

Program
International Symposium
on
Stress Corrosion Cracking
in Structural Materials
at Ambient Temperatures

August 30 – September 4, 2009
Sheraton Padova, Padova, Italy

Conference Chairs

A.K. Vasudevan
ONR

Henry Holroyd
Luxfer, Inc.

Richard Ricker
NIST

Neville Moody
Sandia National Laboratories



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Sunday, August 30, 2009

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|---------------|---------------------------------------|
| 17:00 - 19:00 | Conference check-in (Sheraton Padova) |
| 19:00 – 21:00 | Welcome reception with hors d'oeuvres |

NOTES

- Audiotaping, videotaping and photography of presentations are strictly prohibited.
- Invited Speakers have a total of 45 minutes for their presentation – 35 minutes for the talk and 10 minutes for questions. Please keep to the schedule.

All other speakers have a total of 35 minutes for their presentation – 25 minutes for the talk and 10 minutes for questions. Please keep to the schedule.

Session chairs will keep track of timing for their session.

- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.
- Be sure to make any corrections to your name/contact information on the Master Participant List or confirm that the listing is correct. A corrected copy will be sent to all participants after the conference.

Monday, August 31, 2009

07:00 – 08:45 Breakfast buffet

08:45 – 09:00 **Welcome and Announcements**

Session I: MECHANISMS

Session Chair: Dr. L Kabacoff, Office of Naval Research, USA

09:00 – 09:45 **AQUEOUS STRESS CORROSION CRACKING AND HYDROGEN EMBRITTLEMENT MODELS**

Meryl M. Hall Jr. (Invited), Retired, Monroeville, Pennsylvania, USA

09:45 – 10:20 **FACTORS AFFECTING NUCLEATION OF STRESS CORROSION CRACKS**

K. Sadananda, Technical Data Analysis, Falls Church, Virginia, USA
A. K. Vasudevan, Office of Naval Research, Virginia, USA

10:20 – 11:10 Coffee break

11:10 – 11:45 **COHESIVE ZONE FE SIMULATION OF HYDROGEN INFLUENCED SURFACE CRACK GROWTH INITIATION IN 25%CR DUPLEX STAINLESS STEEL**

Vigdis Olden, SINTEF, Trondheim, Norway
Christian Thaulow, Roy Johnsen, NTNU, Trondheim, Norway
Erling Østby, Torodd Berstad, SINTEF, Trondheim, Norway

11:45 – 12:20 **OBSERVATION AND MODELING OF STRESS CORROSION CRACKING**

A. Chudnovsky, The University of Illinois at Chicago, Chicago, Illinois, USA
B.-H Choi, Korea University, Seoul, Republic of Korea

12:30 – 14:00 Lunch at hotel

Session Chair: Dr. W. Dietzel, GKSS, Germany

14:00 – 14:45 **THE USE OF ATOMIC FORCE MICROSCOPY TO STUDY CRACK TIPS IN GLASS**

Sheldon Wiederhorn (Invited), National Institute of Standards and Technology, Gaithersburg, Maryland, USA
Jean-Pierre Guin, University of Rennes, Rennes, France
Theo Fett, University of Karlsruhe, Karlsruhe, Germany

14:45 – 15:20 **ROLES OF DE-ALLOYING IN STRESS CORROSION CRACKING**

Stan Lynch, Defense Science and Technology Organization, Melbourne, Victoria, Australia

15:20 – 15:50 Coffee break

15:50 – 16:25 **STRESS CORROSION CRACK TIP MORPHOLOGY AND CRACK TIP CHEMISTRY BOUNDARY CONDITIONS**

Richard E. Ricker, NIST, Gaithersburg, Maryland, USA

16:25 – 17:00 **CRACK-TIP CHEMISTRY DURING ENVIRONMENT-ENHANCED CRACKING OF ALUMINUM ALLOYS**

N. J. Henry Holroyd, Luxfer Gas Cylinders (Retired), Riverside, California, USA

17:00 - *Ad hoc* discussions/free time

Dinner on your own

Tuesday, September 1, 2009

- 07:00 – 08:45 Breakfast buffet
- 08:45 – 09:00 **Session II: MODELING**
Session Chair: Prof. S. Baragetti, University of Bergamo, Italy
- 09:00 – 09:35 **FIRST-PRINCIPLES STUDY ON THE DECOHESION OF GRAIN BOUNDARIES IN METALS BY HYDROGEN TRAPPING**
Masatake Yamaguchi, Japan Atomic Energy Agency, Tokai-mura, Ibaraki
Ken-ichi Ebihara, Mitsuhiro Itakura, Tomoko Kadoyoshi, Tomoaki Suzudo, Hideo Kaburakil, Japan
- 09:35 – 10:10 **HYDROGEN ASSISTED CRACKING IN ALUMINUM USING MODIFIED MONTE CARLO DYNAMICS**
K. N. Solanki, Center for Advanced Vehicular Systems, Mississippi State University, Starkville, Mississippi, USA
D.K. Ward, Mississippi State University, Mississippi, USA
- 10:10 – 10:40 Coffee break
- 10:40 – 11:15 **A CONSISTENT THERMODYNAMIC DESCRIPTION OF HYDROGEN DIFFUSION AND DEFECT INTERACTION IN A MATERIAL CONTAINING DISLOCATIONS, VOIDS AND MICRO-CRACKS**
D. J. Bammann, Center for Advanced Vehicular Systems, Mississippi State University, Starkville, Mississippi, USA
K.N. Solanki, Mississippi State University, Mississippi, USA
- 11:15 – 11:50 **FIRST-PRINCIPLES STUDY ON THE DECOHESION OF IRON (FE) GRAIN BOUNDARY BY SOLUTE (B, C, P, S) SEGREGATION**
Masatake Yamaguchi, Japan Atomic Energy Agency, Tokai-mura, Ibaraki, Japan
- 11:50 – 12:25 **STRESS CORROSION CRACKING IN CUSTOM 465 STAINLESS STEEL**
E. U. Lee, Naval Air Warfare Center Aircraft Division, Patuxent River, Maryland, USA
- 12:30 – 14:00 Lunch at hotel
- 14:00 - *Ad hoc* discussions/free time

Dinner on your own

Wednesday, September 2, 2009

- 07:00 – 08:45 Breakfast buffet
- 08:45 – 09:00 **Session III: STRESS CORROSION**
Session Chair: Dr. K. Solanki, Mississippi State University, USA
- 09:00 – 09.45 **PRINCIPLES UNDERLYING THE STRESS CORROSION CRACK GROWTH**
K. Sadananda (Invited), Technical Data Analysis, Falls Church, Virginia, USA
A.K. Vasudevan, Office of Naval Research, Virginia, USA
- 09:45 – 10:20 **MECHANISMS OF SUBCRITICAL CRACK GROWTH IN GLASSES – ARE THEY REAL?**
Sheldon M. Wiederhorn, National Institute of Standards and Technology, Gaithersburg, Maryland, USA
- 10:20 – 11:10 Coffee break
- 11:10 – 11:45 **STRESS-CORROSION CRACKING IN PURE MAGNESIUM**
Stan Lynch, Defense Science and Technology Organization, Melbourne, Victoria, Australia
- 11:45 – 12:20 **ALLOY MICROSTRUCTURE & SLIP MODE ON THE SCC BEHAVIOR**
A. K. Vasudevan, Office of Naval Research, Arlington, Virginia, USA
K.Sadananda, TDA Inc. Leesburg Pike, Virginia, USA
- 12:20 – 14:00 Lunch at hotel
- Session Chair: Prof. T. Tsakalakos, Rutgers University, USA**
- 14:00 – 14:35 **THE ROLE OF PRECIPITATES IN THE STRESS CORROSION CRACKING OF SENSITIZED AA5083**
David J. Quesnel, University of Rochester, Mechanical Engineering Department, Rochester, New York, USA
Jie Gao, University of Rochester, New York, USA
- 14:35 – 15:10 **THE EFFECTS OF OVERAGING OF AA 7075 ON CORROSION, EXFOLIATION, AND STRESS CORROSION CRACKING**
Richard E. Ricker, NIST, Gaithersburg, Maryland, USA
- 15:10 – 15:40 Coffee break
- 15:40 – 16:15 **ON THE TRANSITION FROM CORROSION PITS TO STRESS CORROSION CRACKS**
Alan Turnbull, National Physical Laboratory, Teddington, U.K.
D. A. Horner, B.J. Connolly, University of Birmingham, U.K.
S. Zhou, National Physical Laboratory, U.K.
- 16:15 – 16:50 **STRESS-CORROSION CRACKING OF AISI 4340 STEEL IN AQUEOUS ENVIRONMENTS**
Yanyao Jiang, Department of Mechanical Engineering, University of Nevada, Reno, Nevada, USA
Sergiy Kalnaus, Jixi Zhang University of Nevada, Reno, USA
- 16:50 - *Ad hoc* discussions/free time
- Dinner on your own

Thursday, September 3, 2009

- 07:00 – 08:45 Breakfast buffet
- 08:45 – 09:00 **Session IV: DISSOLUTION**
Session Chair: Dr. Michelle Koul, U.S. Naval Academy, USA
- 09:00 – 09:45 **DISSOLUTION CONDENSATION MECHANISM OF LIQUID METAL EMBRITTLEMENT**
Evgeny E. Glickman (Invited), Tel Aviv University, Ramat Aviv, Tel Aviv, Israel
- 09:45 – 10:20 **TRANSMISSION ELECTRON MICROSCOPIC INVESTIGATION OF AL BASE ALLOYS SUSCEPTIBLE TO STRESS CORROSION CRACKING**
Ramasis Goswami, SAIC/Naval Research Laboratory, Washington DC, USA
P.S. Pao, G. Spanos, R.L. Holtz, Naval Research Laboratory, Washington DC, USA
- 10:20 – 11:10 Coffee break
- 11:10 – 11:45 **MECHANISMS THAT CONTROL THE KINETICS OF ANODIC DISSOLUTION DURING STRESS CORROSION CRACKING**
David J. Quesnel, Mechanical Engineering Dept., University of Rochester, Rochester, New York, USA
Yingrui Zhang, Quanhe Wan, University of Rochester, New York, USA
- 11:45 – 12:20 **STRESS INTENSITY FACTOR DEPENDENCE OF HG-LME IN ALUMINUM**
Scott G. Keller, University of Central Florida, Orlando, Florida, USA
Ali P. Gordon, University of Central Florida, Florida, USA
- 12:30 – 14:00 Lunch at hotel
- Session V: GENERAL TOPICS**
Session Chair: Dr. S. Lynch, Defense Science & Technology, Australia
- 14:00 – 14:45 **MULTISCALE STRAIN MAPPING OF STRESS CORROSION CRACKING BY SYNCHROTRON PROBE**
Thomas Tsakalakos, Rutgers University, Piscataway, New Jersey, USA
- 14:45 – 15:20 **STRESS CORROSION CRACKING - CREVICE INTERACTION IN AUSTENITIC STAINLESS STEELS CHARACTERIZED BY ACOUSTIC EMISSION**
Heikki Leinonen, VTT Technical Research Centre of Finland, Finland
Tanja Schild, Hannu Hänninen, Helsinki University of Technology, Finland
- 15:20 – 16:10 Coffee break
- 16:10 – 16:45 **AN ENVIRONMENTALLY ASSISTED CRACKING EVALUATION OF HIGH TOUGHNESS NI-BASED ALLOYS UNDER CATHODIC PROTECTION CONDITIONS**
Michelle G. Koul, United States Naval Academy, Annapolis, Maryland, USA
- 16:45 – 17:20 **ANALYSIS OF DEFORMATION RATE ON SCC BEHAVIOR**
Daniel Kujawski, Western Michigan University, Kalamazoo, Michigan, USA
A. K. Vasudevan, Office of Naval Research, Virginia, USA
- 17:20 – 20:00 *Ad hoc* discussions/free time
- 20:00 - Conference Banquet

Friday, September 4, 2009

- 07:00 – 08:45 Breakfast (Buffet)
- 08:45 – 09:00 **Session VI: INTERNAL STRESS/LOADING RATES**
Session Chair: Dr. H. Leinonen, VTT Tech Research, Finland
- 09:00 – 09:35 **STUDY ON THE SULFIDE STRESS CORROSION MECHANISM OF LINE-PIPES STEELS BY SLOW STRAIN RATE METHOD**
Yong Choi¹ and Sang Ho Kim^{2, 1} Sunmoon University, Korea; ² Korea University of Technology and Education, Korea
- 09:35 – 10:10 **RISING LOAD/RISING DISPLACEMENT SCC TESTING**
Wolfgang Dietzel, GKSS - Forschungszentrum Geesthacht GmbH, Geesthacht, Germany
- 10:10 – 10:40 **EFFECT OF LOADING HISTORY ON STRESS CORROSION CRACKING OF 7075-T651 ALUMINUM ALLOY IN SALINE AQUEOUS ENVIRONMENT**
Yanyao Jiang, Department of Mechanical Engineering, University of Nevada, Reno, Nevada, USA
Jixi Zhang, Sergiy Kalnaus, Majid Behrooz, University of Nevada, Reno, USA
- 10:40 – 11:10 Coffee break
- 11:10 – 11:45 **ROLE OF INTERNAL STRESS ON STRESS CORROSION CRACK GROWTH BEHAVIOR**
A. K. Vasudevan, Office of Naval Research, Arlington, Virginia, USA
K.Sadananda, TDA Inc., Leesburg Pike, Virginia, USA
- 11:45 – 12:30 Organizers EPILOG-comments, remarks, discussions and departures