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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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

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)

16:30 – 19:00	***In-situ* / Small Scale Testing** Chair: Daniel Kiener, University of Leoben, Austria
16:30 – 17:00	Invited: **Dislocation-nucleation mediated deformation in single crystal gold nanowires** Cynthia A. Volkert, University of Göttingen, Germany
17:00 – 17:20	**TEM and AFM study of the elementary deformation mechanisms induced by nanoindentation in the MAX phase Ti_3AlC_2** Christophe Tromas, Institut Pprime – University of Poitiers, France
17:20 – 17:50	Invited: **In-situ Laue diffraction during micro-compression: slip in bcc metals** Helena Van Swygenhoven, Paul Scherrer Institute / EPFL, Switzerland
17:50 – 18:10	**Deformation localization and strain hardening during micro shear experiments on gold in the scanning electron microscope** Steffen Brinckmann, Max Planck Institute for Iron Research, Germany
18:10 – 18:30	**Using small scale testing to extract the impact of structural defects on plasticity mechanisms** David Bahr, Purdue University, USA
19:00 – 19:30	**Poster Session I: Preview** Chair**: George Pharr**
19:30 – 20:45	Dinner
20:45 – 23:30	**Poster Session I**

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

Tuesday, October 8, 2013 (continued)

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

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 eeramic 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 Philippi, 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) - École 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