes Ast, University of Erlangen Nürnberg

70. **Size effects on the mechanical properties of nanotwinned Cu thin films studied by bulge testing**  
Jan Philipp Liebig, University of Erlangen-Nürnberg

71. **Influence of the initial defect morphology on the deformation behavior of metal nanowires**  
Bahne Kapelle, University of Göttingen

72. **Three-Dimensional analysis of slip bands in fatigued dual phase steel**  
Lisa Zellmer, University of Kassel

73. **Understanding length-scale effects in nanotribology: Lateral size effects**  
Anna Kareer, University of Leicester

74. **Penetration resistance: The quantitative energetics in nano- and micro-mechanical testing**  
Gerd Kaupp, University of Oldenburg

75. **Extracting single crystal elastic constants using L-shaped micro-cantilevers**  
James R. Herring, University of Oxford

76. **Comparison of temperature dependence in nano-scale metallic multilayer systems**  
Rachel Schoeppner, Washington State University

77. **On the mechanical properties of tungsten disulfide nanotubes**  
Ifat Kaplan-Ashiri, Weizmann Institute of Science

78. **Characterizing thermal and mechanical properties of silicon carbide thin films at high temperatures**  
Daniel Leisen, Karlsruhe Institute of Technology

79. **In situ force measurements made easy: Characterizing microstructures in the SEM**  
Stephan Kleindiek, Kleindiek Nanotechnik GmbH

80. **The effect of vanadium content and temperature on stick-slip phenomena under friction of CrV(x)N coatings studied by micro and nano-mechanical methods**  
Alex Laikhtman, Holon Institute of Technology
81. The influence of FIB preparation technique on single crystalline deformation as studied with in situ microcompression testing
   Julia Hütsch, Helmholtz-Zentrum Geesthacht

82. Strain-rate sensitivity in nano-structured Cu/X (X=V, Ni, Co) multilayers measured by Instrumented Indentation
   Holger Pfaff, Agilent Technologies

83. Modelling and measurement of phase transformations induced during indentation of a shape memory alloy
   Trevor W. Clyne, Cambridge University

84. Micro-mechanical survey of nanocrystalline nickel produced by electrodeposition
   Jeff Wheeler, EMPA

85. Temperature-dependent size effects in LiF [111] single crystals
   Rafael Soler, IMDEA Materials Institute

86. Thermomechanical behavior of lead-free Sn-Ag-Cu solder joints by nanoindentation
   Saeid Lotfian, IMDEA Materials Institute

87. An improved methodology for determining the beta correction factor in instrumented indentation experiments
   Fazilay Abbes, GRESPI/MPSE - University of Reims

88. Fracture behavior of freestanding and supported gold thin films characterized by bulge testing
   Eva Preiß, University of Erlangen-Nuremberg