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International Workshop on the Environmental
Damage in Structural Materials Under Static Load/
Cyclic Loads at Ambient Temperatures

Proceedings

5-29-2016

Conference Program

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Ronald Latanision
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Program

International Workshop on the Environmental Damage in Structural Materials Under Static Load/Cyclic Loads at Ambient Temperatures

May 29 - June 3, 2016

Cork, Ireland

Conference Chairs

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

Ronald Latanision
Exponent, Inc.

Henry Holroyd
Luxfer, Inc. (retired)

Neville Moody
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The conference organizers gratefully acknowledge support from the U.S. Office of Naval Research.



Sunday, May 29, 2016

17:00 – 18:00 Conference Check-in (South's Bar)

18:00 – 19:00 Opening Reception (South's Bar)

Welcome remarks:
Conference Organizers + ECI Liaison

NOTES

- Technical sessions will be in the Plunkett and Morgan rooms.
- Poster sessions will be in the Hillcrest Room.
- Lunches will be in the Pembroke Restaurant. The conference banquet will be in the Whitechurch Suite.
- Audiotaping, videotaping and photography of presentations are strictly prohibited.
- Speakers – Please leave at least 5 minutes for questions and discussion.
- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.
- Please write your name in the front of this booklet in case it is misplaced.
- Be sure to check the participant list in this booklet to confirm that your listing is correct. If there are changes or updates, please login to the ECI website and update your listing so that the list that ECI will send to all participants after the conference will be correct.

Monday, May 30, 2016

09:00 – 09:15

Welcome and Announcements

A.K. Vasudevan, Conference Chair, H.Holroyd,
R. Latanision, ECI Technical Liaison

Session I: Special Topics

Session Chair: Matteo Ciccotti, ESPCI ParisTech, France

09:15 – 09:55

Incorrect materials selection as a cause of environmentally assisted cracking

Stan Lynch, Monash University, Australia

09:55 – 10:35

Crack nucleation, growth & arrest under subcritical crack growth

K. Sadananda & A.K. Vasudevan, TDA,Inc., USA

10:35 – 11:15

Coffee break + Poster session

11:15 – 11:55

A perspective on environmentally-induced cracking

Ronald M. Latanision, Exponent, Inc., USA

11.55 – 13:15

Lunch

Session II: Special Topics (continued)

Session Chair: Alan Turnbull, NPL, UK

13:15 – 13:55

Micromechanisms of fracture propagation in glassy polymers

Matteo Ciccotti, ESPCI ParisTech, France

13:55 – 14:35

Environmentally assisted fatigue of superelastic NiTi

Jan Racek, Institute of Physics of the Czech Academy of Sciences,
Czech Republic

14:35 – 15:15

Competition of stress corrosion crack branches observed in-situ using time-lapse 3D x-ray synchrotron computed tomography

Tim L. Burnett, University of Manchester, UK

15:15 – 16:30

Coffee break + Poster session

16.30

Evening on your own

Tuesday, May 31, 2016

Session III: Models & Experiments

Session Chair: Monica Trueba, Università Degli Studi di Milano, Italy

- 09:00 – 09:40 **Predicting fatigue crack initiation in metals using dislocation dynamics simulations**
Veera Sundararaghavan, University of Michigan Ann Arbor, USA
- 09:40 – 10:20 **Role of defect interactions during hydrogen embrittlement in iron: A multiscale perspective**
K.N. Solanki, Arizona State University, USA
- 10:20 – 11:00 Coffee break + Poster session
- 11:00 – 11:40 **SCC characterization of AL-Li-Cu-x Alloys**
A.K. Vasudevan, TDA Inc., USA & H. Holroyd, USA
- 11:40 – 12:20 **The effect of composition, temper, and crack orientation on the stress corrosion cracking behavior of Al-Mg alloys**
James Burns, University of Virginia, USA
- 12:20 – 13:55 Lunch
- 14:00 – 18:00 Excursion to Blarney Castle and Gardens
- Free time / evening on your own

Wednesday, June 1, 2016

Session IV: Microstructure

Session Chair: Dan Kujawski, Western Michigan University, USA

09:00 – 09:40

Effect of grain boundary microstructural features on the fracture behavior of Al-Li alloys

Ramasis Goswami, Naval Research Laboratory, USA

09:40 – 10:20

The effect of corrosion morphology on the fatigue initiation and small crack growth behavior of AA7050-T7451

James Burns, University of Virginia, USA

10:20 – 11:00

Coffee Break + Poster session

11:00 – 11:40

Microstructural and environmental effects on stress corrosion and corrosion fatigue of 7075 aluminum alloy

Nik Chawla, Arizona State University, USA

11:40 – 12:45

Lunch

Session IV: Microstructure (continued)

Session Chair: Scott A. Fawaz, SAFE, Inc., USA

12:45 – 13:25

Mechanical & chemical driving force affecting crack nucleation

A.K. Vasudevan & K. Sadananda, TDA, Inc, USA

13:25 – 14:05

Rate-controlling processes during environment-sensitive crack propagation in aluminum

Tim Burnett, The University of Manchester, United Kingdom

14:05 – 14:45

Solution conductivity dependent crack size effect in stress corrosion cracking and corrosion fatigue

Alan Turnbull, NPL, United Kingdom

14:45 – 15:30

Technical Discussion

15:30 – 16:00

Coffee Break + Poster session

Session V: Hydrogen Assisted Cracking/Applications

Session Chair: Tim Burnett, The University of Manchester, UK

16:00 – 16:40

Environmental assisted cracking of pipeline steels in CO₂ containing environment

Marina Cabrini, University of Bergamo, Italy

16:40 – 17:20

Material weakening due to corrosion in hardened bearing steels

Reinder Hindrik Vegter, SKF Engineering & Research Centre, Netherlands

Evening on your own

Thursday, June 2, 2016

Session VI: Electrochemistry

Session Chair: Sarah E. Galyon Dorman, SAFE, Inc., USA

- 09:00 – 09:40 **Electrochemical stress intensity approach to modeling galvanic coupling and localized damage initiation in Navy Structures**
William Nickerson, Office of Naval Research, Arlington, USA
- 09:40 – 10:20 **Relationship between electrochemical reaction processes and environment-assisted crack growth under static and dynamic atmospheric conditions**
Fritz J. Friedersdorf, Luna Innovations, USA
- 10:20 – 11:00 **Effect of sensitization on the stress corrosion cracking of AA5083**
Ramgopal Thodla, DNVGL, USA
- 11:00 – 11:40 Coffee break
- 11:40 – 12:20 **Pre-exposure embrittlement of sensitized aluminum-magnesium alloy, 5083-H116**
Henry Holroyd, Bolivar, MO, USA
- 12:20 – 13:00 **Investigation of electrochemically-induced repassivation of Al 7075-T6 and Al 2024-T3 as a function of applied stress and galvanic corrosion**
Monica Trueba, Università degli Studi di Milano, Italy

13:00 – 14:30 Lunch

Session VII: Fatigue

Session Chair: N. Chawla, Arizona State University, USA

- 14:30 – 15:10 **Understanding small crack effects on failure & threshold diagrams**
Daniel Kujawski, Western Michigan University, USA
- 15:10 – 15:50 **A numerical model to assess the role of crack-tip hydrostatic stress and plastic deformation in Environmental Assisted Fatigue Cracking**
Francesco Villa, University of Bergamo, Italy
- 15:50 – 16:30 Coffee Break
- 16:30 – 17:10 **Examination and prediction of corrosion fatigue damage and inhibition**
Sarah E. Galyon Dorman, SAFE, Inc., USA
- 19:00 – 21:00 Conference Banquet

Friday June 3, 2016

- 09:00 – 09:40 **UnioGrow & UnioCorr Life Prediction Models**
N. Iyyer, TDA, Inc, USA
- 09:40 – 10:40 **Discussion: What Corrosion Parameters are needed in Life Prediction Models?**
Moderator: R. Latanision, Exponent, USA
- 10:40 – 11:10 Coffee break
- 11:10 – 11:40 Feedback + Comments
- 11:40 – 13:00 Lunch and departures

List of Posters

1. **Effects of atmospheric environmental conditions on fatigue crack growth rates**
Scott A. Fawaz, SAFE, Inc., USA
2. **Understanding different factors affecting Supersonic Particle Deposition (SPD) repaired Al 7075-T651 plate for structural restoration**
Saravanan Arunachalam, SAFE Inc, USA
3. **In situ three-dimensional study of corrosion fatigue crack initiation and growth of corroded 7075 aluminum alloys**
T.J. Stannard, S.S. Singh, A.S.S. Sundar, S. Niverty, J.J. Williams, and N. Chawla, Arizona State University, USA
4. **Numerical and theoretical models to predict fatigue life in aggressive environments from experimental data**
Francesco Villa, University of Bergamo, Italy
5. **A method for corrosion-fatigue life prediction**
Daniel Kujawski, Western Michigan University, USA
6. **Numerical investigation of a galvanic structural joint subjected to a mechano-electrochemical loading**
N. Muthgowda, I. Adlakh, B. Gholami, and K.N. Solanki, Arizona State University, USA
7. **Investigation of Alkali metal embrittlement of Aluminum Lithium alloys using first principles calculations and dislocation theory**
Veera Sundararaghavan, University of Michigan Ann Arbor, USA