

## **RICHARD PAUL GANGLOFF**

### **Born:**

Pittsburgh, Pennsylvania

August, 1948

### **Education:**

B.S. in Metallurgy and Materials Science Lehigh University, 1970

M.S. in Metallurgy and Materials Science Lehigh University, 1972

Ph.D. in Metallurgy and Materials Science Lehigh University, 1974

### **Professional Experience:**

Department of Metallurgy and Materials Science, Lehigh University, Bethlehem, PA

Graduate Instructor, 1970-1972

Graduate Research Assistant, 1972-1974

Corporate Research and Development Center, General Electric Co., Schenectady, NY

Metallurgist, 1974-1980

Corporate Research Science Laboratories, Exxon Research and Engineering, Annandale, NJ

Staff Metallurgist, 1980-1982

Senior Staff Metallurgist, 1982-1986

School of Engineering and Applied Science, University of Virginia, Charlottesville, VA

Associate Professor of Materials Science, 1986-1990

Professor of Materials Science and Engineering, 1990-present

Director, NASA-UVa Light Aerospace Alloy and Structures Technology Program, 1987-2000

Chairman, Department of Materials Science and Engineering, 2003-present

## Honors and Awards:

BS Degree with Highest Honors  
Member, Tau Beta Pi and Sigma Xi  
Undergraduate Research Paper Award (National), TMS-AIME; 1969  
Henry Marion Howe Medal, ASM International; 1986  
Award of Merit, ASTM, 1991  
Fellow of the Society, ASTM, 1991  
Fellow of the Society, ASM International; 1996  
ASTM E08 Fatigue Lecturer; 1996

## Professional Development:

Management Development Program, Harvard School of Higher Education, 2004

## Professional Societies and Committees:

ASM International

Chairman, Metals Handbook Committee on Environmental Effects in Fatigue; 1984  
Organizer, International Conference on Environmental Cracking; 1988  
Member, International Materials Review Committee; 1985-1992  
Member, Awards Policy Committee; 1997-2001  
Member, Technical Books Committee; 1998-2001

The Minerals, Metals & Materials Society of AIME

Chairman, Hudson-Mohawk Chapter; 1978-1980  
Member, Environmental Effects Committee; 1983-1989  
Organizer, International Conference on Crack Chemistry, 1983  
Member, Board of Review for Metallurgical Transactions, 1983-1993

ASTM Committee E08 on Fatigue & Fracture

Chairman, Task Group on Elevated Temperature Cracking; 1982-83  
Chairman, Task Group on Small Cracks; 1983-85  
Chairman, Subcommittee on Subcritical Crack Growth; 1985-91  
Member, Executive Committee on Fracture Mechanics; 1985-92  
Organizer, 3 International Conferences on Fracture; 1984, 1987, 1995

National Association of Corrosion Engineers

Board of Editors, Corrosion Journal; 1993-1996

Chairman, Gordon Research Conference on Physical Metallurgy; 1994

Board of Editors, Fatigue and Fracture of Engineering Materials and Structures, 1996-

Board of Editors, Engineering Fracture Mechanics, 1996-

### **Research Interests:**

The metallurgy, mechanics and chemistry of metal fatigue and fracture, with emphasis on mechanistic understanding of time-dependent failure modes necessary for high performance materials development and quantitative life prediction. Current research focuses on hydrogen embrittlement, corrosion fatigue, stress corrosion cracking, elevated temperature damage tolerance and experimental fracture mechanics of ferrous, nickel-based, titanium and aluminum alloys.

### **Publications:**

M.R. Begley, S.R. Agnew, U. Komaragiri, and R.P. Gangloff, "Hydrogen Damage in the Crack Tip Environment", in Proceedings, International Congress on Fracture-11, A. Carpinteri et al., eds., Elsevier Science, Oxford, UK, in press (2005).

A.M. Al-Rumaih and R.P. Gangloff, "New Fracture Mechanics Approach to Characterize Internal Hydrogen Embrittlement of Steel for Fitness-for-Service Modeling", in Proceedings, International Congress on Fracture-11, A. Carpinteri et al., eds., Elsevier Science, Oxford, UK, in press (2005).

S.R. Agnew, Y.J. Ro, M.R. Begley, and R.P. Gangloff, "Fatigue Crack Tip Damage-Based Models in Structural Prognosis", in Proceedings, International Congress on Fracture-11, A. Carpinteri et al., eds., Elsevier Science, Oxford, UK, in press (2005).

R.P. Gangloff, "Critical Issues in Hydrogen Assisted Cracking of Structural Alloys", in Environment Induced Cracking of Metals (EICM-2), Sergei Shipilov, ed., Elsevier Science, Oxford, UK, in press (2005).

M.P. Ciccone, R.P. Gangloff, and R.G. Kelly, "Test Environment Selection for Corrosion Fatigue Testing of AA7075-T6", in Proceedings, Corrosion of Light Metals and Alloys, Electrochemical Society, Princeton, NJ, in press (2005).

J.R. Scully, H. Dogan, D. Li, and R.P. Gangloff, "Controlling Hydrogen Embrittlement in Ultra-high Strength Steels", in Proceedings of the Tri-Service Conference on Corrosion, Army Research Laboratory, Aberdeen, MD, in press (2005).

D. Li, J. Burns, R. Bush, M. Garratt, A. Hinkle, T. Mills, C. Marks, J. Moran, J. Scully and R.P. Gangloff, "Characterization of Corrosion-Fatigue Interaction for Aluminum Alloy Substitution", in Proceedings of the 8<sup>th</sup> Joint NASA/FAA/DoD Conference on Aging Aircraft, R. D. Young, Editor, web site publication: [www.JCAA.US/AA\\_Conference2005](http://www.JCAA.US/AA_Conference2005) (2005).

R.P. Gangloff, "Corrosion Fatigue Cracking", in Corrosion Tests and Standards:: Application and Interpretation, 2<sup>nd</sup> Edition, R. Baboian, ed., ASTM International, West Conshohocken, PA, pp. 302-321 (2005).

Y.J. Ro, S.R. Agnew and R.P. Gangloff, "Uncertainty in the Determination of Fatigue Crack Facet Crystallography", Scripta Materialia, Vol. 52, pp. 531-536 (2005).

J.R. Scully, H. Dogan, D. Li, and R.P. Gangloff, "Controlling Hydrogen Embrittlement in Ultra-high Strength Steels", in Paper No. 04563, CORROSION/2004, NACE, Houston, TX (2004).

D. Li, R.P. Gangloff, and J.R. Scully, "Hydrogen Trap States in Ultrahigh-Strength AerMet<sup>®</sup> 100 Steel", Metallurgical and Materials Transactions, A, Vol. 35A, pp. 849-864 (2004).

R.P. Gangloff, "Hydrogen Assisted Cracking of High Strength Alloys", in Comprehensive Structural Integrity, I. Milne, R.O. Ritchie and B. Karihaloo, Editors-in-Chief, J. Petit and P. Scott, Volume Editors, Vol. 6, Elsevier Science, New York, NY, pp. 31-101 (2003).

R.P. Gangloff, "Diffusion Control of Hydrogen Environment Embrittlement in High Strength Alloys", in Hydrogen Effects on Material Behavior and Corrosion Deformation Interactions, N.R. Moody, A.W. Thompson, R.E. Ricker, G.S. Was and R.H. Jones, eds., The Minerals, Metals & Materials Society, Warrendale, PA, pp. 477-497 (2003).

R.L.S. Thomas, J.R. Scully and R.P. Gangloff, "Internal Hydrogen Embrittlement of Ultrahigh-Strength AerMet<sup>®</sup>100 Steel", Metallurgical and Materials Transactions, A, Vol. 34A, pp. 327-344 (2003).

R.L.S. Thomas, D. Li, R.P. Gangloff and J.R. Scully, "Trap-Governed Hydrogen Diffusivity and Uptake Capacity in Ultrahigh-Strength AerMet®100 Steel", Metallurgical and Materials Transactions, A, Vol. 33A, pp. 1991-2004 (2002).

R.P. Gangloff, "Environment Sensitive Fatigue Crack Tip Processes and Propagation in Aerospace Aluminum Alloys", in Fatigue '02, Anders Blom, Editor, Engineering Materials Advisory Services, West Midlands, UK, pp. 3401-3433 (2002).

G.H. Bray, M. Glazov, R.J. Rioja, D. Li, and R.P. Gangloff, "Effect of Artificial Aging on the Fatigue Crack Propagation Resistance of 2000 Series Aluminum Alloys", International Journal of Fatigue, Vol. 23, pp. S265-S276 (2002).

L.M. Young and R.P. Gangloff, "S-Phase Effect On Environmental Cracking in AA7050", in Advances in the Metallurgy of Aluminum Alloys, M. Tiryakioglu, ed., ASM International, Materials Park, OH, pp. 135-140 (2001).

R.P. Gangloff, "Embrittlement of High Strength  $\beta$ -Ti Alloys", in Advances in Fracture Research, Proceedings of ICF10, K. Ravi-Chandar, B.L. Karihaloo, T. Kishi, R.O. Ritchie, A.T. Yokobori, Jr. and T. Yokobori, eds., Paper No. ICF108920R, CD version, Elsevier Science, Oxford, UK, (2001).

D. Li, R.P. Gangloff, G.H. Bray, M.V. Glazov and R.J. Rioja, "Aging Dependent Intrinsic Fatigue Crack Propagation In AA2024", in Advances in the Metallurgy of Aluminum Alloys, M. Tiryakioglu, ed., ASM International, Materials Park, OH, pp.105-118 (2001).

Z. Gasem and R.P. Gangloff, "Rate-Limiting Processes in Environmental Fatigue Crack Propagation in 7000-Series Aluminum Alloys", in Chemistry and Electrochemistry of Corrosion and Stress Corrosion Cracking: A Symposium Honoring the Contributions of R.W. Staehle, R.H. Jones, ed., TMS, Warrendale, PA, pp. 501-521 (2001).

R.L.S. Thomas, R.P. Gangloff and J.R. Scully, "Effect of Diffusible Hydrogen Concentration on Internal Hydrogen Embrittlement of AerMet® 100", CD file S08p1c.pdf, in Proceedings of the Tri-Service Conference on Corrosion, J.V. Kelley and B. Placzankis, eds., Army Research Laboratory, Aberdeen, MD (2000).

E. Richey, III and R.P. Gangloff, "Strain Rate Dependent Environment Assisted Cracking of  $\alpha/\beta$ -Ti Alloys in Chloride Solution", in Environmentally Assisted Cracking: Predictive Methods for Risk Assessment and Evaluation of Materials, Equipment, and Structures, ASTM STP 1401, R.D. Kane, Ed., American Society for Testing and Materials, West Conshohocken, PA, pp.104-127 (2000).

K.R. Cooper, L.M. Young, R.P. Gangloff, and R.G. Kelly, "The Electrode Potential Dependence of Environment-Assisted Cracking of AA7050", Materials Science Forum, Vols. 331-337, pp. 1625-1634 (2000).

Z.M. Gasem and R.P. Gangloff, "Effect of Temper on Environment-Assisted Fatigue Crack Propagation in 7000-Series Aluminum Alloys", Materials Science Forum, Vols. 331-337, pp. 1479-1488 (2000).

B.P. Somerday, L.M. Young and R.P. Gangloff, "Crack Tip Mechanics Effects on Environment-Assisted Cracking of Beta-Titanium Alloys in Aqueous NaCl", Fatigue and Fracture of Engineering Materials and Structures, Vol. 23, pp. 39-58 (2000).

B.P. Somerday and R.P. Gangloff, "Effect of Strength on Environment-Assisted Cracking of Ti-8V-6Cr-4Mo-4Zr-3Al in Aqueous Chloride: Age Hardening vs Work Hardening", Materials Science and Engineering A, Vol. A254, pp. 166-178 (1998).

B.P. Somerday and R.P. Gangloff, "Effect of Strength on Environment-Assisted Cracking of Ti-8V-6Cr-4Mo-4Zr-3Al in Aqueous Chloride: Crack Tip Strain Rate", Materials Science and Engineering A, Vol. A254, pp. 179-188 (1998).

R.P. Gangloff, "Fracture Mechanics Characterization of Hydrogen Embrittlement in Cr-Mo Steel", in Present Situation on Steels for Hydrogen Pressure Vessels, Creusot-Loire Industrie, Le Creusot, France (1998).

M.J. Haynes and R.P. Gangloff, "Temperature-Dependent Void-Sheet Fracture in Al-Cu-Mg-Ag", Metallurgical and Materials Transactions, A, Vol. 29A, pp. 1599-1613 (1998).

B.P. Somerday, N.R. Moody, J.E. Costa and R.P. Gangloff, "Environment-Induced Cracking in Structural Titanium Alloys", Paper No. 27, Corrosion '98, NACE, Houston, TX, (1998).

B.P. Somerday and R.P. Gangloff, "Environmental Cracking Limitations to the Application of High Strength Beta-Titanium Alloys in the Marine Environment", in Proc. of the Tri-Service Conference on Corrosion, Vol. I, D.A. Shifler, ed., LaQue Corrosion Services, Wrightsville Beach, NC, pp. 1-1 to 1-21 (1997).

M.J. Haynes and R.P. Gangloff, "Elevated Temperature Fracture Toughness of Al-Cu-Mg-Ag Sheet: Characterization and Modeling", Metallurgical and Materials Transactions, A, Vol. 28A, pp. 1815-1829 (1997).

L.M. Young, G.A. Young, J.R. Scully and R.P. Gangloff, "The Effects of Electrode Potential and Temper on Environment Assisted Cracking in AA7050", in Light Weight Alloys for Aerospace Applications IV, E. Lee, W.E. Frazier, N.J. Kim and K. Jata, eds., TMS-AIME, Warrendale, PA, pp. 3-18 (1997).

J.A. Lillard, R.G. Kelly and R.P. Gangloff, "Effect of Electrode Potential on Stress Corrosion Cracking and Crack Chemistry of a Nickel-Base Superalloy", Corrosion '97, Paper No. 197, NACE, Houston, TX (1997).

M.J. Haynes and R.P. Gangloff, "High Resolution R-Curve Characterization of the Fracture Toughness of Thin Sheet Aluminum Alloys", Journal of Testing and Evaluation, Vol. 25, pp. 82-98 (1997).

M.J. Haynes, B.P. Somerday, C.L. Lach and R.P. Gangloff, "Micromechanical Modeling of Temperature-Dependent Initiation Fracture Toughness in Advanced Aluminum Alloys", in Elevated Temperature Effects on Fatigue and Fracture, ASTM STP 1297, R.S. Piascik, R.P. Gangloff and A. Saxena, eds., ASTM, Philadelphia, PA, pp. 165-190 (1997).

R.P. Gangloff, B.P. Somerday and D.L. Cooke, "Understanding Crack Tip Strain Rate Effects in Hydrogen Embrittlement for Improved Fitness-for-Service Modeling", in Life Prediction of Structures Subject to Environmental Degradation, P.L. Andresen and R.N. Parkins, eds., NACE, Houston, TX, pp. 161-175 (1996).

D.C. Slavik and R.P. Gangloff, "Environment and Microstructure Effects on Fatigue Crack Facet Orientation in an Al-Li-Cu-Zr Alloy", Acta Metallurgica et Materialia, Vol. 44, pp. 3515-3534 (1996).

R.S. Piascik and R.P. Gangloff, "Modeling Environment-Enhanced Fatigue Crack Growth in Al-Li-Cu-Zr", in Hydrogen Effects on Material Behavior, A.W. Thompson and N.R. Moody, eds., TMS-AIME, Warrendale, PA, pp. 409-433 (1996).

S.S. Kim, M.J. Haynes and R.P. Gangloff, "Localized Deformation Control of Elevated Temperature Fracture in Submicron Grain Aluminum with Dispersoids", Materials Science and Engineering A, Vol. 203, pp. 256-271 (1995).

B.P. Somerday, Yang Leng and R.P. Gangloff, "Elevated Temperature Fracture Toughness of a Particulate Reinforced Aluminum Alloy Composite--Part II: Micromechanical Modeling", Fatigue and Fracture of Engineering Materials and Structures, Vol. 18, pp. 1031-1050 (1995).

B.P. Somerday, Yang Leng and R.P. Gangloff, "Elevated Temperature Fracture Toughness of a Particulate Reinforced Aluminum Alloy Composite--Part I: Fracture Toughness", Fatigue and Fracture of Engineering Materials and Structures, Vol. 18, pp. 565-582 (1995).

R.P. Gangloff, "Corrosion Fatigue Cracking", in Corrosion Tests and Standards: Application and Interpretation, R. Baboian, ed., ASTM, Philadelphia, PA, pp. 253-271 (1995).

L.M. Young, G.A. Young, Jr., J.R. Scully, and R.P. Gangloff, "Aqueous Environment Enhanced Crack Propagation in High Strength Beta Titanium Alloys", Metallurgical and Materials Transactions, A, Vol. 26A, pp. 1257-1271 (1995).

J.A. Grandle, B.P. Somerday and R.P. Gangloff, "Yield Strength and Solution Composition Effects on Aqueous Environmental Cracking of Ti-8V-6Cr-4Zr-4Mo-3Al (Beta C)", in Proc. of the Tri-Service Conference on Corrosion, T. Naguy, ed., USAF Wright-Patterson Air Force Base, OH, pp. 375-392 (1994).

M.E. Mason and R.P. Gangloff, "Modeling Time-Dependent Corrosion Fatigue Crack Propagation in 7000 Series Aluminum Alloys", in FAA/NASA International Symposium on Advanced Structural Integrity Methods for Airframe Durability and Damage Tolerance, C.E. Harris, ed., NASA Conference Publication 3274, Part 1, NASA-Langley Research Center, Hampton, VA, pp. 441-462 (1994).

B.P. Somerday and R.P. Gangloff, "Global Constraint Insensitive Fracture in a Metal Matrix Composite", Metallurgical and Materials Transactions, A, Vol. 25A, pp. 1471-1479 (1994).

R.P. Gangloff, R.S. Piascik, D.L. Dicus and J.C. Newman, "Fatigue Crack Propagation in Aerospace Aluminum Alloys", Journal of Aircraft, Vol. 31, pp. 720-729 (1994).

R.P. Gangloff and R.G. Kelly, "Microbe Enhanced Environmental Fatigue Crack Propagation in HY130 Steel", Corrosion, Vol. 50, pp. 345-354 (1994).

W.C. Porr, Jr. and R.P. Gangloff, "Elevated Temperature Fracture of RS/PM Alloy 8009: Part I -- Fracture Mechanics Behavior", Metallurgical and Materials Transactions, A, Vol. 25A, pp. 365-379 (1994).

L.M. Young and R.P. Gangloff, "Hydrogen Environment Embrittlement of Beta Titanium Alloys", in Titanium '92, Science and Technology, Vol. 3, F.H. Froes and I.L. Caplan, eds., TMS-AIME, Warrendale, PA, pp. 2209-2216 (1993).

R.S. Piascik and R.P. Gangloff, "Environmental Fatigue of an Al-Li-Cu Alloy: Part II - Microscopic Hydrogen Cracking Processes", Metallurgical Transactions, A, Vol. 24A, pp. 2751-2762 (1993).

D.C. Slavik, J.A. Wert and R.P. Gangloff, "Determining Fracture Facet Crystallography Using Electron Back Scatter Patterns and Quantitative Tilt Fractography", Journal of Materials Research, Vol. 8, pp. 2482-2491 (1993).

D.C. Slavik, C.P. Blankenship, Jr., E.A. Starke, Jr. and R.P. Gangloff, "Intrinsic Fatigue Crack Growth Rates for Al-Li-Cu-Mg Alloys in Vacuum", Metallurgical Transactions A, Vol. 24A, pp. 1807-1817 (1993).

D.C. Slavik and R.P. Gangloff, "Microscopic Processes of Environmental Fatigue Crack Propagation in Al-Li-Cu Alloy 2090", in Fatigue '93, Vol. II, J.-P. Bailon and J.I. Dickson, eds., EMAS, West Midlands, UK, pp. 757-765 (1993).

R.P. Gangloff, D.C. Slavik, R.S. Piascik and R.H. Van Stone, "Direct Current Electrical Potential Measurement of the Growth of Small Fatigue Cracks", in Small Crack Test Methods, ASTM STP 1149, J.M. Larsen and J.E. Allison, eds., ASTM, Philadelphia, PA, pp. 116-168 (1992).

J.A. Wagner and R.P. Gangloff, "Fracture Toughness of Al-Li-Cu-In Alloys", Scripta Metallurgica et Materialia, Vol. 26, pp. 1779-1784 (1992).

B.P. Somerday, Yang Leng, F.E. Wawner and R.P. Gangloff, "Elevated Temperature Fracture Toughness of a SiC Particulate Reinforced 2009 Aluminum Composite", in Advanced Metal Matrix Composites for Elevated Temperatures, M.N. Gungor, ed., ASM International, Metals Park, OH, pp. 167-182 (1992).

W.C. Porr, Jr., Anthony Reynolds, Yang Leng and R.P. Gangloff, "Elevated Temperature Cracking of RSP Aluminum Alloy 8009: Characterization of the Environmental Effect", Scripta Metallurgica et Materialia, Vol. 25, pp. 2627-2632 (1991).

R.S. Piascik and R.P. Gangloff, "Environmental Fatigue of an Al-Li-Cu Alloy: Part I - Intrinsic Crack Propagation Kinetics in Hydrogenous Environments", Metallurgical Transactions, A, Vol. 22A, pp. 2415-2428 (1991).

W.C. Porr, Jr., Y. Leng, and R.P. Gangloff, "Elevated Temperature Fracture Toughness of P/M Al-Fe-V-Si", in Low Density, High Temperature Powder Metallurgy Alloys, W.E. Frazier, M.J. Koczak, and P.W. Lee, eds., TMS-AIME, Warrendale, PA, pp. 129-155 (1991).

Yang Leng, W.C. Porr, Jr. and R.P. Gangloff, "Time Dependent Crack Growth in P/M Al-Fe-V-Si at Elevated Temperatures", Scripta Metallurgica et Materialia, Vol. 25, pp. 895-900 (1991).

R.P. Gangloff, "Hydrogen Environment Enhanced Fatigue Crack Propagation in Metals", in Advanced Earth-To-Orbit Propulsion Technology, R.J. Richmond and S.T. Wu, eds., NASA CP 3092, Vol. III, Washington, DC, pp. 483-510 (1990).

Y. Leng, W.C. Porr, Jr. and R.P. Gangloff, "Tensile Deformation of 2618 and Al-Fe-Si-V Aluminum Alloys at Elevated Temperatures", Scripta Metallurgica et Materialia, Vol. 24, pp. 2163-2168 (1990).

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R.P. Gangloff, "Corrosion Fatigue Crack Propagation in Metals", in Environment Induced Cracking of Metals, R.P. Gangloff and M.B. Ives, eds., NACE, Houston, TX, pp. 55-109 (1990).

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K.T. Venkateswara Rao, R.S. Piascik, R.P. Gangloff and R.O. Ritchie, "Fatigue Crack Propagation in Aluminum-Lithium Alloys", in Proc. Fifth Intl. Al-Li Conf., T.H. Sanders, Jr. and E.A. Starke, Jr., eds., Materials and Component Engineering Publications Ltd., Birmingham, UK, pp. 955-971 (1989).

R.P. Wei and R.P. Gangloff, "Environmentally Assisted Crack Growth in Structural Alloys: Perspectives and New Directions", in Fracture Mechanics: Perspectives and Directions, ASTM STP 1020, R.P. Wei and R.P. Gangloff, eds., ASTM, Philadelphia, PA, pp. 233-264 (1989).

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P.L. Andresen, R.P. Gangloff, L.F. Coffin and F.P. Ford, "Applications of Fatigue Analyses: Energy Systems", in Fatigue 87, Vol. III-A, R.O. Ritchie and E.A. Starke, Jr., eds., EMAS, West Midlands, UK, pp. 1723-1751 (1987).

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*Measurement and Modeling of Temperature Dependent Hydrogen Embrittlement of Cr-Mo Steel to Enable Fitness-for-Service Modeling*, Abdullah M. Al-Rumaih, University of Virginia, Charlottesville, VA (2004).

### **MS Theses Advised:**

*Elevated Temperature Fracture Toughness of a SiC Particulate-Reinforced 2009 Aluminum Composite*, Brian P. Somerday, University of Virginia, Charlottesville, VA (1993).

*Environment-Assisted Cracking in Beta Titanium Alloys*, Lisa M. Young, University of Virginia, Charlottesville, VA (1993).

*Time-Dependent Corrosion Fatigue Crack Propagation in 7000 Series Aluminum Alloys*, Mark E. Mason, University of Virginia, Charlottesville, VA (1994).

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*Internal Hydrogen Embrittlement of a Trap-Rich Ultrahigh-Strength Steel, AerMet<sup>®</sup>100*, Richard L.S. Thomas, University of Virginia, Charlottesville, VA (2000).

*Post Overload Fatigue Crack Growth Retardation in AA7050 in Aqueous Chloride-Chromate Environments*, Chelsey L. Gallik, University of Virginia, Charlottesville, VA (2002).

*Residual, Diffusible and Total Hydrogen Concentrations and Embrittlement after Baking in Cadmium Plated AerMet<sup>®</sup>100*, Hakan Dogan, University of Virginia, Charlottesville, VA (2004).

*Fatigue Crack Surface Crystallography of Precipitation Hardened Aluminum Alloys*, Yunjo Ro, University of Virginia, Charlottesville, VA (2004).

#### **Published Reports:**

General Electric - 12  
University of Virginia - 42

Exxon - 14

#### **Technical Presentations (1980 - 2005):**

Invited - 98  
Contributed - 54

Company Seminars - 14

#### **Consulting:**

Naval Research Laboratory  
Exxon Research and Engineering Company  
Crouse-Hinds  
Infilco Degremont  
Stephenson and Balthrop, Ltd.  
Lawrence Livermore National Laboratory  
Sharples Incorporated  
NASA-Johnson Space Flight Center  
United Technologies - Pratt & Whitney  
Southwest Research Institute

Allied Signal, Inc.  
Carson Associates/U.S. Internal Revenue Service  
General Electric Corporate Research and Development  
McGuire, Woods, Battle & Boothe  
Chevron Research and Technology Company  
International Consortium of 14 Petrochemical and Steel Companies  
Christian and Barton  
ALCOA Technical Center  
Structural Reliability Technology  
Century Aluminum  
Rogers, Joseph, O'Donnell & Quinn  
S&KT/U.S. Air Force  
NASA-Langley Research Center

**Courses Developed:**

Fracture Mechanics of Engineering Materials (graduate; televised)  
Physical Metallurgy of Transition Element Alloys (graduate; televised)  
Deformation and Fracture Mechanics of Structural Materials (advanced undergraduate and graduate; televised)  
Engineering Materials: Properties and Applications (undergraduate)  
Aerospace Materials: Properties and Applications (undergraduate)

**Short Course Participation:**

Modern View of Fatigue; Union College, Schenectady, NY; 18 years, 1976 to 1993.  
Aircraft Design and Development; NAVAIR, Alexandria, VA; 13 years, 1986 to 1998.  
Electrochemical Techniques in Corrosion Engineering; UVa Center for Electrochemical Science and Engineering; 1 year, 1994.