Program

SIXTH INTERNATIONAL WORKSHOP ON ENVIRONMENTALLY-ASSISTED CRACKING

July 16 - 21, 2023

Sheraton Reston Hotel
Reston, Virginia, USA

Conference Chairs

A.K. Vasudevan
Office of Naval Research (retired)

Ron Latanision
Exponent, Inc

Henry Holroyd
Luxfer (retired)

Fritz Friedersdorf
Luna Labs USA, LLC

Mehdi Amiri
George Mason University

Engineering Conferences International
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Previous conferences in this series:

Stress Corrosion Cracking in Structural Materials at Ambient Temperatures  
August 30 – September 4, 2009  
Padova, Italy  
Conference Chairs:  
A.K. Vasudevan, ONR, USA  
Henry Holroyd, Luxfer, Inc., UK  
Richard Ricker, NIST, USA  
Neville Moody, Sandia National Laboratories, USA

Environmental Damage in Structural Materials Under Static Cyclic Loads at Ambient Temperatures II  
August 14-19, 2011  
Krakow, Poland  
Conference Chairs:  
A.K. Vasudevan, ONR, USA  
Henry Holroyd, Luxfer, Inc., USA  
Richard Ricker, NIST, USA  
Neville Moody, Sandia National Laboratories, USA

Environmental Damage in Structural Materials Under Static/Cyclic Loads at Ambient Temperatures III  
June 15-20, 2014  
Bergamo, Italy  
Conference Chairs:  
A.K. Vasudevan, ONR, USA  
Henry Holroyd, Luxfer, Inc., USA  
Richard Ricker, NIST, USA  
Neville Moody, Sandia National Laboratories, USA

Environmental Damage in Structural Materials Under Static Load/Cyclic Loads at Ambient Temperatures IV  
May 29-June 3, 2016  
Cork, Ireland  
Conference Chairs:  
A.K. Vasudevan, ONR, USA  
Ronald Latanision, Exponent, Inc., USA  
Henry Holroyd, Luxfer, Inc., USA  
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Environmental Damage in Structural Materials Under Static Load/Cyclic Loads at Ambient Temperatures V  
July 15-20, 2018  
Hernstein, Austria  
Conference Chairs:  
A.K. Vasudevan, ONR, USA  
Ronald Latanision, Exponent, Inc., USA  
Henry Holroyd, Luxfer, Inc., USA
The conference organizers gratefully acknowledge support from the U.S. Office of Naval Research.
Sunday, July 16, 2023

17:30 – 18:00  Conference check-in (Magnolia Foyer)
18:00 – 18:30  Opening Reception (Magnolia Room)
18:30 – 20:00  Dinner

NOTES

● Technical Sessions will be held in the Oak and Spruce Rooms.

● Meals will be in the Magnolia Room.

● Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).

● Speakers – Please leave at least 3-5 minutes for questions and discussion.

● Please do not smoke at any conference functions.

● Turn your mobile telephones to vibrate or off during technical sessions.

● After the conference, ECI will send an updated participant list to all participants. 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, July 17, 2023

08:00 – 09:00  Breakfast

09:00 – 09:10  Opening Remarks
Fritz Friedersdorf, Conference Co-Chair
Ron Latanision, ECI Technical Liaison

Session 1
Chair: Dave Rusk, Naval Air Warfare Center Aircraft Division, USA

09:10 – 10:00  Keynote
Environment-induced crack initiation in metals - experimental studies
Henry Holroyd, Consultant, USA

10:00 – 10:30  Characterizing environmentally assisted crack initiation and short crack growth
Tim L. Burnett, The University of Manchester, United Kingdom

10:30 – 11:00  Coffee Break

11:00 – 11:30  Effect of laser surface treatment on the corrosion and fatigue performance of aa5456-h116 alloys
Rajaguru Jeyamohan, University of Virginia, USA

11:30 – 12:00  Evaluation of chloride stress corrosion susceptibility of stainless steels
Earl Johns, Naval Nuclear Laboratory; Fluor Marine Propulsion, USA

12:00 – 13:30  Lunch

Session 2
Chair: Siddiq Qidwai, National Science Foundation, USA

13:30 – 14:20  Keynote
Modeling electrochemically assisted hydrogen adsorption on alloy surfaces
Chris Taylor, DNV GL and Ohio State University, USA

14:20 – 14:50  Advances in peridynamic modeling of environmentally-assisted cracking
Florin Bobaru, University of Nebraska-Lincoln, USA

14:50 – 15:30  Coffee Break

15:30 – 16:00  Combined damage-fracture model for corrosion fatigue crack growth in 3D parts
Alexander Staroselsky, Raytheon Technologies Research Center, USA

16:00 – 16:30  Electrochemical-mechanical phase field model for electroplating process
Jung Ho Yang, Technical Data Analysis, Inc., USA

Dinner on your own
Tuesday, July 18, 2023

08:00 – 09:00  Breakfast

**Session 3**  
Chair: Rick Ricker, University of Maryland, USA

09:00 – 09:30  
**A computational framework for prediction of atmospheric**  
Mehdi Amiri, George Mason University, USA

09:30 – 10:00  
**Correlating nature of precipitates with environmental degradation in aluminum alloys**  
Ramasis Goswami, US Naval Research Laboratory, USA

10:00 – 10:30  
Coffee Break

10:30 – 11:00  
**Unusual behavior of long cracks at low dk: Marci effect**  
Daniel Kujawski, Western Michigan University, USA

11:00 – 11:30  
**New aluminum alloy design**  
Asuri Vasudevan, Office of Naval Research (Retired), USA

11:30 – 13:00  
Lunch

13:15  
Board bus for excursion

13:30 – 16:30  
Excursion - National Air and Space Museum - The Steven F. Udvar-Hazy Center VA  
*Note: The bus will depart from the hotel promptly at 13:30*
Wednesday, July 19, 2023

08:00 – 09:00  Breakfast

**Session 4**
Chairs: Victor Rodriquez-Santiago, NAWCAD, USA

09:00 – 09:50  **Keynote**
Quantification of environmentally-assisted cracking mechanisms with high-resolution characterisation
Sergio Lozano-Perez, University of Oxford, United Kingdom

09:50 – 10:20  **Preferred EAC initiation sites in 7xxx aluminum**
Matthew Curd, University of Manchester, UK

10:20 – 11:00  Coffee Break

11:00 – 11:30  **Atomic mechanism of near threshold fatigue crack growth in vacuum as a basis for understanding environmental effects**
Mingjie Zhao, Exponent, Inc., USA

11:30 – 12:00  **Microstructural crack path prediction using graph theory**
Veera Sundararaghavan, University of Michigan, USA

12:00 – 13:30  Lunch

**Session 5**
Chairs: Nagaraja Iyyer, Technical Data Analysis, Inc., USA

13:30 – 14:20  **Keynote**
Dynamic fracture in dealloying induced stress-corrosion cracking
Karl Sieradzki, Arizona State University, USA

14:20 – 14:50  **Surface stress in metals induced by organic monolayer films**
Srinivasan Chandrasekar, Purdue University, USA

14:50 – 15:20  **Modeling hydrogen diffusion in precipitation hardened nickel alloy**
Attilio Arcari, Naval Research Laboratory, USA

15:20 – 15:50  Coffee Break

15:50 – 16:20  **Development of a lifetime prediction model for evaluating the sensitivities of aisc susceptibility in stainless-steel nuclear waste storage canisters**
Sarah Blust, University of Virginia, USA

16:20 – 17:00  **Use of an inverse life plot for fatigue endurance/limit estimation**
Daniel Kujawski, Western Michigan University, USA

17:00 – 18:00  Reception

*Dinner on your own*
Thursday, July 20, 2023

08:00 – 09:00  Breakfast

Session 6
Chairs: Earl Johns, Naval Nuclear Laboratory, USA

09:00 – 09:50  Keynote
Is laboratory testing of SCC susceptibility fit for purpose?
Alan Turnbull, NPL, United Kingdom

09:50 – 10:20  Assessing the loading rate dependence of hydrogen environment-assisted cracking behavior in a wide-range of engineering alloys
James Burns, University of Virginia, USA

10:20 – 10:50  Environment-assisted fracture, my friend: The cutting of gummy metals
Ronald M. Latanision, Exponent Inc.; Massachusetts Institute of Technology, USA

10:50 – 11:30  Coffee Break

11:30 – 12:00  The influence of additive manufacturing (3D printing) on susceptibility to environmentally induced fracture
Rick Ricker, University of Maryland, USA

12:00 – 12:30  Electrochemical activities at the crack tip: A localized approach
Leila Saberi, George Mason University, USA

12:30 – 14:00  Lunch

Session 7
Chairs: Alexander Staroselsky, Raytheon Technologies Research Center, USA

14:00 – 14:30  Environmentally-assisted degradation and erosion of polymers for attritable metamaterials
Nicole Apetre, U.S. Naval Research Laboratory, USA

14:30 – 15:00  Fracture toughness $K_{1c}$ affecting static threshold $K_{1scc}$
Asuri Vasudevan, TDA, Inc., USA

15:00 – 15:30  Fatigue threshold $K_{max,th}$ affected by static threshold $K_{1scc}$
Asuri Vasudevan, TDA, Inc, USA

15:30 – 16:00  Atmospheric laboratory and outdoor testing of aluminum alloy environment assisted cracking
Fritz Friedersdorf, Luna Labs USA, LLC, USA

16:00 – 16:30  Coffee Break

19:00 – 21:00  Conference Banquet
Friday, July 21, 2023

07:30 – 08:30  Breakfast

08:30 – 09:00  Needs and path forward for EAC
William Nickerson, Office of Naval Research, USA

09:00 – 09:20  Needs and path forward for EAC
Dave Rusk, Siddiq Qidwai, Earl Johns

09:20 – 09:35  Coffee Break

09:35 – 12:00  Panel Discussion: The path forward: The convergence of modeling and experiment in EAC
Moderator: Ron Latanision, Exponent Inc, USA.

Panelists: Alan Turnbull, Chris Taylor, Henry Holroyd, Karl Sieradzki, Sergio Lozano-Perez

12:00 – 12:10  Workshop Closing

Panel Discussion: The path forward: The convergence of modeling and experiment in EAC

Engineering systems of all kinds are constructed from materials that meet design specifications. Those engineering systems are assembled and then operated, inspected and maintained during performance in service environments. The environmental degradation of materials is well known phenomenologically. Mechanistic understanding is often the subject of intense research and concurrent debate. This is true of Environmentally Assisted Cracking, EAC. Debate is in part a reflection of the complexity of EAC. In order to develop an understanding of any EAC phenomenon researchers must take into account the microstructural characteristics of the materials, chemical interactions with the service environment and mechanical forces that are imposed as the system performs. This ongoing series of conferences has assembled researchers who have experience in all of these areas. Our goal is to develop a core of understanding in which appreciation of materials, chemistry and mechanics essentials are common to all EAC researchers. Looking to the future, the convergence of experimental tools which allow atom scale observations and simulation and modeling tools for characterizing materials as well as chemical and mechanical interactions provides room for optimism that mechanistic fundamentals will become elucidated and with such advances EAC will become better understood and better managed.