

SYMPOSIUM NM9

High-Performance Metals and Alloys in Extreme Conditions
April 18 - April 20, 2017

Symposium Organizers

Ying Chen, Rensselaer Polytechnic Institute
Weizhong Han, Xi'an Jiaotong University
Nan Li, Los Alamos National Laboratory
Christopher Weinberger, Drexel University

Symposium Support

FEI, part of Thermo Fisher Scientific

Proceedings Statement

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* Invited Paper

SESSION NM9.1: *In Situ* Nanomechanics I
Session Chairs: Weizhong Han and Christopher Weinberger
Tuesday Morning, April 18, 2017
PCC West, 100 Level, Room 102 C

10:30 AM *NM9.1.01
Plasticity in Nano-Scale Heterogeneous Metallic Structures [Amit Misra](#); University of Michigan–Ann Arbor, United States.

11:00 AM *NM9.1.02
Effects of Hydrogen on the Formation of Blister and the Dislocation Behavior of Al [Zhiwei Shan](#); Xi'an Jiaotong Univ, China.

11:30 AM *NM9.1.03
High Cycle Fatigue Testing at Extremes of Sample Size and Frequency [Angus J. Wilkinson](#); University of Oxford, United Kingdom.

SESSION NM9.2: *In Situ* Nanomechanics II
Session Chairs: Ying Chen and Nan Li
Tuesday Afternoon, April 18, 2017
PCC West, 100 Level, Room 102 C

1:30 PM *NM9.2.01
Nanoscale Strain Mapping of Individual Defects during *In Situ* Deformation [Andrew M. Minor](#)^{1,2}; ¹University of California, Berkeley, United States; ²Lawrence Berkeley National Laboratory, United States.

2:00 PM *NM9.2.02
Spatiotemporal Slip Dynamics during Deformation of Microcrystals [Robert Maass](#); University of Illinois at Urbana-Champaign, United States.

2:30 PM NM9.2.03
Small-Volume Aluminum Alloys with Native Oxide Shell Deliver Unprecedented Strength and Toughness [Shihao Li](#); Xi'an Jiaotong University, China.

2:45 PM NM9.2.04
Microscale Fracture Experiments of Chevron-Notched Tungsten Cantilevers up to 700 °C [Bo-Shiuan Li](#); University of Oxford, United Kingdom.

3:00 PM BREAK

SESSION NM9.3: High Entropy Alloy
Session Chairs: Ying Chen and Nan Li
Tuesday Afternoon, April 18, 2017
PCC West, 100 Level, Room 102 C

3:30 PM *NM9.3.01
Understanding Solid Solution Strengthening in a High-Entropy Alloy by Micropillar Compression and Dislocation Analysis [Easo P. George](#)^{1,2}; ¹Oak Ridge National Laboratory, United States; ²University of Tennessee, United States.

4:00 PM *NM9.3.02
Dislocation Mechanisms and 3-D Twin Architectures Generate the Exceptional Strength, Ductility and Toughness of CrCoNi Medium-Entropy Alloy [Qian Yu](#); Zhejiang University, China.

4:30 PM NM9.3.03
Atomic Scale Study of Twinning in Zirconium [Emmanuel Clouet](#); CEA Saclay, France.

4:45 PM NM9.3.04
Understanding the Deformation Mechanism of the Individual Phases of Al_{0.7}CoCrFeNi High Entropy Alloy (HEA) at Cryogenic Temperature [Adenike M. Giwa](#); California Inst of Technology, United States.

SESSION NM9.4: Radiation Damage
Session Chairs: Weizhong Han and Nan Li
Wednesday Morning, April 19, 2017
PCC West, 100 Level, Room 102 C

8:00 AM *NM9.4.01
Radiation Response of Nanoporous and Nanotwinned Metals [Xinghang Zhang](#); Purdue University, United States.

8:30 AM *NM9.4.02
Elastic Interaction between Nano-scale Defects in Irradiated Materials—Implications for Microstructural Evolution [Sergei Dudarev](#); UK Atomic Energy Authority, United Kingdom.

9:00 AM NM9.4.03
Microstructural Evolution and Self-Ion Damage in Nanocrystalline Tungsten Alloys [Olivia K. Donaldson](#); Stony Brook University, United States.

9:15 AM NM9.4.04
Quantification of the Role of Interfaces and Grain Boundaries in the Development of Radiation Tolerant Nuclear Materials [Pranav K. Suri](#); Drexel University, United States.

9:30 AM NM9.4.05
Effects of Annealing and Heavy Ion Irradiation on the Mechanical Properties of AlSc Alloys [Sezer Ozerine](#); Middle East Technical University, Turkey.

9:45 AM BREAK

SESSION NM9.5: Defect Microstructure
Session Chairs: Josh Kacher and Qian Yu
Wednesday Morning, April 19, 2017
PCC West, 100 Level, Room 102 C

10:15 AM *NM9.5.01
Atomistic Study of Dislocations in Intermetallic Compounds [Jian Wang](#); University of Nebraska–Lincoln, United States.

10:45 AM *NM9.5.02

The Role of Interfaces on Plasticity in Dislocation Nucleation-Mediated Nanostructures Daniel S. Gianola; University of California Santa Barbara, United States.

11:15 AM *NM9.5.03

Combining Statistical Electron Microscopy Measurements with Computational Simulations to Understand Twin/Grain Boundary Interactions in Pure Rhenium Joshua Kacher; Georgia Institute of Technology, United States.

11:45 AM NM9.5.04

Thermally-Induced Microstructure Evolution in Nanocrystalline Metals Ying Chen; Rensselaer Polytechnic Institute, United States.

SESSION NM9.6: Severe Plastic Deformation
Session Chairs: Ying Chen and Christopher Weinberger
Wednesday Afternoon, April 19, 2017
PCC West, 100 Level, Room 102 C

2:00 PM *NM9.6.01

Strength-Ductility Synergy in a Gradient Structure Xiaolei Wu; Chinese Aca Sci, China.

2:30 PM BREAK

3:30 PM *NM9.6.02

Severe Microscale Deformation of Pearlite and Cementite Gerhard Dehm; Max-Planck-Institut (MPIE), Germany.

4:00 PM *NM9.6.03

Self-Healing and Shape Memory Effects in Gold Microparticles through the Defects-Mediated Diffusion Eugen Rabkin; Technion, Israel.

4:30 PM NM9.6.04

Mechanical Grain Refinement vs Dynamic Recrystallization within Adiabatic Shear Bands in Steel and Copper during Impact Solomon Boakye-Yiadom; University of Waterloo, Canada.

SESSION NM9.7: Poster Session
Session Chairs: Ying Chen and Weizhong Han
Wednesday Afternoon, April 19, 2017
8:00 PM - 10:00 PM
Sheraton, Third Level, Phoenix Ballroom

NM9.7.01

Stress Corrosion Cracking and Polarization Test Analysis of Al-Mg-Zn Alloys by Homogenization InKyu Choi; Korea University of Technology and Education, Korea (the Republic of).

NM9.7.02

Electrodeposition of Ni-Mo Defect-Free Alloy from Ammonium-Citrate Electrolyte in Pulse Current Mode Sergey M. Karabanov; Ryazan State Radioengineering University, Russian Federation.

NM9.7.03

Failure of Granular Boron Carbide under Extreme Loading Pouyan Motamedi^{1,2}; ¹National Institute for Nanotechnology, Canada; ²University of Alberta, Canada.

NM9.7.04

Radiation Stability of Metal Nanowires Sergey A. Bedin; Institute of Electrophysics, Ural Branch, Russian Academy of Sciences, Russian Federation.

NM9.7.05

Effect of B_x (0 < x < 10) on a Fe₅₀Mn₃₀Co₁₀Cr₁₀ High Entropy Alloy on Wear Resistance Produced by Laser Cladding Jose Y. Aguilar Hurtado; Universidad de Chile, Chile.

NM9.7.06

Corrosion Behavior of Welded ASTM A-299 Steel in Simulated Marine Atmosphere Muhammad Kamran; University of the Punjab, Pakistan.

NM9.7.07

Fabrication of Random Nano Crack Assisted Bundled Ag Nanowire Network for Transparent Flexible Conductor Jinwook Jung; Seoul National University, Korea (the Republic of).

NM9.7.08

Nanocrystalline Growth Mechanisms in High Speed Electrodeposition of Ni-Co Films on Untreated Titanium Virginia M. Ayres; Michigan State University, United States.

NM9.7.09

Modelling and Simulation of Microstructural Evolution in Zr Based Bulk Metallic Glass Matrix Composites during Solidification M. M. A. Rafique; RMIT University, Australia.

SESSION NM9.8: Stress Corrosion Cracking
Session Chairs: Ying Chen and Weizhong Han
Thursday Morning, April 20, 2017
PCC West, 100 Level, Room 102 C

8:00 AM *NM9.8.01

New Insights into Processes Driving Irradiation Assisted Stress Corrosion Cracking Gary S. Was; University of Michigan, United States.

8:30 AM *NM9.8.02

Environmentally-Induced Degradation of Coherent Twin Boundaries Michael J. Demkowicz; Texas A&M University, United States.

9:00 AM NM9.8.03

Fracture Path Analysis of Sodium Induced Embrittlement of 304L Stainless Steel Bassem Barkia; CNRS/CentraleSupélec, France.

9:15 AM NM9.8.04

Oxygen Embrittlement in Niobium Pingjiong Yang; Xi'an Jiaotong University, China.

9:30 AM NM9.8.05

Character Dependence of Grain Boundary Corrosion in Aluminum Ali Sangghaleh; Texas A&M University, United States.

9:45 AM NM9.8.06

Three-Dimensional Maps and Models of Helium Nanobubbles in a Palladium Alloy Xiaowang Zhou; Sandia National Laboratories, United States.

10:00 AM BREAK

SESSION NM9.9: Superalloy
Session Chairs: Nan Li and Christopher Weinberger
Thursday Morning, April 20, 2017
PCC West, 100 Level, Room 102 C

10:30 AM *NM9.9.01

New Insights into Rate Limiting Deformation Processes in Ni-Base Superalloys Michael J. Mills; The Ohio State University, United States.

11:00 AM NM9.9.02

Migration of Recrystallization Grain Boundary during High Temperature Creep in a Directionally Solidified Superalloy Guang Xie^{1,2}; ¹Institute of Metal Research, Chinese Academy of Sciences, China; ²Shenyang National Laboratory for Materials Science, Institute of Metal Research, Chinese Academy of Sciences, China.

11:15 AM NM9.9.03

Liquid Metal Embrittlement with Mercury of Austenitic Steels Thierry Auger; CNRS/ECP, France.

11:30 AM NM9.9.04

TaC Precipitate Strengthening in Co-Re Alloys for Ultra-High Temperature Applications—Investigated with Neutron Scattering Lukas Karge; Technical University Munich, Germany.

11:45 AM NM9.9.05

High Pressure Phase Stability of Transition Metal High-Entropy Alloys Cameron L. Tracy; Stanford University, United States.

SESSION NM9.10: Mechanical Properties
Session Chairs: Wenjun Cai and Robert Maass
Thursday Afternoon, April 20, 2017
PCC West, 100 Level, Room 102 C

1:30 PM NM9.10.01

Toward the Design of Tribocorrosion Resistant Aluminum Alloys Wenjun Cai; University of South Florida, United States.

1:45 PM NM9.10.02

Advanced Mechanical Properties of Powder Metallurgy Titanium with a High Concentration of Oxygen and Nitrogen Jianghua Shen; Osaka University, Japan.

2:00 PM NM9.10.03

Ballistics Performance of Sintered Metal/Ceramic Composites Formed by Electrophoretic Deposition of Al and B₄C Particles Jason R. Morales; Lawrence Livermore National Lab, United States.

2:15 PM *NM9.10.04

Effect of Rolling Temperature on Microstructure and Tensile Properties of Nanocrystalline/Microcrystalline 304 Stainless Steel Pei Q. La; Lanzhou University of Technology, China.

2:30 PM NM9.10.05

Microstructure and Mechanical Behavior of a Fe-15Mn Steel under Static and Dynamic Conditions Xiaoxue Chen; University of North Carolina at Charlotte, United States.

2:45 PM NM9.10.06

Electrochemical Metal Identification Tool for Light Metal Sorting and Recycling Jessy B. Rivest; PARC, A Xerox Company, United States.

3:00 PM BREAK

3:30 PM NM9.10.07

Low Temperature Relaxation Mode in Bulk Metallic Glasses Robert Maass; University of Illinois at Urbana-Champaign, United States.

3:45 PM NM9.10.08

Field Induced Martensitic Phase Transition in Disordered Ni₃₅Mn₄₄Sn₉In₂ Heusler Alloy Tanmay Chabri; Indian Institute of Technology Kharagpur, India.

4:00 PM NM9.10.09

Linking Structure to Fragility in Bulk Metallic Glass-Forming Liquids—Understanding the Structural and Dynamic Transitions in a Deeply Undercooled Levitated Metallic Droplet Shuai Wei; Arizona State University, United States.

4:15 PM NM9.10.10

Characterization of Fiber Laser Welded TC4/SS 304 Joints Using Cu Interlayer Seyed Reza Elmi Hosseini; Shanghai Jiao Tong University, China.