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International Hydrogen Conference:
Understanding Hydrogen-Materials Interactions

Proceedings

9-17-2023

23 Conference program - International Hydrogen Conference Understanding Hydrogen-Materials Interactions

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May Martin

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Program

International Hydrogen Conference

Understanding Hydrogen-Materials Interactions

September 17- 21, 2023
Park City, Utah, USA

Conference Co-Chairs:

Prof. Jimmy Burns
University of Virginia, USA

Dr. May Martin
NIST, USA



Engineering Conferences International

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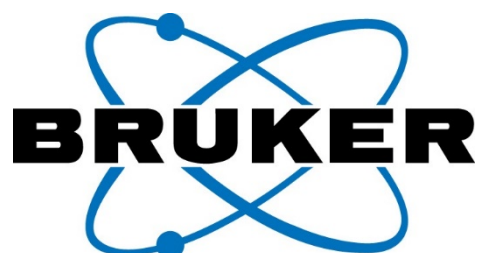
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Sunday, September 17, 2023

15:00 – 18:30 Conference Check-in (Grand Ballroom Lobby) / Dinner on own

Opening Plenary Session

18:30 – 19:15 **Electrochemistry of hydrogen uptake – Implications for evaluating resistance to hydrogen embrittlement**

Alan Turnbull, National Physical Laboratory, United Kingdom

19:15 – 20:00 **Predicting hydrogen embrittlement in steels and high entropy alloys**

William Curtin, EPFL, Switzerland

20:00 – 20:15 Break

20:15 – 21:00 **Understanding Hydrogen Embrittlement/Environment-Sensitive Behavior of Materials via Microstructural Characterization: Advances, Applications and Opportunities**

M. Grace Burke, Idaho National Laboratory, USA

21:00 – 21:45 **Advances in mechanical testing methods for hydrogen assisted cracking**

Kevin Nibur, Hy-Performance Materials Testing, LLC, USA

Special Notes and Locations

- Technical Sessions will be in the Kokopelli Grand Ballroom.
- The poster session will be in the Sundial Pavilion.
- Continental Breakfasts will be in the Grand Ballroom Lobby.
- The ECI office is the Painted Horse – Parlor 1.
- Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).
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- Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.
- Audiotaping, videotaping and photography of presentations are prohibited.

Monday, September 18, 2023

07:15 – 08:00 Continental Breakfast

Session: Hydrogen Effects on Fracture I

08:00 – 08:30

Invited

Computational models for predicting hydrogen-assisted failures

Emilio Martinez-Paneda, Imperial College London, United Kingdom

08:30 – 08:50

Hydrogen-enhanced creep deformation of SUY-1 pure iron

Kentarou Wada, Kyushu University, Japan; Ryosuke Komoda, WPI I2CNER, Kyushu University, Japan; Toshihiro Tsuchiyama, WPI I2CNER, Kyushu University, Japan; Masanobu Kubota, WPI I2CNER, Kyushu University, Japan

08:50 – 09:10

Hydrogen enhances cross-slip of dislocations in the vicinity of grain boundaries

Ali Tehrani, Max-Planck-Institut für Eisenforschung GmbH, Germany; Tilman Hicke, Max-Planck-Institut für Eisenforschung GmbH, Germany; Joerg Neugebauer, Max-Planck-Institut für Eisenforschung GmbH, Germany

09:10 – 09:30

Surface engineering impacts on hydrogen charging and hardness of high strength steels

David Bahr, Purdue University, USA; Jia-Huei Tsai, Purdue University, USA; Megan Reger, Purdue University, USA; David Johnson, Purdue University, USA

09:30 – 09:50

Role of T phase in the hydrogen embrittlement suppression for Al-Zn-Mg-Cu alloys

Yafei Wang, Kyushu University, Japan; Bhupendra Sharma, Kyushu University, Japan; Yuantao Xu, Kyushu University, Japan; Kazuyuki Shimizu, Iwate University, Japan; Hiro Fujihara, Kyushu University, Japan; Hiroyuki Toda, Kyushu University, Japan

09:50 – 11:00

Poster Session 1 and Break

Session: Hydrogen Effects on Additive Manufacturing and High Entropy Alloys

11:00 – 11:30

Invited

Hydrogen embrittlement of CrCoFeMnNi high-entropy alloys: Cases of monotonic tension and fatigue loading

Motomichi Koyama, Tohoku University, Japan

11:30 – 11:50

Effect of hydrogen at cryogenic temperatures on tensile properties of 316L stainless steel obtained by different manufacturing process

Laura Moli-Sanchez, Institut de la Corrosion - RISE, France; Christophe Mendibide, Institut de la Corrosion - RISE, France; Nicolas Bulidon, Institut de la Corrosion - RISE, France

11:50 – 12:10

Hydrogen-assisted fracture of additively manufactured type 304L austenitic stainless steel

Chris San Marchi, Sandia National Laboratories, USA; Thale Smith, Sandia National Laboratories, USA; Richard Karnesky, Sandia National Laboratories, USA; Joseph Ronevich, Sandia National Laboratories, USA; Joshua Sugar, Sandia National Laboratories, USA; Dorian Balch, Sandia National Laboratories, USA

Monday, September 18, 2023 (continued)

12:10 – 12:30 **Mechanistic influence of sub-micrometer porosity on the hydrogen environment-assisted cracking behavior of additively manufactured 17-4PH steel**
Zachary Harris, University of Pittsburgh, USA; Trevor Shoemaker, University of Virginia, USA; Alfredo Zafra, Imperial College London, United Kingdom; Emilio Martinez-Paneda, Imperial College London, United Kingdom; James Burns, University of Virginia, USA

12:30 – 17:30 *Ad hoc* time

17:30 – 18:30 Welcome Reception: Light Dinner (Sundial Pavilion)

Session: Mechanisms of Hydrogen Embrittlement 1

19:00 – 19:30 **Invited**
Defect-hydrogen interaction in Al alloys: Challenges and benefits revealed by ab initio calculations
Tilmann Hickel, BAM Federal Institute for Materials Research and Testing, Germany; Ali Tehrani, Max-Planck-Institut für Eisenforschung, Germany; Poulami Chakraborty, Max-Planck-Institut für Eisenforschung, Germany; Marti Lopez Freixes, Max-Planck-Institut für Eisenforschung, Germany; Huan Zhao, Max-Planck-Institut für Eisenforschung, Germany; Baptiste Gault, Max-Planck-Institut für Eisenforschung, Germany; Joerg Neugebauer, Max-Planck-Institut für Eisenforschung, Germany

19:30 – 19:50 **Hydrogen embrittlement susceptibility of deposited nickel-based alloy 82**
Anaïs Barou, CIRIMAT, Université de Toulouse, CNRS INP-ENSIACET, France; Éric Andrieu, CIRIMAT, Université de Toulouse, CNRS INP-ENSIACET, France; Pierre Joly, FRAMATOME, France; Lydia Laffont, CIRIMAT, Université de Toulouse, CNRS INP-ENSIACET, France; Christine Blanc, CIRIMAT, Université de Toulouse, CNRS INP-ENSIACET, France

19:50 – 20:10 **Effects of hydrogen on 4130 steel microstructure during tensile loading**
Zachary Buck, National Institute of Standards and Technology, USA; Matthew Connolly, National Institute of Standards and Technology, USA; May Martin, National Institute of Standards and Technology, USA; Damian Lauria, National Institute of Standards and Technology, USA; Jason Killgore, National Institute of Standards and Technology, USA; Peter Bradley, National Institute of Standards and Technology, USA; Yan Chen, Oak Ridge National Laboratory, USA; Andrew Slifka, National Institute of Standards and Technology, USA

20:10 – 20:30 **The power of the chemical potential – Beyond textbook wisdom**
Reiner Kirchheim, University of Goettingen, Germany

20:30 – 20:50 Break

Session: Mechanisms of Hydrogen Embrittlement II

20:50 – 21:10 **A mechanistic interpretation for the initiation and propagation of hydrogen induced and assisted cracks**
Margot Pinson, Gent University, Belgium; Aurélie Laureys, Gent University, Belgium; Tom Depover, Gent University, Belgium; Kim Verbeken, Gent University, Belgium

Monday, September 18, 2023 (continued)

- 21:10 – 21:30 **Mechanisms of hydrogen trapping and clustering at nanovoids and dislocations in BCC metals**
Jun Song, McGill University, Canada; Jie Hou, Hunan University, China
- 21:30 – 21:50 **Three-dimensional crack propagation behavior in hydrogen-related fracture of high-strength martensitic steel**
Akinobu Shibata, National Institute for Materials Science, Japan; Ivan Gutierrez-Urrutia, National Institute for Materials Science, Japan; Akiko Nakamura, National Institute for Materials Science, Japan; Taku Moronaga, National Institute for Materials Science, Japan; Kazuho Okada, National Institute for Materials Science, Japan; Yazid Madi, Mines Paris-PSL, France; Jacques Besson, Mines Paris-PSL, France; Toru Hara, National Institute for Materials Science, Japan
- 21:50 – 22:10 **Incorporating mechanistic understanding of the H-embrittlement process into next generation EAC testing approaches**
James Burns, University of Virginia, USA; Zachary Harris, University of Pittsburgh, USA

Tuesday, September 19, 2023

07:15 – 08:00 Continental Breakfast

Session: Hydrogen Effects on Fatigue

08:00 – 08:30

Invited

Fatigue crack growth behavior of pipeline and pressure vessel steels in gaseous hydrogen

Joseph Allen Ronevich, Sandia National Laboratories, USA; Milan Agnani, Sandia National Laboratories, USA; Chris San Marchi, Sandia National Laboratories, USA

08:30 – 08:50

Fatigue crack growth of type 304/304L stainless steel in pressurized hydrogen gas at elevated temperature

Bryan D. Miller, Naval Nuclear Laboratory, USA; John R. Brockenbrough, Naval Nuclear Laboratory, USA; Fassett Hickey, Southwest Research Institute, USA; Brian P. Somerday, Somerday Consulting LLC, USA; Thomas W. Webb, Naval Nuclear Laboratory, USA

08:50 – 09:10

Mechanistic model for hydrogen accelerated fatigue crack growth in a low carbon steel

Mohsen Dadfarnia, Seattle University, USA; Zahra Hosseini, University of Illinois at Urbana-Champaign, USA; Masanobu Kubota, WPI I2CNER, USA; Akihide Nagao, WPI-I2CNER, USA; Brian Somerday, University of Illinois at Urbana-Champaign, USA; Petros Sofronis, University of Illinois at Urbana-Champaign, USA; Robert Ritchie, University of California, Berkeley, USA

09:10 – 09:30

Effect of water vapor content on the toughness and fatigue properties of two storage steels under NG/H₂ gas pressure

Lisa Blanchard, Université Grenoble Alpes, CEA LITEN, DTCH, LCA, France; Laurent Briottet, Université Grenoble Alpes, CEA LITEN, DTCH, LCA, France; Xavier Campaignolle, STORENGY SAS, France; Christophe Pommier, STORENGY FRANCE, France

09:30 – 09:50

On the possible role of hydrogen in the formation of fatigue striation in a moist atmosphere

Sarah Saanouni, Institut PPrime, France; Guillaume Benoit, Institut PPrime, France; Thomas Billaudeau, Airbus SAS, France; Manuel de Araujo, Airbus SAS, France; Jerome Rousset, Airbus SAS, France; Hadi Bahsoun, Institut Pprime, France; Patrick Villechaise, Institut Pprime, France; Gilbert Henaff, Institut Pprime, France

09:50 – 11:00

Poster Session II and Break

Session: Mechanisms of Hydrogen Embrittlement III

11:00 – 11:30

Invited

Understanding of the hydrogen embrittlement mechanisms of nickel base alloys: A review of some recent advances on intergranular fracture

Abdelali Oudriss, La Rochelle Université – LaSIE, France; Marie Landeiro Dos Reis, La Rochelle Université – LaSIE, France; Jamaa Bouhattate, La Rochelle Université – LaSIE, France; Xavier Feaugas, La Rochelle Université – LaSIE, France

Tuesday, September 19, 2023 (continued)

- 11:30 – 11:50 **Influence of ϵ/ϵ' lattice misfit on hydrogen embrittlement mechanism of single-crystal nickel-based superalloy CMSX-4**
Jisung Yoo, Korea Institute of Materials Science, South Korea; Seungwoo Song, Korea Research Institute of Standards and Science, South Korea; Jeonghyeon Do, Korea Institute of Materials Science, South Korea; Dae Won Yun, Korea Institute of Materials Science, South Korea; In Soo Kim, Korea Institute of Materials Science, South Korea; Baig-Gyu Choi, Korea Institute of Materials Science, South Korea
- 11:50 – 12:10 **Modeling the frequency-dependent hydrogen-assisted fatigue crack growth in engineering alloys**
Zuhair Gasem, King Fahd University of Petroleum and Minerals, Saudi Arabia;
- 12:10 – 12:30 **Atomic Mechanism and Criterion for Hydrogen-Induced Transgranular to Intergranular Fracture Transition**
Yu Ding, Norwegian University of Science and Technology (NTNU), Norway; Zhiliang Zhang, Norwegian University of Science and Technology (NTNU), Norway
- 12:30 – 13:45 Boxed Lunch Break (Sundial Pavilion)
- Session: Advanced Methods for Characterizing Hydrogen-Metal Interactions I**
- 13:45 – 14:15 **Invited**
Kelvin Probe Techniques for mapping effective local hydrogen activity and permeation rates
Michael Rohwerder, Max-Planck-Institut für Eisenforschung, Germany
- 14:15 – 14:35 **Neutron dark-field imaging of hydrogen-fatigued pressure vessel steel**
Youngju Kim, University of Maryland, USA; Daniel S. Hussey, National Institute of Standards and Technology, USA; Caitlyn M. Wolf, National Institute of Standards and Technology, USA; Katie M. Weigandt, National Institute of Standards and Technology, USA; Pushkar Sathe, National Institute of Standards and Technology, USA; Peter N. Bajcsy, National Institute of Standards and Technology, USA; Paul A Kienzle, National Institute of Standards and Technology, USA; Sarah M. Robinson, National Institute of Standards and Technology, USA; Nikolai N. Klimov, National Institute of Standards and Technology, USA; Ryan P. Murphy, National Institute of Standards and Technology, USA; Michael G. Huber, National Institute of Standards and Technology, USA; Zachary N. Buck, National Institute of Standards and Technology, USA; Matthew J. Connolly, National Institute of Standards and Technology, USA
- 14:35 – 14:55 **Integrated analysis of hydrogen embrittlement mechanisms of a steel from its mechanical behaviours and atom probe tomography**
Sugin Zhu, The University of Sydney, Australia; Qi Wang, The University of Sydney, Australia; Yuya Murata, Kobe Steel, Ltd., Japan; Takumi Kitayama, Kobe Steel, Ltd., Japan; Simon Ringer, The University of Sydney, Australia
- 14:55 – 15:15 **In-Situ TEM study of the effect of hydrogen on crack propagation in steel**
Cynthia Volkert, University of Goettingen, Germany; Lin Tian, University of Goettingen, Germany; Kubota Masanobu, Kyushu University, Japan; Petros Sofronis, University of Illinois at Urbana-Champaign, USA; Reiner Kirchheim, University of Goettingen, Germany

Tuesday, September 19, 2023 (continued)

- 15:15 – 15:35 Break
- Session: Advanced Methods for Characterizing Hydrogen-Metal Interactions II**
- 15:35 – 15:55 **Hydrogen trapping mechanisms of TiC and (Ti,Mo)C precipitates in steels**
Pang-Yu Liu, The University of Sydney, Australia; Ranming Niu, The University of Sydney, Australia; Patrick Burr, UNSW Sydney, Australia; Yi-Sheng Chen, The University of Sydney, Australia; Julie Cairney, The University of Sydney, Australia
- 15:55 – 16:15 **In Situ neutron diffraction study of effect of hydrogen on deformation mechanisms in austenitic and duplex steels**
Lawrence Cho, Colorado School of Mines, USA; Donald W. Brown, Los Alamos National Laboratory, USA; Samantha K. Lawrence, Los Alamos National Laboratory, USA; Bjørn Clausen, Los Alamos National Laboratory, USA; Sven C. Vogel, Los Alamos National Laboratory, USA; Joseph A. Ronevich, Sandia National Laboratories, USA; Chris W. San Marchi, Sandia National Laboratories, USA; Lucas Ravkov, Queens University, Canada; Levente Balogh, Queens University, Canada; Yuran Kong, Colorado School of Mines, USA; Pawan Kathayat, Colorado School of Mines, USA; John G. Speer, Colorado School of Mines, USA; Kip O. Findley, Colorado School of Mines, USA
- 16:15 – 16:35 **Imaging hydrogen interactions with materials at the nanoscale: SIMS-based correlative microscopy**
Santhana Eswara, Luxembourg Institute of Science and Technology, Luxembourg; Dustin Andersen, Luxembourg Institute of Science and Technology, Luxembourg; Tom Wirtz, Luxembourg Institute of Science and Technology, Luxembourg
- 16:35 – 16:55 **In-Situ measurement of hydride corrosion of uranium using X-ray and neutron scattering techniques**
Samantha K. Lawrence, Los Alamos National Laboratory, USA; Travis Carver, Los Alamos National Laboratory, USA; Reeru Pokharel, Los Alamos National Laboratory, USA; Donald W. Brown, Los Alamos National Laboratory, USA; Bjørn Clausen, Los Alamos National Laboratory, USA
- 16:55 – 18:30 *Ad hoc* time
- 18:30 – 21:00 Banquet & Award Ceremony

Wednesday, September 20, 2023

07:15 – 08:00 Continental Breakfast

Session: Engineering Perspectives and Approaches to Hydrogen Challenges

08:00 – 08:30 **Invited**
Hydrogen embrittlement in energy industry: Perspective on mechanisms of Sulfide Stress Cracking (SSC) and approaches to improve SSC resistance in line pipe steels
Neeraj Thirumalai, ExxonMobil Technology and Engineering Company, USA

08:30 – 09:00 **Invited**
Engineering challenges encountered by designers of high pressure gaseous hydrogen storage vessels
John Felbaum, FIBA Technologies, Inc., USA

09:00 – 09:20 **Balanced material selection approach of 316 stainless steel for high pressure hydrogen systems**
Xiaoli (Shelly) Tang, Swagelok, USA

09:20 – 09:40 **Welding high strength, ferritic steels for hydrogen service**
Matteo Ortolani, Tenaris, Italy; Paolo Bortot, Tenaris, Italy; Michele Sileo, Tenaris, Italy; Erick Escorza, Tenaris, Italy; Matthew Connolly, NIST, USA; Ashwini Chandra, DNV, USA

09:40 – 10:00 **The effect of hydrogen in the HIP treatment of additive manufactured IN718**
Niklas Ehrlin, Air Liquide, Sweden; Dawid Nadolski, Air Liquide, Sweden; Aurelien Prillieux, IRT, France; Mauro Ravaioli, IRT, France

10:00 – 11:00 **Poster Session III and Break**

Session: Uptake, Transport, and Trapping of Hydrogen

11:00 – 11:20 **Internal friction study of hydrogen interactions in duplex stainless steel**
Liese Vandewalle, Ghent University, Belgium; Milan J. Konstantinović, Belgian Nuclear Research Centre, Belgium; Kim Verbeken, Ghent University, Belgium; Tom Depover, Ghent University, Belgium

11:20 – 11:40 **Formation and deformation of hydrides in titanium**
Stoichko Antonov, National Energy Technology Laboratory, USA; Qing Tan, Max-Planck-Institut für Eisenforschung GmbH, Germany; Baptiste Gault, Max-Planck-Institut für Eisenforschung GmbH, Germany

11:40 – 12:00 **Grain boundary networks as a fundamental feature to design materials to manage diffusion of hydrogen**
Jamaa Bouhattate, La Rochelle University, France; Abdelali Oudriss, La Rochelle University, France; Xavier Feaugas, La Rochelle University, France

12:00 – 12:20 **An ab initio driven model for the trapping and diffusion of hydrogen in Fe-Cr-Ni alloys**
Patrick Thomas, Kansas City National Security Campus, USA; Jacob Pursley, Kansas City National Security Campus, USA; John Porter, Kansas City National Security Campus, USA; Dale Hitchcock, Savannah River National Laboratory, USA; Timothy Krentz, Savannah River National Laboratory, USA; Erich Wimmer, Materials Design, Inc., USA; Clive Freeman, Materials Design, Inc., USA

Wednesday, September 20, 2023 (continued)

12:20 – 19:00 *Ad hoc* time / Dinner on Own

Session: Hydrogen Effects on Fracture II

19:00 – 19:30 **Invited**
Hydrogen embrittlement in subsea pipelines – From natural gas to hydrogen gas transport
Vigdis Olden, SINTEF Industry, Norway

19:30 – 19:50 **Mitigation of hydrogen embrittlement by carbon monoxide impurity in gaseous H₂**
Ryosuke Komoda, Kyushu Institute of Technology, Japan; Masanobu Kubota, International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, Japan; Aleksandar Staykov, International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, Japan; Patrick Ginet, Air Liquide France Industrie, France; Francoise Barbier, Air Liquide Research & Development Innovation Campus Paris, France; Jader Furtado, Air Liquide Research & Development Innovation Campus Paris, France; Laurent Prost, Air Liquide Research & Development Innovation Campus Frankfurt, Germany; Akihide Nagao, Air Liquide Research & Development Innovation Campus Tokyo, Japan

19:50 – 20:10 **Austenitic stainless steel weld embrittlement by hydrogen and tritium**
Timothy Krentz, Savannah River National Laboratory, USA; Joseph Ronevich, Sandia National Laboratories, USA; Dorian Balch, Sandia National Laboratories, USA; Chris San Marchi, Sandia National Laboratories, USA

20:10 – 20:30 **Strain localization and hydrogen-related fracture in martensitic steels investigated by combined digital image correlation and electron backscatter diffraction**
Xiaodong Lan, National Institute for Materials Science, Japan; Kazuho Okada, National Institute for Materials Science, Japan; Ivan Gutierrez-Urrutia, National Institute for Materials Science, Japan; Akinobu Shibata, National Institute for Materials Science, Japan

20:30 – 20:50 Break

Session: Electrochemically Generated Hydrogen

20:50 – 21:10 **ab initio insights into hydrogen UPTAKE AND EVOLUTION ON electrified solid/liquid interfaces**
Mira Todorova, Max-Planck-Institut für Eisenforschung, Germany; Sudarsan Surendralal, Max-Planck-Institut für Eisenforschung, Germany; Zhenyu Wang, Max-Planck-Institut für Eisenforschung, Germany; Jörg Neugebauer, Max-Planck-Institut für Eisenforschung, Germany

21:10 – 21:30 **Hydrogen permeation and embrittlement of ferritic SOEC/SOFC interconnect materials**
David Kniep, DECHEMA-Forschungsinstitut, Germany; J.F. Drillet, DECHEMA-Forschungsinstitut, Germany; M. Rudolphi, DECHEMA-Forschungsinstitut, Germany; M.C. Galetz, DECHEMA-Forschungsinstitut, Germany

Wednesday, September 20, 2023 (continued)

21:30 – 21:50 **Contribution of hydrogen to intergranular corrosion of 2024 aluminum alloy**
Christine Blanc, Université de Toulouse, France; Emilie Mondou, Université de
Toulouse, France; Arnaud Proietti, UAR Raimond Castaing, France; Cédric
Charvillat, Université de Toulouse, France; David Sinopoli, Airbus Helicopter
SAS, France

21:50 – 22:10 **Investigation and prediction of hydrogen uptake kinetics of cathodic**
polarized metals in aqueous electrolytes
Livia Cupertino-Malheiros, Imperial College London, United Kingdom; Alfredo
Zafra, Imperial College London, United Kingdom; Tim Hageman, Imperial
College London, United Kingdom; Emilio Martínez-Pañeda, Imperial College
London, United Kingdom

Thursday, September 21, 2023

Departure

Poster Presentations

Monday, September 18, 2023

- Mon - 1 **Is microstructural homogeneity the answer to hydrogen embrittlement resistance?**
Andrew Slifka, NIST, USA
- Mon - 2 **Co-existence of hydrogen embrittlement mechanisms of a X100 seamless pipeline revealed by fracture mechanics tests at 100bar H₂ under different loading cycles**
Laura Moli-Sanchez, Institut de la Corrosion, France
- Mon - 3 **In-situ wear behaviors of various rubbers in low-pressure hydrogen environment**
Byeong-lyul Choi, Korea University, South Korea
- Mon - 4 **Prevention of hydrogen embrittlement in Al-Zn-Mg alloys by dispersion of novel phases**
Kazuyuki Shimizu, Iwate University, Japan
- Mon - 5 **Investigation of grain-boundary effect on hydrogen behaviors in single- and polycrystalline medium-entropy CrCoNi alloy**
Ki Jeong Kim, Korea University, South Korea
- Mon - 6 **Oxidation potential and barrier effects of Cr-based coatings on aluminized press-hardened steels**
Mohamed Krid, Uclouvain, Belgium
- Mon - 7 **Analysis of hydrogen absorption - desorption mechanisms in Al-Si coated high strength steel during hot stamping process**
Mohamed Krid, Uclouvain, Belgium
- Mon - 8 **Probabilistic fracture mechanics toolkit for hydrogen blends in natural gas infrastructure**
Chris San Marchi, Sandia National Laboratories, USA
- Mon - 9 **Performance of conventional and additive manufactured austenitic stainless steels under gaseous hydrogen environment using in-situ hollow specimen technique**
Jonathan Nietzsche, Bundesanstalt fuer Materialforschung und -pruefung, Germany
- Mon - 10 **WITHDRAWN**
- Mon - 11 **Fractographic study for screening the hydrogen compatibility of X70 pipeline steels and welds**
Lisa Claeys, Ghent University, Belgium
- Mon - 12 **A model of internal crack extension due to a continuous build-up of hydrogen pressure: Application to a pressure vessel component**
Krzysztof Wolski, Mines Saint-Etienne, France
- Mon - 13 **Current status of hydrogen trapping evaluation by thermal desorption spectroscopy and advanced microstructural characterization**
Tom Depover, Ghent University, Belgium

- Mon - 14 **Modelling of hydrogen diffusion in a steel containing micro-porosity**
Alixé Dreano, Mines Saint-Etienne, France
- Mon - 15 **Application of in situ hydrogen charging during micromechanical testing**
Szilvia Kalacska, Laboratoire Georger Friedel, Mines St. Etienne, France
- Mon - 16 **Fine insight on high temperature hydrogen attack initiation and morphology on case studies**
Raphael Goti, TotalEnergies, France
- Mon - 17 **Combined high energy X-Ray diffraction and small-angle scattering measurements of strain, dislocation density and porosity near steel fatigue cracks grown in hydrogen**
Matthew J. Connolly, National Institute of Standards and Technology, USA
- Mon - 18 **Effect of hydrogen on creep properties of SUS304 austenitic stainless steel**
Masanobu Kubota, Kyushu University, Japan
- Mon - 19 **Modeling the frequency-dependent hydrogen-assisted fatigue crack growth in engineering alloys**
Zuhair Gasem, King Fahd University of Petroleum and Minerals, Saudi Arabia
- Mon - 20 **Investigating the effect of soluble hydrogen on plasticity in low-symmetry alpha-uranium**
Mary O'Brien, Los Alamos National Laboratory, USA
- Mon - 21 **Application of the small punch test to evaluate hydrogen embrittlement in steels and nickel alloys**
Rodrigo Alvarenga, LTAD-UFU, Brazil
- Mon - 22 **Comparison of J-r test techniques under gaseous hydrogen environment**
Mihaela Eliza Cristea, Tenaris Dalmine, Italy
- Mon - 23 **Strain-life testing in hydrogen; Adapting equipment for fully reversed loading of pressure vessel steels in hydrogen**
Peter Bradley, NIST, USA
- Mon - 24 **Hydrogen permeation through surface oxides of titanium iron alloys**
Andrew Rowberg, Lawrence Livermore National Laboratory, USA
- Mon - 25 **Measurements of hydrogen isotopes permeation in 316L stainless steel at low temperature**
Stephanie Thiebaut, CEA, France
- Mon - 26 **A study on mechanical properties of natural gas pipe material in high pressure hydrogen gas environment**
Won Jung Kim, Hyundai Steel, South Korea
- Mon - 27 **Hydrogen effects on fatigue and fracture properties of 17-4PH stainless steel**
Robert Wheeler, Sandia National Laboratories, USA
- Mon - 28 **Multi-layer hydrogen-barrier coating for natural gas transmission pipelines**
Gianluca Roscioli, Arculus Solutions, Inc., USA

Tuesday, September 19, 2023

- Tue - 1 **Low cycle fatigue testing in high pressure gaseous hydrogen using tubular specimens**
Heiner Oesterlin, Fraunhofer IWM, Germany
- Tue - 2 **Hydrogen-induced degradation of mechanical properties despite reduction in brittle fracture-features in a 1.5 GPa dual-phase steel**
Rama Srinivas Varanasi, Tohoku University, Japan
- Tue - 3 **Observation and analysis of low temperature leak characteristics of the O-ring for hydrogen electric vehicles**
Sang Min Lee, Korea University, South Korea
- Tue - 4 **Effects of C and Al on hydrogen embrittlement mechanism in medium Mn-Ni steels**
Min Young Sung, Korea University, South Korea
- Tue - 5 **Semantic segmentation of microscopy images of lower bainite and tempered martensite high-strength steels**
Jun Song, McGill University, Canada
- Tue - 6 **Hydrogen embrittlement evaluation of HSLA steels using small punch and slow strain rate tests**
Rodrigo Alvarenga, LTAD - UFU, Brazil
- Tue - 7 **Hydrogen effects in thermoplastics and elastomers in high-pressure and low-pressure cycling environments under ambient and cold temperature conditions**
Nalini Menon, Sandia National Labs, USA
- Tue - 8 **Resonant tunneling of Hydrogen in Pd**
Takahiro Ozawa, The University of Tokyo, Japan
- Tue - 9 **Hydrogen embrittlement of an X70 pipeline steel assessed by slow strain rate tensile tests**
Margo Cauwels, Ghent University, Belgium
- Tue - 10 **Hydrogen barrier coatings and liners for steel pipelines**
Omer Dogan, DOE National Energy Tech Lab, USA
- Tue - 11 **Microstructural effects on fracture resistance of vintage pipeline steels in gaseous hydrogen**
Milan Agnani, Sandia National Laboratories, USA
- Tue - 12 **Fatigue cracks initiation in a low alloy steel: Impact of hydrogen on plasticity**
Marie Lemaitre, Univ. Grenoble Alpes, CEA, France
- Tue - 13 **Hydrogen induced cracking of ultra high strength 350 grade maraging steel**
Cédric Bosch, Mines Saint-Etienne, CNRS UMR 5307 LGF, France
- Tue - 14 **Influence of nano-sized VC and TiC carbides on hydrogen embrittlement in ferritic AHSS**
Tim Boot, Delft University of Technology, Netherlands

- Tue - 15 **Structural integrity analysis of trunnion studs under cathodic protection based on pre-cracked and notched specimens**
Rodrigo Alvarenga, LTAD - UFU, Brazil
- Tue - 16 **Effect of microstructure on hydrogen embrittlement susceptibility of martensitic and bainitic high strength steels**
Salim Brahim, McGill University, Canada
- Tue - 17 **A combined micromechanics/materials science approach to understanding high temperature hydrogen attack**
Kshitij Vijayvargia, University of Illinois Urbana-Champaign, USA
- Tue - 18 **Hydrogen effect on the activation enthalpy of plastic deformation**
Florian Schaefer, Saarland University, Germany
- Tue - 19 **Predicting hydrogen embrittlement of stainless steels using physics-based machine learning**
Michael Gao, National Energy Technology Laboratory, USA
- Tue - 20 **Effect of high-temperature hydrogen on diffusion and mechanical properties in additive manufactured Ni-base superalloy for gas turbine hot parts**
Daichi Akama, Mitsubishi Heavy Industries, Japan
- Tue - 21 **Effect of mechanical strength on the hydrogen embrittlement susceptibility and fracture behavior of a modified AISI 4130 steel**
Guilherme Martiniano, LTAD, UFU, Brazil
- Tue - 22 **Numerical simulation of hydrogen entering a second phase particle in aluminum**
Ken-ichi Ebihara, Japan Atomic Energy Agency, Japan
- Tue - 23 **Evaluating the sensitivities of AISC susceptibility in stainless-steel nuclear waste storage canister environments**
Sarah Blust, University of Virginia, USA
- Tue - 24 **The hydrogen effects on materials program at NIST-Boulder**
Matthew J. Connolly, National Institute of Standards and Technology, USA
- Tue - 25 **Evaluation of tungsten as a hydrogen permeation barrier in reduced activation steel F82H for nuclear fusion applications**
Dannisa Chalfoun, National Commission of Atomic Energy of Argentina (CNEA), Argentina
- Tue - 26 **Towards next generation, low cost, hydrogen resilient austenitic steels: Relating composition, microstructure and deformation modes across length**
Jessica Krogstad, University of Illinois, Urbana Champaign, USA
- Tue - 27 **MOVED TO Wed - 9**
- Tue - 28 **Effect of bainite morphology on hydrogen trapping in X70 microalloyed steel**
Lu Sun, University of Alberta, Canada

Wednesday, September 20, 2023

- Wed - 1 **WITHDRAWN**
- Wed - 2 **WITHDRAWN**
- Wed - 3 **Assessment of hydrogen embrittlement behavior in Al-Zn-Mg alloys by multi-modal 3D image-based simulation**
Hiro Fujihara, Kyushu University, Japan
- Wed - 4 **Effects of hydrogen embrittlement on the fracture strength of notched tensile specimens: An Engineering Approach**
Marcelo Paredes, Texas A&M University, USA
- Wed - 5 **Improvement of resistance against hydrogen embrittlement by increasing carbon segregation at prior austenite grain boundary in low-carbon martensitic steels**
Kazuho Okada, National Institute for Materials Science, Japan
- Wed - 6 **In situ micromechanics during hydrogen charging: Case study of diffusible hydrogen in bcc iron alloys**
Maria Jazmin Duarte Correa, Max-Planck-Institut für Eisenforschung GmbH, Germany
- Wed - 7 **In-situ microcantilever bending of titanium revealing hydrogen-dislocation interactions**
Liesbet Deconinck, Ghent University, Belgium
- Wed - 8 **Fatigue crack growth resistance and fracture toughness of pipe welds exposed to a blend of hydrogen and natural gas under high pressure**
Guillaume Benoit, Institut Prime, ISAE-ENSMA, France
- Wed - 9 **Accelerated methods for quantitative assessment of hydrogen embrittlement and hydrogen stress cracking using incremental step loading**
Joshua Jackson, US Corrosion Services, USA
- Wed - 10 **Hydrogen diffusion and trapping in a low alloy steel containing micro-porosity**
Frédéric Christien, Mines Saint-Etienne, France
- Wed - 11 **A new approach for characterization of steel weld metal hydrogen cracking susceptibility**
Marie Quintana, Welding & Materials Consultant to BMT Canada Limited, USA
- Wed - 12 **Effect of microstructure on the internal hydriding behavior of uranium**
Zachary Harris, University of Pittsburgh, USA
- Wed - 13 **Effect of hydrogen partial pressure on crack initiation and growth rate in X52 vintage steel**
Fernando Daniel León-Cázares, Sandia National Laboratories, USA
- Wed - 14 **Evaluation of the “nickel effect” in sulfide stress cracking of low alloy steels using thiosulfate as an alternative to H₂S-containing environments**
Dannisa Chalfoun, National Commission of Atomic Energy of Argentina (CNEA), Argentina
- Wed - 15 **Effect of hydrogen on phase stabilities in steels**
Tilman Hickel, Max-Planck-Institut für Eisenforschung GmbH, Germany

- Wed - 16 **Hydrogen delayed cracking assessment for super high strength hot rolled heavy gauge martensitic steels**
Robin Dedoncker, Arcelormittal Global R&D, Belgium
- Wed - 17 **The history of hydrogen embrittlement mitigation in the fastener industry - We finally SAW the light**
Salim Brahim, McGill University, Canada
- Wed - 18 **Effects of pre-existing hydrogen to stress triaxiality and damage evolution on ultra high strength steel**
Hye-Jin Kim, Hyundai-Steel Company, South Korea
- Wed - 19 **External hydrogen embrittlement assessment of pipeline base metal and heat affected zone through slow strain rate tensile testing**
Lise Jemblie, SINTEF Industry, Norway
- Wed - 20 **Atomistic simulations of hydrogen distribution in Fe-c steels**
Xiaowang Zhou, Sandia National Laboratories, USA
- Wed - 21 **Hydrogen embrittlement evaluation of stainless steels in cryogenic temperature**
Jaeyeong Park, Korea Research Institute of Standards and Science, South Korea
- Wed - 22 **Evaluation of the hydrogen compatibility of material: A comparison with different methodologies**
Kyung-Oh Bae, Korea Research Institute of Standards and Science, South Korea
- Wed - 23 **Multi scale study of the effect of hydrogen and grain boundary character on plasticity mechanisms in pure nickel**
Abdelali Oudriss, La Rochelle Université - LaSIE, France
- Wed - 24 **Analysis of hydrogen induced failure by hydrogen injection methods in micro-alloyed steels**
Jae-Myung Kim, Hyundai steel, South Korea
- Wed - 25 **Effect of atmospheric environments on the environment-assisted cracking behavior of 5xxx-Series aluminum alloys**
Gabiella Marino, University of Virginia, USA
- Wed - 26 **Assessment of hydrogen embrittlement of natural gas pipeline steels**
Irina Pushkareva, CanmetMATERIALS, Canada