Preliminary Program (7-17-2013)

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

Engineering Conferences International
32 Broadway, Suite 314 - New York, NY 10004, USA
Phone: 1 - 212 - 514 - 6760, Fax: 1 - 212 - 514 - 6030
www.engconfintl.org – info@engconfintl.org
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.

**ECI BOARD MEMBERS**

Barry C. Buckland, President  
Peter Gray  
Michael King  
Raymond McCabe  
David Robinson  
William Sachs  
Eugene Schaefer  
P. Somasundaran  
Deborah Wiley

Chair of ECI Conferences Committee: William Sachs  
ECI Technical Liaison for this conference: Ram Darolia  
ECI Executive Director: Barbara K. Hickernell  
ECI Associate Director: Kevin M. Korpics

©Engineering Conferences International
Organizing Committee

Prof. George Pharr
University of Tennessee, USA

Dr. Nigel M. Jennett
National Physical Laboratory, UK

Dr. Rejin Raghavan
EMPA - Materials Science & Technology, Switzerland

Steering Committee

Prof. George Pharr
University of Tennessee, USA

Dr. Mathias Göken
University of Erlangen-Nurnberg, Germany

Dr. Gerhard Dehm
Max-Planck-Institut für Eisenforschung, Germany
Sunday 6th October, 2013

0800  **Overview of Tutorial Session**
Chair: **Johann Michler**

0830 – 1100  Tutorial:
**Introduction to nanoindentation and related techniques**
George Pharr and E.G. Herbert
University of Tennessee, USA

1400 – 1700  Tutorial:
**Thin film and small scale mechanics**
William D. Nix
Stanford University, USA

1600 – 1800  Registration

1800 – 1815  **Welcome**
Conference Chair: Dr. Johann Michler
ECI Technical Liaison: Dr. Ram Darolia

1815 – 1900  Opening Reception

1900 – 1930  **Plenary**:
**Abstract awaited**
Marc Legros
CEMES-CNRS, France

1945 – 2100  Dinner

Plenary talk:  30 minutes including discussion
Invited talk:  25 minutes including discussion
Regular:  15 minutes including discussion
0730 – 0900  Breakfast buffet

0900 – 1300  **In-situ testing**
Chair: Rejin Raghavan

0900 – 0930  Invited:
**In situ mechanical testing in electron microscopes to study small scale deformation mechanisms**
Daniel Kiener, University of Leoben, Austria

0930 – 0950  **X-ray μLaue: A novel view on fatigue damage at the micron scale**
Christoph Kirchlechner, Max-Planck-Institute für Eisenforschung, Germany

0950 – 1010  **Flaw-driven failure in nanocrystalline Pt nanostructures**
Wendy Gu, California Institute of Technology, USA

1010 – 1030  **Critical-temperature/ Peierls-stress dependent size effects in body centered cubic nanopillars**
Seung Min Han, Korea Advanced Institute of Science and Technology, South Korea

1030 – 1100  Coffee break

1100 – 1130  Invited:
**Intrinsic and extrinsic size-effects in metallic systems**
Jeff De Hosson, University of Groningen, The Netherlands

1130 – 1150  **In-situ squared: Multi property thin film measurements during straining**
Megan Cordill, Erich Schmid Institute, Austria

1150 – 1220  Invited:
**Probing deformation phenomena at small length scales**
Gerhard Dehm, Max-Planck-Institut für Eisenforschung, Germany

1220 – 1240  **Synchrotron-based in situ mechanical testing of nanocrystalline metals and alloys**
Patric A. Gruber, Karlsruhe Institute of Technology, Germany

1240 – 1300  **A comparison of micro-cantilever bend and micro-double edge notch tension tests**
Richard P. Vinci, Lehigh University, USA

1300 – 1400  Lunch

1400 – 1600  Free time /ad hoc sessions

1600 – 1630  Afternoon coffee and snacks
1630 – 1830  
**In-situ / Small scale testing**
Chair: Daniel Kiener

1630 – 1700  
**Invited:**
Dislocation-nucleation mediated deformation in single crystal gold nanowires  
Cynthia A. Volkert, University of Goettingen, Germany

1700 – 1720  
**TEM and AFM study of the elementary deformation mechanisms induced by nanoindentation in the MAX phase Ti₃AlC₂**  
Christophe Tromas, Institut Prime - Université de Poitiers, France

1720 – 1750  
**Invited:**
**In-situ Laue diffraction during micro-compression: Slip in bcc metals**  
Helena Van Swygenhoven, Paul Scherrer Institute / EPFL, Switzerland

1750 – 1810  
Deformation localization and strain hardening during micro shear experiments on gold in the scanning electron microscope  
Jenna-Kathrin Heyer, Ruhr-Universität Bochum, Germany

1810 – 1830  
**Using small scale testing to extract the impact of structural defects on plasticity mechanisms**  
David Bahr, Purdue University, USA

1830 – 1900  
**Poster Session I: Preview**
Chair: George Pharr

1905 – 2030  
Dinner

2030 – 2300  
**Poster Session I and Social Hour**
Tuesday, 8th October, 2013

0730 – 0900  Breakfast buffet

0900 – 1320  **Variable temperature testing and indentation**
Chair: Bill Clegg

0900 – 0930  **Invited:**
*In situ micro-thermomechanical testing: A general tool for investigating plasticity*
Jeffrey Wheeler, EMPA - Materials Science & Technology, Switzerland

0930 – 0950  **Strain-rate sensitivity in bcc-metals temperature and microstructural influences**
Verena Maier, FAU Erlangen-Nürnberg, Germany

0950 – 1020  **Invited:**
*High temperature mechanical behavior of nanoscale multilayers*
Jon Molina, IMDEA Materials Institute, Spain

1020 – 1050  **Invited:**
*Nano and micro-mechanical testing of reactive metals in vacuum*
David Armstrong, University of Oxford, UK

1050 – 1120  Coffee break

1120 – 1150  **Invited:**
*Extracting elastic properties of coatings on stiff and compliant substrates by nanoindentation*
Steve Bull, Newcastle University, UK

1150 – 1210  **Plasticity size effects: when is a micro-pillar like a nanoindentation?**
Andy Bushby, Queen Mary University of London, UK

1210 – 1240  **Invited:**
*Temperature and strain-rate dependent dislocation nucleation in Pd nanowhiskers*
Dan Gianola, University of Pennsylvania, USA

1240 – 1300  **Critical appraisal of a procedure for extracting primary & secondary creep parameters from nanoindentation data**
Bill Clyne, Cambridge University, UK

1300 – 1320  **Orientation informed indentation of magnesium on different length scales**
Claudio Zambaldi, MPI für Eisenforschung, Germany

1320 – 1400  Lunch

1400 – 1600  Free time / *ad hoc* sessions

1600 – 1630  Afternoon coffee with snacks
Tuesday (contd….)

8th October, 2013

1630 – 1930  **New instrumentations and developments**
Chair: **Johann Michler**

<table>
<thead>
<tr>
<th>Time</th>
<th>Company/Institution</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1630</td>
<td>Hysitron</td>
<td>Ude Hangen</td>
</tr>
<tr>
<td>1650</td>
<td>Alemnis</td>
<td></td>
</tr>
<tr>
<td>1710</td>
<td>Synton</td>
<td></td>
</tr>
<tr>
<td>1730</td>
<td>CSM</td>
<td></td>
</tr>
<tr>
<td>1750</td>
<td>Surface: Wolfgang Stein</td>
<td></td>
</tr>
<tr>
<td>1810</td>
<td>Kleindiek: Stephan Kleindiek</td>
<td></td>
</tr>
<tr>
<td>1830</td>
<td>Hysitron</td>
<td></td>
</tr>
<tr>
<td>1850</td>
<td>Alemnis</td>
<td></td>
</tr>
<tr>
<td>1910</td>
<td>CSM</td>
<td></td>
</tr>
<tr>
<td>1930</td>
<td>Hysitron</td>
<td></td>
</tr>
</tbody>
</table>

Agilent: Jennifer Hay
Nanomechanics: Bryan Crawford
Zwick (ASMEC): T. Chuboda
Fischer: Fischer
Michalex: Vincent Jardret
Micromaterials: Ben Beake

Free evening / Dinner on your own
0730 – 0900 Breakfast buffet

0900 – 1300 **Mechanics of plasticity and fracture**
Chair: Mathias Göken

0900 – 0930 Invited:
**Fracture and fatigue testing at the nano-scale**
Oliver Kraft, Karlsruhe Institute of Technology, Germany

0930 – 0950 **Understanding low temperature plasticity in brittle intermetallics Insights from nanomechanical testing**
Sandra Korte, RWTH Aachen University / FAU Erlangen-Nürnberg, Germany

0950 – 1020 Invited:
**Deformation of complex crystals**
Bill Clegg, University of Cambridge, UK

1020 – 1050 Coffee break

1050 – 1120 Invited:
**A more unified view on size effects in plasticity**
Erica Lilleodden, Helmholtz-Zentrum Geesthacht, Germany

1120 – 1140 **Plasticity of silica at the micron-scale: From nanomechanical testing to multiscale modeling**
Guillaume Kermouche, CNRS, France

1140 – 1210 Invited:
**Strength of small metallic materials – effects of external vs internal length scales**
Alfonso Ngan, University of Hong Kong, P. R. China

1210 – 1230 **Small scale plasticity: Insights into displacement jump velocities**
Robert Maab, Georg-August Universität Göttingen, Germany

1230 – 1250 **Mechanical properties of fcc metallic Nanowires: A comparative simulation study of single-crystalline and fivefold-twinned structures**
Erik Bitzek, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

1250 – 1310 **Crystal plasticity modeling of nanoindentation near a grain boundary in alpha-titanium**
David Mercier, Max-Planck-Institut für Eisenforschung, Germany

1315 – 1800 Boxed lunch and excursion

1845 – 1915 **Poster Session II: Preview**
Chair: George Pharr

1915 – 2030 Dinner
2030 – 2300  

Poster Session II and Social Hour
0730 – 0900 Breakfast buffet

0900 – 1320 **Mechanics of thin films**
   Chair: David Bahr

0900 – 0930 Invited: **Mechanical and thermal stability of nanotwinned alloys**
   Andrea Hodge, University of Southern California, USA

0930 – 0950 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

0950 – 1020 Invited: **Micro-cantilever tests as tools to support the development of high temperature materials and coatings**
   Mathias Göken, University Erlangen-Nürnberg, Germany

1020 – 1040 **A new method to investigate fracture toughness in thin ceramic films**
   Marco Sebastiani, University of Rome "Roma TRE", Italy

1040 – 1110 Coffee break

1110 – 1140 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

1140 – 1200 **A micro double cantilever beam method to measure the fracture toughness of hard coatings**
   Shiyu Liu, University of Cambridge, UK

1200 – 1230 Invited: **Stable storage of helium at interfaces in nanocomposites**
   Amit Misra, Los Alamos National Laboratory, USA

1230 – 1250 **The deformation and fracture mechanisms of thin freestanding gold films studied by bulge tests**
   Benoit Merle, University of Erlangen-Nürnberg, Germany

1250 – 1320 Invited: Abstract awaited
   **Jean-Luc Loubet CNRS**

1320 – 1400 Lunch

1400 – 1600 Free time / *ad hoc* sessions
1600 – 1630  Afternoon coffee and snacks

1630 – 1840  Deformation mechanisms
Chair: Cynthia Volkert

1630 – 1700  Invited:
Size effect or no size effect - that is the question?
Ralph Spolenak, ETH, Switzerland

1700 – 1720  Deformation mechanisms in inorganic glasses by nanomechanical testing
V. Keryvin, University of South-Britanny, France

1720 – 1750  Invited:
Plasticity in small dimensions and the influence of defect structure, boundaries and environment
Christian Motz, Saarland University, Germany

1750 – 1810  Study by AFM and EBSD of plastic deformation mechanisms induced by nanoindentation in a hardmetal binder-like cobalt allot
Joan Josep Roa, CIEFMA-Universitat Politècnica de Catalunya, Spain

1810 – 1840  Invited:
Local mechanical properties of SX and nanocrystalline binary CuAl solid solutions
Karsten Durst, University of Erlangen-Nürnberg, Germany

1900 – 2000  Reception

2000 – 2230  Conference Banquet
0730 – 0900  Breakfast buffet

0900 – 1150  **Combinatorial synthesis, analysis and architectural design of materials**  
Chair: Ralph Spolenak

0900 – 0930  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

0930 – 0950  **Approaches to strengthen bulk metallic glasses**  
Oliver Franke, University of Southern California, USA

0950 – 1010  **3D nanomechanical imaging of complex materials using FIB-AFM**  
Asa H. Barber, Queen Mary University of London, UK

1010 – 1040  Coffee break

1040 – 1110  **Ex-situ and in-situ study of the plastic deformation of InSb micropillars under coherent x-rays**  
Ludovic Thilly, University of Poitiers, France

1110 – 1130  **Integrated in-situ experiments full field crystal plasticity simulations to analyze stress strain partitioning in multi-phase alloys**  
Cemal Cem Tasan, Max-Planck Institute für Eisenforschung, Germany

1130 – 1150  **Time-dependent mechanical-electrical coupled behavior of single crystal ZnO nanorods**  
Yong-Jae Kim, Hanyang University, Korea

1150 – 1230  General Discussion and Future Directions

1230 – 1330  Lunch and Departure
<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Author, Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Strain-rate sensitivity in nano-structured Cu/X (X=V, Ni, Co) multilayers measured by Instrumented Indentation</td>
<td>Jennifer Hay, Agilent Technologies</td>
</tr>
<tr>
<td>2.</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</td>
</tr>
<tr>
<td>3.</td>
<td>The research of atomic structure and diffusion permeability of triple junctions of grain boundaries in nickel by the method of molecular dynamics</td>
<td>Gennady Poletaev, Altai State Technical University</td>
</tr>
<tr>
<td>4.</td>
<td>Mechanical properties of silicon oxide coatings deposited by plasma enhanced CVD and assessed by instrumented nanoindentation</td>
<td>Jon Arrikaberri, Asociación de la Industria de Navarra</td>
</tr>
<tr>
<td>5.</td>
<td>Comparative analysis of some physico-chemical properties of the glassy system (GeTe5)100-xlnx and (GeSe5)100-xlnx</td>
<td>Ani Stoilova, Bulgaria/UCTM Sofia</td>
</tr>
<tr>
<td>6.</td>
<td>Fabrication and deformation of three-dimensional biomimetic ceramic nanoarchitected materials</td>
<td>Lucas R. Meza, California Institute of Technology</td>
</tr>
<tr>
<td>7.</td>
<td>Limitations of a common method for extraction of the creep stress exponent from indentation data</td>
<td>James Dean, Cambridge University</td>
</tr>
<tr>
<td>8.</td>
<td>Modelling and measurement of phase transformations induced during indentation of a shape memory alloy</td>
<td>Dimitris Tsarouchas, Cambridge University</td>
</tr>
<tr>
<td>9.</td>
<td>Hardness of finely dispersed carbides in iron-based hard alloys</td>
<td>Alexandra Yulinova, Chemnitz University of Technology</td>
</tr>
<tr>
<td>10.</td>
<td>New method for mechanical characterization of viscoelastic materials using a modified spherical nanoindenter</td>
<td>Philippe Kempe, CSM Instruments</td>
</tr>
<tr>
<td>11.</td>
<td>Phenomenological characteristics of microindentation behavior in WC-Co-TiC+TaC sintered carbides</td>
<td>Adepu Kumaraswamy, Defense Institute of Advanced Technology(DU)</td>
</tr>
<tr>
<td>12.</td>
<td>Hydrogen effect on dislocation nucleation in a ferritic alloy Fe-15Cr as observed per nanoindentation</td>
<td>Guillaume Kermouche, Ecole Des Mines de Saint-Etienne</td>
</tr>
<tr>
<td>Number</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>13.</td>
<td><strong>Measuring the stress-strain curves of materials using repeated micro-impact testing</strong></td>
<td>G. Kermouche, Ecole Des Mines de Saint-Etienne</td>
</tr>
<tr>
<td>14.</td>
<td><strong>A new method to measure the mechanical properties of very thin top layers by nanoindentation</strong></td>
<td>Gaylord Guillonneau, Ecole Nationale d'Ingénieurs de Saint-Etienne</td>
</tr>
<tr>
<td>15.</td>
<td><strong>Cast aluminium microwires</strong></td>
<td>Jérôme Krebs, Ecole Polytechnique Fédérale de Lausanne</td>
</tr>
<tr>
<td>16.</td>
<td><strong>Super-plastic flow of confined nanocrystalline Cu</strong></td>
<td>Rejin Raghavan, EMPA</td>
</tr>
<tr>
<td>17.</td>
<td><strong>Micro-mechanical survey of nanocrystalline nickel produced by electrodeposition</strong></td>
<td>Juri Wehrs, EMPA</td>
</tr>
<tr>
<td>18.</td>
<td><strong>Combinatorial experimentation for nanomechanical characterization: Elevated temperature nanoindentation testing of composition gradients</strong></td>
<td>Gaurav Mohanty, EMPA</td>
</tr>
<tr>
<td>19.</td>
<td><strong>Traditional (DC and DCP) MS and HIPIMS of silver for improved E. coli inactivation: A comparative study (testing and characterization)</strong></td>
<td>Oualid Baghriche, EPFL-SB-ISIC-GPAO</td>
</tr>
<tr>
<td>20.</td>
<td><strong>In situ compression testing of miniaturized Cu samples with grain boundaries</strong></td>
<td>Peter J. Imrich, Erich Schmid Institute of Materials Science</td>
</tr>
<tr>
<td>21.</td>
<td><strong>Alloy development of Ti-based thin films for microstructural stability mechanical properties and microstructural analysis</strong></td>
<td>Diana Courty, ETH Zurich</td>
</tr>
<tr>
<td>22.</td>
<td><strong>Size-dependent plasticity in ionic crystal systems: The influence of temperature, orientation and doping level</strong></td>
<td>Yu Zou, ETH Zurich</td>
</tr>
<tr>
<td>23.</td>
<td><strong>Pillar compression testing of low stacking fault energy FCC alloys</strong></td>
<td>Matthias Schamel, ETH Zurich</td>
</tr>
<tr>
<td>24.</td>
<td><strong>Nanoindentation and deformation of γ-Mg17Al12 at high temperatures</strong></td>
<td>Harshal Mathur, FAU Erlangen-Nürnberg</td>
</tr>
<tr>
<td>25.</td>
<td><strong>An improved methodology for determining the beta correction factor in instrumented indentation experiments</strong></td>
<td>Alexis Jaime Garcia Guzman, GINUMA / Universidad Pontificia Bolivariana</td>
</tr>
<tr>
<td>26.</td>
<td><strong>Nanomechanical analysis of time-dependent plasticity in nanostructured materials</strong></td>
<td>In-Chul Choi, Hanyang University</td>
</tr>
<tr>
<td>No.</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>27.</td>
<td>The influence of FIB preparation technique on single crystalline deformation as studied with in situ microcompression testing</td>
<td>Julia Hapke, Helmholtz-Zentrum Geesthacht</td>
</tr>
<tr>
<td>28.</td>
<td>Investigation of the temperature dependence of polymeric materials with nanoindentation</td>
<td>Tanja Haas, Helmut Fischer GmbH Institut für Elektronik und Messtechnik</td>
</tr>
<tr>
<td>29.</td>
<td>Long-term creep behaviour with the instrumented indentation test</td>
<td>Gottfried Bosch, Helmut Fischer GmbH Institut für Elektronik und Messtechnik</td>
</tr>
<tr>
<td>30.</td>
<td>Time and temperature dependent mechanical properties of materials at nanometer length scale</td>
<td>Asif Syed, Hysitron, Inc.</td>
</tr>
<tr>
<td>31.</td>
<td>In situ electromechanical study of nanowires</td>
<td>Sanjit Bhowmick, Hysitron, Inc.</td>
</tr>
<tr>
<td>32.</td>
<td>Thermal expansion and steady state creep study in a TSV-structure</td>
<td>Jaroslav Lukes, Hysitron, Inc.</td>
</tr>
<tr>
<td>34.</td>
<td>Turning helical bundles into fibrils via redesign of folding pathways</td>
<td>Maria Amprazi, IMBB-FORTH</td>
</tr>
<tr>
<td>35.</td>
<td>Determination of elastic modulus of porous cathode films using nanoindentation</td>
<td>Zhangwei Chen, Imperial College London</td>
</tr>
<tr>
<td>36.</td>
<td>Bending and fracturing of nanopillars</td>
<td>Dariusz Jarząbek, Insitutie of Fundamental Technological Research</td>
</tr>
<tr>
<td>37.</td>
<td>Indenter dependent behavior of the Zr-based bulk metallic glass</td>
<td>Hu Huang, Jilin University</td>
</tr>
<tr>
<td>38.</td>
<td>In situ characterization of stress-coupled grain boundary migration in nanocrystalline metals</td>
<td>Paul Rottmann, Johns Hopkins University</td>
</tr>
<tr>
<td>39.</td>
<td>Nanoindentation and compression testing of silver nanowires on substrate</td>
<td>Jae Hyun Kim, KAIST</td>
</tr>
<tr>
<td>40.</td>
<td>Methodology of stress measurement in copper and silicon around through-silicon via by using nanoindentation and micro raman spectroscopy for advanced semiconductor interconnects</td>
<td>Jae Hyun Kim, KAIST</td>
</tr>
<tr>
<td>41.</td>
<td>Size and orientation dependent deformation behavior of a dual phase steel</td>
<td>Moritz Wenk, Karlsruhe Institute of Technology</td>
</tr>
</tbody>
</table>
42. Deformation behavior of copper thin films during nanoimprinting
   Anke Schachtsiek, Karlsruhe Institute of Technology

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

44. Mechanical testing of the interface between different metallization layers on annealed borophosphosilicate glass
   Bernhard Völker, Kompetenzzentrum Automobil- und Industrie-Elektronik GmbH

45. Influence of microstructure on thermo-mechanical fatigue of Cu films on substrates
   Walther Heinz, Kompetenzzentrum Automobil- und Industrie-Elektronik GmbH

46. The mechanical properties of kaolinite clay: Modeling and simulation by molecular dynamics
   Brahim-Khalil Benazzouz, LFC-R, UPPA

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

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

49. 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

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

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

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

53. Durability under severe mechanical contact: Predicting performance with nanoimpact testing
   Ben D. Beake, Micro Materials Ltd

54. In situ AFM and SEM investigation of Cu single crystals during microbending tests
   Josef Kreith, Montanuniversität Leoben
55. **Improving the accuracy and precision of nanoindentation results**  
Warren Oliver, Nanomechanics Inc.

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

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

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

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

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

61. **Steels revisited by nanomechanical testing**  
Bjørn Rune Sørås Rogne, Norwegian University of Science and Technology

62. **A study of the micro-cantilever size effect for single slip in alpha zirconium**  
Jicheng Gong, Oxford University

63. **Microstructure and mechanical properties of nano-silver films**  
Steven van Petegem, Paul Scherrer Institute (PSI) - École polytechnique fédérale de Lausanne (EPFL)

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

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

66. **Grain-size dependence of the strength of metals the hall-petch effect does not scale as the inverse-square-root of grain size**  
David Dunstan, Queen Mary University of London

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

68. **Indentation size effects in restricted volumes of material**  
Temur Ahmad, Queen Mary University of London
69. Flat punch nanoindentation methods for time-dependent materials
Tanya Ekers, Queen Mary University of London

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

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

72. On the crystallographic anisotropy of nanoindentation in NiTi shape memory alloys
Guillaume Laplanche, Ruhr Universitaet Bochum

73. Nanoindentation of soft polymer: Theoretical and experimental investigation
Zhaoyu Chen, Saarland University

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

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

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

77. Analysis and design of friction stir welding
Abd Fattah Khourshid, Tanta University

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

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

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

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

82. Length scale effects on the mechanical behavior and the strength of metal/ceramic multilayers
Dong Wang, TU Ilmenau

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

85. **Stress-strains relationship study at grain scale in low carbon steel by in-situ XRD peak broadening analysis**  
Ahcene Boumaiza, Université de Jijel

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

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

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

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

90. **Comparison of some optical properties of In containing chalcogenide thin films**  
Vladislava Ivanova, University of Chemical Technology and Metallurgy

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

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

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

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

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

96. **The influence of specimen thickness on the nanoindentation of contact lens hydrogels**  
Brian Derby, University of Manchester

97. **Mechanical properties of Cu and Ni nanowires grown in AL₂O₃ templates**  
Zongyang Pei, University of Manchester
98. **Formulation and physicochemical characterization of ultra-high performance fiber concrete based of sand dunes (UHPFC)**  
Mohammed Saidi, University of M'Hamed Bougara of Boumerdes Algeria

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

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

101. **Constitutive modelling of bulk metallic glasses via micromechanical testing**  
Vincent Keryvin, University of South-Britanny

102. **Mechanical behaviour of thin InP membranes bonded to patterned Si**  
Eric Le Bourhis, University Poitiers

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

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

105. **Nanocompression of individual multilayered polyhedral nanoparticles**  
Rita Rosentsveig, Weizmann Institute of Science

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

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