

Robert G. Kelly
Professor of Materials Science and Engineering

Born:

February 1, 1962
Philadelphia, PA

Research and Professional

Education

Ph.D. The Johns Hopkins University, Materials Science & Engineering, January, 1989
M.S.E. The Johns Hopkins University, Materials Science & Engineering, May, 1986
B.E.S. The Johns Hopkins University, satisfied the requirements for degrees in both
 Biomedical Engineering and Materials Science & Engineering, graduated with
 departmental and general honors, May, 1984

Professional Experience

Department of Materials Science and Engineering, School of Engineering and Applied
Science, University of Virginia, Charlottesville, VA
Professor, 2004-present
Associate Professor, August, 1997- August, 2004
Assistant Professor, September, 1994 – August, 1997
Institutional Research Assistant Professor, July, 1992 - September, 1994
Research Assistant Professor, July, 1990 - July, 1992

Visiting Research Fellow
Corrosion and Protection Centre, University of Manchester Institute of Science &
Technology, Manchester, United Kingdom
September, 1988 - July, 1990

A. Honors and Awards

2007 Rodman Scholars Outstanding Professor Award
2007 Fellow, National Association of Corrosion Engineers
2007 Harold S. Morton Award for Undergraduate Teaching (SEAS/UVa)
2005 UVa MSE Undergraduate Teaching Award
2004 All-University Teaching Award
2004 Rodman Scholars Outstanding Professor Award
2003 Election as Honorary Member, Golden Key International Honour Society
2002 Raouf Lecture, Dept. of Mechanical Engineering, U.S. Naval Academy
2001 Robert T. Foley Award from Natl Capital Section of ECS
2000 UVa MSE Undergraduate Teaching Award
1999 H. H. Uhlig Award (NACE International) – young educator award
1997 A. B. Campbell Award (NACE International) – best paper by young author (< 35 y)
1996-97 University Teaching Fellow
1996 Rodman Scholars Award for Excellence in Teaching

1995, 1996, 1997 Local Section of the Electrochemical Society, Gwendolyn Wood Award for best local section while officer
1989-90 NSF/NATO Post-Doctoral Fellowship
1988-89 Academic Year - Fulbright Scholarship
Sigma Xi Scientific Research Honor Society - elected 1988
1987 - Achievement Reward for College Scientists
1986 - Electrochemical Society Energy Summer Research Fellowship
The 1985-86 Carl E. Menneken Fellowship for Scientific Research
1984-86 - NSF Graduate Fellowship
Tau Beta Pi National Engineering Honor Society - elected 1983
ASM Undergraduate Fellow - 1983-84 Academic Year

B. Graduate Students Directed

Ph.D. (12 graduated, 4 in progress)

Sudesh Kannan (May, 1995)

“Understanding mechanisms of corrosion of carbon steel exposed to black liquor”

Zhihao Fei (with J. Hudson) (December, 1996)

“Spatiotemporal behavior of iron and sulfuric acid electrochemical reaction system”

C. Sean Brossia (January, 1997)

1997 Allan Talbott Gwathmey Award (UVa)

1998 Morris Cohen Award (ECS)

1996 UVa Outstanding GTA Award

“The influence of alloy sulfur on the crevice corrosion behavior of austenitic stainless steels”

Jennifer A. Lillard (with R. Gangloff) (August, 1998)

“Aqueous environmental assisted cracking of a ni-based superalloy”

Kevin C. Stewart (August, 1999)

“Intermediate attack in crevice corrosion by cathodic focusing”

Kevin R. Cooper (May, 2001)

2002 Morris Cohen Award (ECS)

“Chemistry and electrochemistry of environment-assisted cracking of an al-zn-mg-cu alloy”

Karen Ferrer (May, 2002)

“Determination of the role of bicarbonate in the corrosion of aircraft lap splice joints”

Sherri Wang (with M. Reed, ECE) (May, 2003)

“Nanofabricated devices for studying crevice corrosion”

Feng Gui (January, 2006)

“Development of a Performance Test Protocol for Corrosion Prevention Compounds for Aircraft”

Chris Taylor (with M. Neurock) (January, 2006) Engineering Physics

“First Principles Modeling of the Structure and Reactivity of Water at the Metal/Water Interface”

2006 Allan Talbott Gwathmey Award (UVa)

Brian Ralston (with D. E. Brown, SIE) (August, 2006)

“Modeling the Evolution of Corrosion: A Feature-Based Model for Growth”

Stephen Policastro (May 2008)

“Role of the Electrolyte in Selective Dissolution”

*Jason Lee (exptd May, 2009)

*Michael Francis (exptd. May 2009)

2007-08 Va Space Grant Consortium Graduate Research Fellowship

*Elissa Bumiller (exptd May 2010)

*Wasiu Adedeji (exptd May 2011)

*current

M.S. (15 graduated, 1 in progress)

James Dante (October, 1992)

“Analysis of the adsorbed electrolyte layer formed on a metal surface during atmospheric corrosion”

Elizabeth Nash (August, 1993)

“A mechanistic study of iron corrosion in methanol solutions”

C. Sean Brossia (May, 1994)

“A mechanistic study of iron corrosion in methanol solutions”

Kevin R. Cooper (August, 1995)

“Development of a quantitative test for the exfoliation resistance of aluminum alloy 7075”

Tracy T. Lunt (with J. Hudson) (February, 1997)

“Analysis of electrochemical noise from the corrosion of steels”

Christopher M. Weyant (January, 1999)

“An investigation of the mitigation of atmospheric corrosion by surface active papers”

Karen E. Lewis (May, 1999)

“Determination of the corrosion conditions within aircraft lap-splice joints”

Lisa DeJong (August, 1999)

“Investigations of Crevice Corrosion Scaling Laws Using Microfabrication Techniques and Modeling”

Jackie Williams (December, 2001)

“Mechanistic framework of localized coating failure on copper-containing aluminum alloys AA2024-T3 and AA1100-H14”

Jason Lee (December, 2001)

“Investigations of crevice corrosion using computational modeling and microfabrication techniques”

Wen Gan (January 2005)

“Corrosion Prediction Modeling of Aircraft Lap Joints”

Marco Ciccone (with R. P. Gangloff) (August, 2005)

“Effect of precorrosion-induced crack closure on fatigue crack growth in Al-Zn-Mg-Cu alloys”

Sarah Galyon (August, 2006)

“The Effects of CPC on the Initiation and Growth of Corrosion Fatigue Cracks in AA 7075-T6”

2005 Tri-Services Corrosion Conference Poster Contest Winner (Engineering)

Andrew Hodges (January, 2008)

“The Effect of Crevice Geometry on Crevice Corrosion Stability of 316 Stainless Steel”

Connor Parker (May, 2008)

“Coating Delamination Mechanism and Electrochemical Kinetics of Filiform Corrosion on AA2024-T3”

2007 Harvey Herro Award (3rd Place) at Corrosion '07 Poster Contest

*Erica Neiser (exptd. May 2010)

C. Undergraduates - Senior Thesis Advisees (18 graduated, 3 in progress)_

Patrick Bastek (Chem.E., 1992)

1992 Sigma Xi Anniversary Award for Undergraduate Research (Engineering)

“Experimental determination of the effect of the surrounding surface area on scratched electrodes”

John Cheng (Appl. Math., 1992)

“Investigation of ion chromatographic techniques for the study of solution chemistry in localized corrosion of aluminum alloys”

- Lyndia Brumback (Appl. Math, May, 1993) 1993 Sigma Xi Anniversary Award for Undergraduate Research (Engineering)
“Investigation of the chemical composition of solutions formed during localized corrosion of aluminum alloys”
- Golchereh Salamat (Chem. E., May, 1993) 1993 SEAS Undergraduate Research and Design Symposium Winner
“Characterization of the solution composition inside dissimilar alloy crevices due to corrosion”
- Robert Wilson (Chem. E., Dec, 1993)
“Design and installation of a black liquor corrosion monitoring system”
- Daniel Chiang (Chem. E., May, 1994)
“Determination of the effects of chloride and thiosulfate ion concentrations on the pitting of A-282 in synthetic black liquor”
- Leigh Ann Pawlick (Mech. E., May, 1995) 1995 SEAS Undergraduate Research and Design Symposium Finalist
“Study of the corrosive effects of methanolic solutions on metallic materials”
- Philip J. Ambrose (Chem.E., May, 1995)
“Black liquor corrosion analysis”
- Stephen Garrison (Computer Science, May, 1997)
“Interfacing with invisible corrosion: The development of a graphical user interface for two dimensional modeling of localized corrosion”
- Hunter Mayo (Chem. E, May, 1997)
“Study of the anodic and cathodic kinetics of localized corrosion in three corrosion-resistant alloys”
- John La Scala (Chem. E, May, 1997)
“An analysis of the ability of surface active papers to mitigate atmospheric corrosion via corrosive gas absorption”
- Jackie Williams (Engr. Sci, May, 1999)
“Investigation of the high temperature durability of Peti-5 adhesive through a capillary electrophoresis analysis of corrosive species concentration growth inside composite wing structures”
- Jonathan Howse (Computer Science, May, 1999)
“Adding a graphical user interface to an existing crevice corrosion modeling application”
- Melissa Snee (Mechanical Engr., May, 1999)
“Improving the safety of riding helmets”

Christian Franck (Mechanical Engr., 2002)

“Quantitative measurements of exfoliation corrosion kinetics at various humidity levels in aluminum alloy 7178-T6”

Jonathan Daniels (Mechanical Engr., 2002)

“A study of the pesticides used at local golf courses: to reduce operating costs and limit pollution”

Marco Ciccone (Chemical Engr., May, 2002) 2003 NACE Fontana Poster Winner

“Effects of quench delay and stabilization treatment on intergranular corrosion resistance from AA7075, and AA2017”

David Ojumu (Mech Engrg, May 2008)

“Corrosion Protection Compounds: Laboratory Measurements of Field Exposed Samples”

*Jessica Bashkoff (Mechanical Engr., May 2009)

*Will Jacobs (Chem Eng, exptd, May 2010)

*Rafat Mehdi (Mech Eng, expted May 2010)

D. Visitors and Postdoctoral Fellows Supervised

Dr. Maria Inman (Ph.D., Univ. of Auckland, NZ), 1994-96

Dr. Jiangnan Yuan (Ph.D., Univ. of Tokyo), 1996-1998

Dr. Oliver Schneider (Ph.D, University of the Saarland), 1998-2001

Dr. Hongwei Wang¹ (Ph.D., Ohio University), 2001-2003

Dr Anna Igual Munoz (Visiting Asst. Prof from University of Valencia, Spain) (2002)

Dr. Francisco J. Presuel-Moreno¹ (Ph.D., Univ. of South Florida), 2002-2005

Research Scientist (2005- 2006)

Dr. Fushuang Cui (Ph.D., Univ. of South Florida), 2003-2005

Dr. Christopher Taylor² (Ph.D., Univ. of Virginia), 2006-2007

Dr. Zhuoyuan Chen (PhD, Royal Institute of Technology), 2006-2008

*Dr. Yu Cai² (Ph.D., Case Western Reserve Univ.), 2005-present

*current

¹co-advised with J. Scully ²co-advised with M. Neurock

E. External Research Grants and Contracts

Completed Research Programs

Li/Cl₂ and Li/F₂ Batteries Based on Energetic Thermoplastics

Revised 11/7/2008

Dates of Contract 9/90-3/91
Sponsor: Innovative Solutions from Advanced Technology
Amount: \$12,000
No. of Graduate Students Supported: 1/4 of a technician

Fundamental Studies of the Influence of Alloying on Localized Corrosion

Dates of Contract: 5/92 - 5/95
Sponsor: National Science Foundation
Amount: \$198,000/3 years
No. of Graduate (Undergraduate) Students Supported: 1
Release Time: 15 %

Research Experiences for Undergraduates

Dates of Contract: 9/92 - 5/93
Sponsor: National Science Foundation
Amount: \$9,900/1 year
No. of Graduate (Undergraduate) Students Supported: (2)
Release Time: 0 %

Research Experience for Undergraduates Supplement

Dates of Contract: 11/95-11/96
Sponsor: National Science Foundation Division of Materials Research
P.I. and all Co-PI's: R. G. Kelly
Amount: \$ 5,000/1 year
Research Equipment: None
No. of Graduate (Undergraduate) Students Supported: (1)

Fundamental Studies of the Corrosion of Steel in Methanol

Dates of Contract: 7/92 - 6/94
Sponsor: Kobe Steel
Amount: \$ 100,671/2 years
No. of Graduate (undergraduate) Students Supported: 1
Release Time: 10 %

Dynamics Analysis of Electrochemical Noise (with J. Hudson, Chem. E.)

Dates of Contract: 9/92 - 8/95
Sponsor: Mobil Oil Research and Development Corp.
Amount: \$ 206,101/3 years
No. of Graduate (Undergraduate) Students Supported: 1
Release Time: 8.3 %

Development of a Quantitative Test for Exfoliation Resistance in 7XXX Alloys

Dates of Gift: 1/93-12/93
Sponsor: Reynolds Metals
Amount: \$ 15,000
No. of Graduate (Undergraduate) Students Supported: 1

Release Time: 0 %

Corrosion of Copper in Ethylene Glycol/Water Mixtures under High Applied Voltage

Sponsor: General Electric Drive Systems and Virginia Center for Innovative Technology

Amount: \$ 18,000

Graduate (Undergraduate) Students Supported: 0 (1/4 of technician)

Release Time: 0 %

Corrosion of Steel in Black Liquor

Dates of Contract: 10/91 - 9/94

Sponsors: International Paper, Union Camp Corporation, Chesapeake Paper Company, Westvaco

Amount of Award: \$240,000/3 years

No. of Graduate (Undergraduate) Students Supported: 1 (1)

Release Time: 0 %

Comparative Study of the Pitting Corrosion Behavior of Alloy 600, Alloy 690 and SS347 in Buffer Solutions

Dates of Contract: 6/94-12/96

Sponsor: Knolls Atomic Power Laboratory

P.I. and all Co-PI's: R. G. Kelly

Amount: \$149,118/2.5 years.

No. of Graduate (Undergraduate) Students Supported: 1

Application of Dynamics Analysis to the Electrochemical Noise Associated with Pitting Corrosion

Dates of Contract: 1/94 - 12/96

Sponsor: Chevron Petroleum Technology Company

P.I. and all Co-PI's: R. G. Kelly and J. L. Hudson (Chem. E.)

Amount: \$237,966/3 years.

No. of Graduate (Undergraduate) Students Supported: 1 + 0.5 PDRA

Release Time: 0 %

"Determination of the Role of Molybdenum and Nitrogen on the Conditions Inside Occluded Corrosion Sites in Stainless Steels"

Sponsor: National Science Foundation Division of Materials Research

P.I. and all Co-PI's: R. G. Kelly

Dates of Award: 6/1/95 - 5/30/98

Amount: \$ 214,008

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 2(1)

Release Time: 8.3%

Mitigation of Atmospheric Corrosion by Surface Active Papers

Sponsor: 3M

P.I. and all Co-PI's: R. G. Kelly, G. E. Stoner
% of funds expended under supervision of each PI and co-PI: 90% RGK
Dates of Award: 6/1/96 - 12/31/98
Amount: \$ 110,000
Research Equipment: None
No. of Graduate (Undergraduate) Students Supported: 1 (1)
Release Time: 8.3%

Development of an Embeddable Microinstrument for Measurements of Rebar Corrosion in Reinforced Concrete

Sponsor: Va. Transportation Research Council
P.I. and all Co-P.I.'s: R. G. Kelly, S. H. Jones, A. P. Batson
% of funds expended under supervision of each PI and co-PI: RGK 50%, SHJ 50%
Dates of Award: 6/1/96 - 5/30/98
Amount: \$166,053
No. of Graduate (Undergraduate) Students Supported: 2
Release Time: 0%

Analysis of Corrodents Trapped Within Ti-Honeycomb/PETI-5 Facsheet Structures

Sponsor: NASA/Langley
P.I. and all Co-PI's: R. G. Kelly
Amount: \$30,000
Dates: 1/1/98-12/31/98
Research Equipment: \$18,000
No. of Graduate (Undergraduate) Students Supported: 1/4 PDRA, 1 undergraduate
Release Time: 0%

Mobil Foundation Scholarship

Sponsor: Mobil Exploration and Production Technology Company
P.I.: R. G. Kelly
Amount: \$10,000
No. of Graduate Students Supported: 2 fellowships for Ph.D. students in CESE along with money for travel to MEPTEC, and computers.

Optimum Microstructures for Stress-Corrosion Cracking Resistance and Strength in 7XXX Al Alloys

Sponsor : ALCOA
Code No: 6-40911
PI and all co-PIs: Scully, Kelly, and Gangloff
% of funds expended under supervision of each PI and co-PI: 33%
Dates of Award: 1/1/96 - 12/31/99
Amount : \$350,000
Research Equipment: None
No. of Graduate (Undergraduate) Students Supported : 1
Release Time: 0%

Measurement of the Chemical Composition of Solutions Inside Aircraft Lap-Splice Joints Developed During Service

Sponsor: NASA Langley Research Center

P.I. and all Co-PI's: R. G. Kelly

Amount: \$ 180,000

Dates of Contract: June 1, 1996 – December 31, 1998

No. of Graduate (Undergraduate) Students Supported: 1

Release Time: 8.3%

The Role of Coating and Substrate Heterogeneities in the Long-Term Performance of Painted Aluminum Alloys

Sponsor: Air Force Office of Sponsored Research

P.I. and all Co-PI's: S. R. Taylor, R. G. Kelly, J. R. Scully

% of funds expended under supervision of each PI and co-PI: 33%

Dates of Award: 5/1/96 - 10/31/99

Amount: \$ 655,371/3 years

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 3

Release Time: 8.3%

Investigation of Some Issues Related to Electrochemical Chloride Extraction from Reinforced Concrete

Sponsor: VTRC

P.I. and all Co-PI's: G. E. Stoner, R. G. Kelly

Dates of Award: 1/1/99-5/31/2002

Amount: \$117,000/3.5 years

Research Equipment: 0

No. of Graduate (Undergraduate) Students Supported: 1

Microfabrication Methods Applied to the Development of Rigorously Defined Corrosion Samples

Sponsor: NSF

P.I. and all Co-PI's: R. G. Kelly, M. L. Reed

Dates of Award: 6/1/99-5/31/2002

Amount: \$347,220/3 years

Research Equipment: 0

No. of Graduate (Undergraduate) Students Supported: 2

Release Time: 8.3%

Development of Commercial Prototype Version of a Corrosivity Microinstrument for Reinforced Concrete

Sponsor: VTRC

P.I. and all Co-PI's: R. G. Kelly

Amount: \$208,274/2 years

Research Equipment:

No. of Graduate (Undergraduate) Students Supported: 1

Corrosion Management Options: Chemical Suppression Technologies

Sponsor: University of Dayton Research Institute (for Air Force Research Lab)

P.I. and all Co-PI's: R. G. Kelly

Amount: \$ 82,500

Dates of Award: 9/27/99-9/27/00

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1

Release Time: 8.3%

The Science of Localized Corrosion: Atomistic and Continuum Modeling

Sponsor: Sandia National Laboratory (as part of a DOE Center for Synthesis and Processing)

P.I. and all Co-PI's: R. G. Kelly, M. Neurock

Amount: \$200,000/4 years

Dates of Award: 5/1/99-4/30/03

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1 Post-Doctoral Research Associate

Release Time: 0%

Corrosion Prevention and Abatement Compounds for Boldly Exposed and Occluded Regions on Aircraft

Sponsor: NCI Information Systems, Inc

P.I. and all Co-PI's: R. G. Kelly

Amount: \$ 65,000

Dates of Award: 7/2/01-6/30/02

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1

Release Time: 8.3%

Tunable Ionic Self-Assembled Monolayers for Corrosion Prevention Coatings

Sponsor: Luna Innovations/AFOSR SBIR

P.I. and all Co-PI's: R. G. Kelly

Amount: \$30,000

Dates of Award: 10/1/01-7/30/02

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: Support for lab tech/manager

Release Time: None

Multiplexed Optical Fiber Chemical Sensor Arrays for *In Situ* Corrosion Monitoring

Sponsor: Luna Innovations/DOE Phase I STTR

P.I. and all Co-PI's: R. G. Kelly

Amount: \$ 30,000

Dates of Award: 9/1/01-5/30/02

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: Support for lab tech/mgr

Release Time: None

The Development of an Environmentally Compliant, Multi-Functional Coating for Aerospace Application Using Molecular- and Nano-Engineering Methods Modeling

Sponsor: AFOSR MURI Program

P.I. and all Co-PI's: S. R. Taylor, J. R. Scully, R. G. Kelly, G. J. Shiflet (UVa), others at Arizona State, Ohio State, Univ. of New Mexico, Univ. of Cincinnati, US Naval Academy

Amount : \$5,000,000/5 years + \$0.7M matching from State and SEAS

RGK Responsible for \$120K/yr of AFOSR funds

Dates of Award: 5/1/01-4/30/06, subgrant ended after 2nd year of grant

Research Equipment: most of the matching money was for equipment

No. of Graduate (Undergraduate) Students Supported:

1 Post-Doctoral Research Associate, 1 GRA

Release Time: 10%

Corrosion Prevention and Abatement Compounds for Boldly Exposed and Occluded Regions on Aircraft

Sponsor: NCI Information Systems, Inc

P.I. and all Co-PI's: R. G. Kelly

Amount: \$ 65,000

Dates of Award: 7/2/01-6/30/02

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1

Release Time: 8.3%

Corrosion Prediction Model Validation

Sponsor: S&KT

P.I. and all Co-PI's: R. G. Kelly

Amount: \$150,000

Dates of Award: 6/1/03-12/31/03

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1

Release Time: 15%

Measurement of IGC Susceptibility of Ni Base Alloy Welds

Sponsor: Knolls Atomic Power Laboratory

P.I. and all Co-PI's: R. G. Kelly

Amount: \$53,750

Dates of Award: 4/1/03-9/30/04

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 30% Lab Tech

Release Time: 4.1%

Corrosion Prevention Compounds: Test Method Development

Sponsor: S&KT

P.I. and all Co-PI's: R. G. Kelly

Amount: \$83,906

Dates of Award: 9/1/02-12/31/03

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1

Release Time: 10%

Environmental Spectra and CPC Effects on Corrosion/Fatigue

Sponsor: NIA/NASA/AFRL

P.I. and all Co-PI's: R. P. Gangloff, R. G. Kelly, S. Agnew

Amount: \$754,880 (RGK responsible for \$236,440)

Dates of Award: 5/16/03-9/30/05

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 2 PhD, 2 PDRA

Release Time: 10%

***Ab Initio* Modeling of the Aqueous Electrochemistry of Nickel**

Sponsor: Knolls Atomic Power Laboratory

P.I. and all Co-PI's: R. G. Kelly, M. Neurock

Amount: \$98,000 (RGK responsible for \$49,000)

Dates of Award: 11/1/03-10/31/04

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1 PhD, 1 PDRA

Release Time: 4.1%

***Ab Initio* Modeling of the Elevated Temperature Electrochemistry of Nickel**

Sponsor: Knolls Atomic Power Laboratory

P.I. and all Co-PI's: R. G. Kelly, M. Neurock

Amount: \$98,000 (RGK responsible for \$49,000)

Dates of Award: 6/1/04-5/31/05

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1 PhD, 1 PDRA

Release Time: 4.1%

Corrosion Damage Modeling Workshop

Sponsor: Office of Naval Research

P.I. and all Co-PI's: R. G. Kelly

Amount: \$32,310

Proposed Dates of Award: 1/1/05-12/31/05

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 0

***Ab Initio* Modeling of the Intergranular Electrochemistry of Nickel**

Sponsor: Knolls Atomic Power Laboratory

P.I. and all Co-PI's: R. G. Kelly, M. Neurock

Amount: \$99,000 (RGK responsible for \$49,500)

Dates of Award: 6/1/05-9/30/06

Award During 2005-06: \$40,218

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1 PhD, 1 PDRA

Release Time: 4.1%

Corrosion Studies in Support of C-130 CWB and C-5 Tie Box Projects

Sponsor: S& K Technologies (for USAF)

P.I. and all Co-PI's: R. G. Kelly

Amount: \$ 403,998

Award During 2005-06: \$180,000

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1 PhD, 1 PDRA

Release Time: 10%

Next-Generation Modeling of Corrosion Damage Evolution

Sponsor: Office of Naval Research

P.I. and all Co-PI's: R. G. Kelly, D. E. Brown

Amount: \$326,958 (RGK responsible for \$163,478)

Dates of Award: 1/1/05-12/31/07

Award During 2005-06: \$54,493

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1 PDRA

Release Time: 5%

Corrosion Modeling Literature Review

Sponsor: Office of Naval Research

P.I. and all Co-PI's: R. G. Kelly

Amount: \$39,167

Dates of Award: 2/1/06-7/31/06

Research Equipment: None

No. of Graduate (Undergraduate) Students Supported: 1 PDRA

TOTAL FUNDING FOR COMPLETED RESEARCH

\$4.605 M

Current Research Programs

Modeling of Critical Crevice Corrosion Chemistry and the Solution Layer in the Presence of Dust

Sponsor: Case Western Reserve University (for DOE)

P.I. and all Co-PI's: R. G. Kelly

Amount of Award: \$610,000 100 % under RGK
Dates of Contract: July 1, 2004 through September 30, 2008
Research Equipment: \$93,739
 Amount expended during 2007-08 (RGK): \$120,000
No. of Graduate (Undergraduate) Students Supported: 1 M.S., 1 PDRA
Release Time: 10%

NIRT: Science and Technology of Nanoporous Metal Films

Sponsor: NSF
P.I. and all Co-PI's: M. L. Reed (PI), H. Bart-Smith, M. Begley, R. G. Kelly, G. Zangari
Amount: \$ 1,350,000 (20% under supervision of reporting PI/co-PI)
Duration of Award: 8/1/05-7/31/09
Amount expended during 2007-08 (RGK): \$56,250
Research Equipment: None
No. of Graduate (Undergraduate) Students Supported: 4 PhD, 1 PDRA
Release time: 0%

First-Principles Modeling of the Iron Dissolution Reaction Mechanism

Sponsor: National Energy Technology Laboratory
P.I. and all Co-PI's: M. Neurock (PI), R. G. Kelly
Amount: \$ 68,000 (50% under supervision of reporting PI/co-PI)
Duration of Award: 12/1/07-11/30/08
Amount expended during 2007-08 (RGK):: \$17,000
Research Equipment: None
No. of Graduate (Undergraduate) Students Supported: 1 PDRA
Release Time: 0%

First-Principles Calculations of the Structure and Energetics of Al/Water Interfaces of Relevance to Corrosion and Fatigue

Sponsor: NASA
PI and all co-PI's: R. G. Kelly, M. Neurock
Dates of proposed program: 1/1/07– 12/31/09
Amount of program: \$415,012 50 % under RGK
Amount expended during 2007-08 (RGK):: \$69,168
Research Equipment: \$10k in computer nodes for Beowulf cluster
No. of Graduate (Undergraduate) Students Supported: 1 PDRA
Release Time: 8.3%

Atmospheric Corrosion Driven by Naturally Generated Reactive Halogens

Sponsor: Mandaree Corporation for Office of Undersecretary of Defense
PI and all co-PI's: R. G. Kelly
Dates of Contract: 06/21/07-04/15/08
Amount of Award (total):\$40,000 100 % under RGK
Research Equipment:0
No. of Students Supported: 0.5 PDRA
Release Time: 5%

Electrochemical Detection of Sensitization in 5xxx Aluminum Alloys

Sponsor: Office of Naval Research

PI and all co-PI's: R. G. Kelly

Dates of Contract: 04/01/2008 - 12/31/2008

Amount of Award (total):\$25,000 100 % under RGK:

Amount of funds expended during reporting period by reporting faculty member: \$0

Research Equipment:0

No. of Students Supported: 0

Release Time: 8.3%

Development and Validation of an Integrated Intergranular Corrosion/Cracking Model of Al-Mg Alloys for Naval Applications

Sponsor: Office of Naval Research

PI and all co-PI's: R. G. Kelly, J. R. Scully, R. P. Gangloff

Dates of Contract: 01/01/08-12/31/10

Amount of Award (total):\$2,207,512 39 % under RGK:

Amount of funds expended during reporting period by reporting faculty member:
\$60,000

Research Equipment:0

No. of Students Supported: 2 PhD, 0.5 PDRA

Release Time: 15%

DURIP: Height-Regulated Scanning Kelvin Probe with Electrochemical Control and Associated System to Produce Controlled Corrosive Atmospheres for Studies of Corrosion Under Atmospheric Exposure

Sponsor: Office of Naval Research

PI and all co-PI's: R. G. Kelly, J. R. Scully

Dates of Contract: 04/14/2008 - 03/16/2009

Amount of Award (total):\$ 250,167 90 % under RGK:

Amount of funds expended during reporting period by reporting faculty member: \$0

Research Equipment:\$250,167

No. of Students Supported: 0

Release Time: 0%

TOTAL in 2007-08: \$ 406,554

MAJOR RESEARCH EQUIPMENT ACQUIRED

Year/Item	Source of Support	Value	
1991	Electrochemical Equipment*	Princeton Applied Research Corporation gift	\$17,000
	Ion Chromatograph*	Grant funds	40,000
1992	KF Titrator**	Gift funds	4,000
	Electrochemical Equipment*	Princeton Applied Research Corporation gift	17,000
	Capillary Electrophoresis System	Waters Chromatography gift	3,000
1993	Upgrade to existing ion chromatograph***	Grant funds	9,500
	Water purification system	Gift funds	4,500
	Electrochemical Equipment*	Princeton Applied Research Corporation gift	17,000
1994	Electrochemical Equipment*	Princeton Applied Research Corporation gift	17,200
	RS6000 Model 25T	IBM Shared University (SUR) program	11,575
1995	Electrochemical Equipment*	Princeton Applied Research Corporation gift	17,000
	Capillary Electrophoresis System	Waters Corporation gift	10,511
1996	Electrochemical Equipment*	Princeton Applied Research Corp gift	17,000
1997	Electrochemical* Equipment	Princeton Applied Research Corp Gift	17,000

	Ambient Air Analyzer	HEET money and research funds	11,089
	Pure Air Generator	HEET money and research funds	3,215
	Scanning Ref. Electrode/ Kelvin Probe [#]	AFOSR	50,000
	Micropositioning stage, impedance analyzer [#]	AFOSR	50,000
	Non-contact surface topography system [#]	AFOSR, gift funds, Dean's Office	186,000
1998	Electrochemical* Equipment	Princeton Applied Research Corp Gift	17,000
1999	Electrochemical* Equipment	Princeton Applied Research Corp Gift	17,000
2000	Electrochemical* Equipment	Princeton Applied Research Corp Gift	17,000
2001	Electrochemical* Equipment	Princeton Applied Research Corp Gift	17,000
2002	Electrochemical* Equipment	Princeton Applied Research Corp Gift	17,000
TOTAL			\$420,190

* with J. Scully

** with S. R. Taylor

*** with G. Stoner

with S. R. Taylor, J. Scully

F. Bibliography of Books and Refereed Publications

Refereed Journal Articles

Graduate Student co-author, Undergraduate student co-author

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Refereed Conference Proceedings

1. C. C. Streinz, R. G. Kelly, P. J. Moran, J. R. Waggoner, "The Effect of P2VP Molecular Weight and Aging Temperature on Self-Discharge and Subsequent High Rate Behavior of Lithium Iodine Batteries," in *Proc. Symp. on Primary and Secondary Lithium Batteries*, J. P. Gabano, P. Bro, eds., The Electrochemical Soc., v. 88-6, pp. 87-95 (1988).
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7. R. G. Kelly, "The Passivity of Iron in Non-Aqueous and Mixed Solvents," Sandia National Laboratories, Albuquerque, NM, January 5, 1990.
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17. R. G. Kelly, "Probing the Chemistry Inside Localized Corrosion Sites," Center for Nuclear Waste Regulatory Analyses, Southwest Research Institute, San Antonio, January 11, 1995.
18. R. G. Kelly, "Control of Localized Corrosion by Occluded Site Solutions," Department of Materials Science and Engineering Seminar Series, McMaster University, June 23, 1995.
19. "The Role of Ion Analysis in Understanding Corrosion Problems," Richmond Chromatography Discussion Group, March 25, 1996.
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22. "Measurement and Modeling of the Factors Controlling Localized Corrosion," Department of Chemical Engineering, University of Virginia, October 17, 1996.
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25. "Accelerated Corrosion Inside Occluded Spaces," Lucent Technology Seminar Series, Lucent Technologies, Murray Hill, NJ, June 10, 1997.
26. "Microinstruments for Corrosion Monitoring," Shell Westhollow Research Center, Houtson, October 13, 1997.
27. "Design, Manufacture, and Performance of Embeddable Microinstruments for Electrochemical Measurements," Corrosion Prevention '97, NACE - Canada, Toronto, Nov, 10, 1997.
28. "Corrosion Conditions Inside Occluded Regions on Aircraft," Research in Progress, Corrosion '98, San Diego, March 25, 1998.

29. "Control of Crevice Corrosion Morphology," Gordon Conference on Aqueous Corrosion, Colby-Sawyer College, July 8, 1998.
30. "Computational Study of the Factors that Control Crevice Corrosion Morphology," Sandia National Laboratory, August 6, 1998.
31. "Effects of Subcrevices in Crevice Corrosion: Computational Modeling Results," L. A. DeJong, J. M. Howse, R. G. Kelly, Corrosion '99.
32. "The Effects of the UTF and Teaching Portfolio on Teaching Effectiveness," R. G. Kelly, UVa Fall Teaching Workshop, September 1, 1998.
33. "Corrosion Microinstruments," TRB Meeting, Washington, DC, January 14, 1999.
34. "Embeddable Corrosion Sensors, SPIE Conf. Proc., Newport Beach, CA, (1999).
35. "Modeling and Measurement of Occluded Crevice Corrosion," Materials Science Seminar Series, Virginia Tech, September 10, 1999.
36. "The Effect of Boundary Conditions on Localized Corrosion Computations," 1999 DoE Corrosion Contractors Meeting, Univ. of Illinois, Urbana, IL, September 18, 1999.
37. "Towards Understanding and Mitigating Crevice Corrosion in Aging Aircraft", Chemical Engineering Dept., University of Oklahoma, March 1, 2000.
38. "Progress Towards Understanding Crevice Corrosion" Chemical Engineering Dept., Case Western Reserve University, March 23, 2000.
39. "Recent Computational and Experimental Investigations of Crevice Corrosion, " Symposium H, MRS Spring Meeting, San Francisco, April, 2000.
40. "Computational Studies of Crevice Corrosion " School of Chemistry, Tel Aviv University, Tel Aviv, Israel, January 10, 2001.
41. "Local Probes of Corrosion and Coating Failure on Al Alloys," University of Western Ontario, New London, Ontario, October 5, 2001.
42. "Localized Failure of Organic Coatings," The State Key Laboratory on Marine Corrosion and Protection, Qingdao Corrosion and Protection Laboratory, Luoyang Ship Materials Research Institute, China, Aug 13, 2001.
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50. "Computational Studies of Localized Corrosion Linking Fundamental Corrosion Science to Technological Applications," Topical Day on "Numerical simulation of localised corrosion," SCK•CEN, Belgium, 15-16th of October, 2002.
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57. J. H. Payer, R. G. Kelly, "Localized Corrosion Data and Analyses from the Materials Performance Thrust of the OCWRM Science and Technology Program," Nuclear Waste Technical Review Board Workshop on Localized Corrosion, Las Vegas, NV, September 25-26, 2006.
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37. Using Flexible Points in a Developing Simulation of Selective Dissolution in Alloys, J. C. Carnahan, S. A. Policastro, E. C. Carson, P. F. Reynolds, R. G. Kelly, Proceedings of the 2007 Winter Simulation Conference, S. G. Henderson, B. Biller, M.-H. Hsieh, J. Shortle, J. D. Tew, and R. R. Barton, eds., IEEE, 891-899 (2008).
38. Seker, Erkin; Huang, Ling; Begley, Matthew R.; Bart-Smith, Hilary; Kelly, Robert G.; Zangari, Giovanni; Reed, Michael L.; Utz, Marcel, "Compressive Stress Accumulation in Composite Nanoporous Gold and Silicone Bilayer Membranes: Underlying Mechanisms and Remedies," Materials Research Society Symposium Proceedings (2008), Paper #: 1052-DD03-20. http://www.mrs.org/s_mrs/bin.asp?CID=11328&DID=205380&DOC=FILE.PDF

39. Seker, Erkin; Zhu, Jianzhong; Bart-Smith, Hilary; Begley, Matthew; Kelly, Robert; Zangari, Giovanni; Reed, Michael L., "Thermo-mechanical and size-dependent behavior of freestanding AuAg and nanoporous-Au beams," Materials Research Society Symposium Proceedings (2007), Volume Date 2006, 976E(Size Effects in the Deformation of Materials--Experiments and Modeling), Paper #: 0976-EE06-09.
40. J. H. Payer, R. G. Kelly, "Perspectives on localized corrosion in thin layers of particulate," Materials Research Society Symposium Proceedings (2007), 985(Scientific Basis for Nuclear Waste Management XXX), 237-248.

Contributed Presentations and Lectures

1. R. G. Kelly, P. J. Moran, "A Study of the Morphology of Lithium/Iodine Cells at Various States of Discharge Using Scanning Electron Microscopy," 168th Meeting of the Electrochemical Society, Las Vegas, NV, October, 1985.
2. L. C. Phillips, R. G. Kelly, J. W. Wagner, P. J. Moran, "A Preliminary Study of the Volume Change Associated with Discharge of Lithium/Iodine Cells via Holographic Interferometric Techniques," 168th Meeting of the Electrochemical Society, Las Vegas, NV, October, 1985.
3. R. G. Kelly, P. J. Moran, "An Investigation of the Rate-Limiting Mechanism in Lithium/Iodine Batteries via Electrochemical Impedance Spectroscopy," 168th Meeting of the Electrochemical Society, Las Vegas, NV, October, 1985.
4. C. C. Streinz, R. G. Kelly, P. J. Moran, J. Jolson, J. R. Waggoner, S. Wicelinski, "Measurement of the Components of the Ohmic Resistance in Lithium/I₂(P2VP) Batteries," Symp. on the Measurement and Compensation of Electrolyte Resistance in Electrochemical Tests, ASTM, Philadelphia, PA, March, 1988.
5. R. G. Kelly, J. Kruger, P. J. Moran, E. Gileadi, "Corrosion, Passivity, and Breakdown of Alloys Used in High Energy Density Batteries," 172nd Meeting of the Electrochemical Society, Honolulu, HI, October, 1987.
6. C. C. Streinz, R. G. Kelly, P. J. Moran, J. R. Waggoner, "An Investigation of the Temperature Dependence and an Interpretation with Regard to the Rate-Limiting Mechanism in Li/I₂ Batteries," 172nd Meeting of the Electrochemical Society, Honolulu, HI, October, 1987.
7. R. G. Kelly, P. J. Moran, K. M. Poneleit, C. C. Streinz, J. W. Wagner, "The Effect of Poly(2-vinylpyridine) Molecular Weight on the Volume Change Associated with Discharge of Li/I₂ Cells," 172nd Meeting of the Electrochemical Society, Honolulu, HI, October, 1987.

8. R. G. Kelly, E. Gileadi, J. Kruger, P. J. Moran, "Passivity of Iron in Propylene Carbonate," Research in Progress Symp., Corrosion '88, Cincinnati, OH, March, 1988.
9. A. J. Young, R. G. Kelly, R. C. Newman, "Characterization of Porous Metallic Dealloyed Layers by Electrochemical Impedance Spectroscopy," 1st Intl. Symp. on Electrochemical Impedance Spectroscopy," Bombannes, France, May, 1989.
10. R. G. Kelly, A. J. Young, R. C. Newman, "The Characterization of Dealloyed Layers by Electrochemical Impedance Spectroscopy," 177th Meeting of the Electrochemical Society, Montreal, Quebec, May, 1990.
11. B. J. Webster, R. G. Kelly, R. C. Newman, "The Electrochemistry of SRB Corrosion," 177th Meeting of the Electrochemical Society, Montreal, Quebec, May, 1990.
12. R. G. Kelly, A. J. Young, R. C. Newman, "The Coarsening of Dealloyed Layers and Its Relation to Stress-Corrosion Cracking," 178th Meeting of the Electrochemical Society, Seattle, WA, October, 1990.
13. R. G. Kelly, R. C. Newman, "Experimental Measurement of Single Crack Advance Events in Ag/Au Stress-Corrosion Cracking," 178th Meeting of the Electrochemical Society, Seattle, WA, October, 1990.
14. B. J. Webster, R. G. Kelly, R. C. Newman, "The Electrochemistry of SRB Corrosion of Stainless Steel," 178th Meeting of the Electrochemical Society, Seattle, WA, October, 1990.
15. R. C. Newman, A. J. Young, M. I. Suleiman, R. G. Kelly, "Coarsening Kinetics of Nanoporosity within De-alloyed Layers: Relevance to Stress-Corrosion Cracking," Research in Progress Symp., Corrosion '91, NACE, Cincinnati, OH, March, 1991.
16. R. G. Kelly, R. C. Newman, "Advanced Materials: Corrosion and Electrochemistry," in M. Ferreira, ed., NATO Advanced Study Institute: Electrochemical and Optical Techniques for the Study and Monitoring of Metallic Corrosion, Portugal, July, 1989.
17. P.J. Moran, E. Gileadi, R. G. Kelly, J. Kruger, D. A. Shifler, M. M. Takeno, "The Corrosion Behavior of Metals in Nonaqueous Environments," 176th Meeting of the Electrochemical Society, Hollywood, FL, October, 1989.
18. B. K. Nash, J. F. Dante, R. G. Kelly, "Applications of Ion Chromatography to Corrosion Studies," Intl. Ion Chromatography Symp., Denver, CO, October, 1991.
19. J. F. Dante, R. G. Kelly, "The Use of Ion Chromatography and the Quartz Crystal Microbalance for the Study of the Corrosion of Magnetic Tapes," IBM, Tuscon, AZ, October, 1991.

20. B. K. Nash, R. G. Kelly, "The Use of Ion Chromatography for the Study of Localized Corrosion," 180th Meeting of the Electrochemical Society, Phoenix, AZ, October, 1991.
21. R. G. Kelly, "EIS as a Broad-based Research Tool," EIS Data Collection, Management and Interpretation for Corrosion Measurement, Schlumberger Instruments, Cincinnati, OH, March, 1991.
22. R. G. Kelly, "Application of Advanced Solution Analysis Techniques in Corrosion and Electrochemistry Studies," Waters Chromatography, Milford, MA, December, 1991.
23. S. Kannan, P. D. Bastek, R. G. Kelly, "Comparison of the Corrosivity of Mill and Simulated Black Liquors," Paper 289, Corrosion '92, NACE, Nashville, TN, April, 1992.
24. P. D. Bastek, R. G. Kelly, R. C. Newman, "Experimental Assessment of the Interaction Between Filmed and Bare Areas During a Scratch Test," Paper 219, Corrosion '92, NACE, Nashville, TN, April, 1992.
25. B. K. Nash, R. G. Kelly, "The Characterization of Crevice Solution Chemistry During the Initiation Stage of Crevice Corrosion," 181st Meeting of the Electrochemical Society, St. Louis, MO, May, 1992.
26. J. F. Dante, R. G. Kelly, "The Composition of an Adsorbed Electrolyte Layer on an Atmospherically Corroding Metal Surface," 181st Meeting of the Electrochemical Society, St. Louis, MO, May, 1992.
27. J. F. Dante, R. G. Kelly, "The Use of Ion Chromatography and the Quartz Crystal Microbalance for the Study of the Corrosion of Magnetic Tapes," 182nd Meeting of the Electrochemical Society, Toronto, October, 1992.
28. H. S. Scully, L. Brumback, R. G. Kelly, "Chromatographic Studies of Localized Corrosion Sites," Intl. Ion Chromatography Symp., Linz, Austria, September, 1992.
29. B. K. Nash, R. G. Kelly, "The Development and Maintenance of the Crevice Solution Chemistry in Type 304 Stainless Steel," 183rd Meeting of the Electrochemical Society, Honolulu, HI, May, 1993.
30. R. G. Kelly, H. S. Scully, "Forensic Corrosion Science Using Capillary Electrophoresis," Intl. Ion Chromatography Symp., Baltimore, MD, September, 1993.
31. R. G. Kelly, J. Underwood, R. C. Wilson, "Monitoring the Ionic Content of Black Liquor by Capillary Electrophoresis and its Relation to Liquor Corrosivity," Intl. Ion Chromatography Symp., Baltimore, MD, September, 1993.

32. C. S. Brossia, R. G. Kelly, "Mechanistic Studies of Iron Corrosion in Methanol Solutions," Research in Progress Symp., Corrosion '94, Baltimore, February, 1994.
33. G. Salamat, R. G. Kelly, "Investigation of the Chemistry Inside Dissimilar Metal Crevice Corrosion Sites," Marine Corrosion Symp., Corrosion '94, Baltimore, MD, February, 1994.
34. K. R. Cooper, R. G. Kelly, "Local Chemical and Electrochemical Conditions During Exfoliation of AA7075," Intl. Symp. on Localized Dissolution/Corrosion, 1994 Fall TMS/ASM Meeting, Rosemont, IL, October 5, 1994.
35. C. S. Brossia, R. G. Kelly, "The Effect of Inclusions on the Crevice Corrosion Chemistry of Stainless Steel," Intl. Symp. on Localized Dissolution/Corrosion, 1994 Fall TMS/ASM Meeting, Rosemont, IL, October 5, 1994.
36. K. R. Cooper, R. G. Kelly, "Application of Capillary Electrophoresis to the Development of a Quantitative Test for the Exfoliation Corrosion Resistance of an Aluminum Alloy," Intl. Ion Chromatography Symp., Dallas, TX, October 2, 1995.
37. R. G. Kelly, C. S. Brossia, K. R. Cooper, J. Krol, "Analysis of Disparate Levels of Anions of Relevance to Corrosion," Intl. Ion Chromatography Symp., Dallas, TX, October 3, 1995.
38. C. S. Brossia, R. G. Kelly, "On the Role of Alloy Sulfur in the Initiation of Crevice Corrosion in Stainless Steel", Symp. on Critical Factors in Localized Corrosion II, The 188th Meeting of the Electrochemical Soc., Chicago, IL, October 9-11, 1995.
39. M. E. Inman, R. G. Kelly, S. A. Willard, R. S. Piascik, "Coordinated Metallographic, Chemical and Electrochemical Analyses of Fuselage Lap Splice Corrosion," ASIP Conference, Atlanta, August 25-29, 1996.
40. C. S. Brossia, R. G. Kelly, "The Influence of Alloy Sulfur Content on the Crevice Corrosion of Austenitic Stainless Steels," Symp. on Prediction of Passivity Breakdown and Localized Corrosion: Experimental and Modeling Approaches, 190th Meeting of the Electrochemical Society, San Antonio, TX, Oct. 6-11, 1996.
41. R. G. Kelly, J. Yuan, S. H. Jones, W. Blanke, J. H. Aylor, W. Wang, A. P. Batson, A. Wintenberg, G.G. Clemena, "Embeddable Microinstruments for Corrosion Monitoring," *Paper 97294, Corrosion '97*, NACE, Houston (1997).
42. J. A. Lillard, R. G. Kelly, R. P. Gangloff, "The Effect of Potential on the Embrittlement and Crack Chemistry of IN 718," *Paper 97197, Corrosion '97*, NACE, Houston (1997).

43. "Optical Fiber-Based Corrosion Sensors for NDE of Aging Aircraft", J. Greene, M. Jones, K. Van Cott, K. Murphy, A. Vengsarkar, R. Claus, R. Kelly, Presentation # N2.2, Aeromat '97, Williamsburg, VA, ASM International, May 16, 1997.
44. "The Instructional Toolkit: Making the Time Investment in Using the Web for Teaching Reasonable for the Non-Computer Geek," UVa Teaching Resource Center Workshop, January 12, 1998.
45. "Embeddable Microinstruments for Corrosion Monitoring in Concrete," Transportation Research Board, Committee A3C15 Annual Meeting, January 13, 1998, Washington, DC.
46. "The Role of Coating Defects and Substrate Heterogeneities in the Long-Term Performance of Organic Coatings on Aluminum," with S. R. Taylor, A. M. Mierisch, J. Yuan, G. Ilevbare, and J. R. Scully, Research in Progress Symp., NACE '98, San Diego, March, 1998.
47. "Inhibition of Corrosion on Chromate Conversion Coated AA 2024-T3: Behavior of Intermetallic Compounds," G. O. Ilevbare, J. Yuan, R.G. Kelly, J. R. Scully, 193rd Meeting of the Electrochemical Society, May, 1998, San Diego.
48. "Understanding the Breakdown of Organic Coatings using LEIM/S and Local Chemical Analysis," S. R. Taylor, A. M. Mierisch, R. B. Leggat, J. Yuan, R. G. Kelly, 4th International Symposium on Electrochemical Impedance Spectroscopy, Angra dos Reis, Brazil, August 2-7, 1998.
49. L. A. DeJong, R. G. Kelly, "The Demonstration of the Microfabrication of Rigorously Defined Crevices for the Investigation of Crevice Corrosion Scaling Laws," in Critical Factors in Localized Corrosion III Symposium, 194th Meeting of the Electrochemical Society, November, 1998, Boston.
50. R.G. Kelly, O. Schneider, J. Yuan, "Influence of the pH on localized Coating Failure of AA2024" Abstract No. 81, Meeting Abstracts Vol. 99-1, Electrochemical Society Meeting, Seattle, WA, May 1999.
51. R.G. Kelly, K.S. Lewis, R.S. Piascik, and S.A. Willard, "Determination of Chemical Species Present within Aircraft Lap-Splice Joints" Electrochemical Society Meeting, Seattle, WA, May 1999.
52. R.G. Kelly, K.S. Lewis, R.S. Piascik, and S.A. Willard "Determination of Chemical Species Present within Aircraft Lap-Splice Joints" *Aeromat '98*. Washington D.C. June 15-18, 1998.
53. K.S. Lewis, R. G. Kelly "Corrosion Conditions Inside Occluded Regions on Aging Aircraft," MRS Fall Meeting, Boston, MA, Dec. 1, 1998.

54. R. G. Kelly, "Modeling of Crevice Corrosion," DOE BES Workshop on Localized Corrosion, Chicago, March 24-25, 1999.
55. M.M. Altynova, R.G. Kelly, J.R. Scully, G. Cooke "An Engineering Model Of Crevice Corrosion For KC-135 Lapjoints" Abstract 611, 196th Meeting of The Electrochemical Society, Inc., Honolulu, October 17-22, 1999.
56. R. G. Kelly, C. Weyant , "Atmospheric Corrosivity Control with Surface Active Papers," 196th Meeting of The Electrochemical Society, Inc., Honolulu, October 17-22, 1999.
57. O.M. Schneider, R. G. Kelly, "Influence of the Bulk Solution Composition on the Blister Formation on AA2024," 197th Meeting of The Electrochemical Society, Toronto, May 14-18, 2000.
58. S. Sharp, G. E. Stoner, R. G. Kelly, "Analyzing Chlorides in Concrete Using Capillary Electrophoresis", 197th Meeting of The Electrochemical Society, Toronto, May 14-18, 2000.
59. K. R. Cooper, R. G. Kelly, "Electrochemical Conditions in the Environment-Assisted Cracking of Al-Zn-Mg-(Cu) Alloys", 197th Meeting of The Electrochemical Society, Toronto, May 14-18, 2000.
60. J. M. Williams, R. G. Kelly, "A Comparison of the Localized Coating Failure of AA1100 and AA2024", 197th Meeting of The Electrochemical Society, Toronto, May 14-18, 2000.
61. K. R. Cooper, R. G. Kelly, "Electrochemical Conditions in the Environment-Assisted Cracking of an Al-Zn-Mg-Cu Alloy", symposium E1, "Corrosion and Corrosion Prevention of Low Density Metals and Alloys ", the 198th Meeting of the Electrochemical Society in Phoenix from October 22-27, 2000.
62. K. S. Lewis, R. G. Kelly, "Understanding the Role of the Carbon Dioxide System in Corrosion of Aircraft Lap Splice Joints," Symposium E1, "Corrosion and Corrosion Prevention of Low Density Metals and Alloys ", the 198th Meeting of the Electrochemical Society in Phoenix from October 22-27, 2000.
63. O. Schneider, G. O. Ilevbare, J. R. Scully, R. G. Kelly, "In-Situ Confocal Scanning Laser Microscopy Studies of the Effects of Surface Treatments on the Corrosion of AA 2024-T3" symposium E1, "Corrosion and Corrosion Prevention of Low Density Metals and Alloys ", the 198th Meeting of the Electrochemical Society in Phoenix from October 22-27, 2000.
64. M. Altynova, R.G. Kelly, G.R. Cooke, J.R. Scully, "A Hybrid Probabilistic-Database Model to Predict Corrosion Damage in Aging Aircraft," NACE '01, Orlando, March, 2001.

65. K. Furrow, J. M. Williams, K. R. Cooper, F. Gui, R. G. Kelly, "Addition of Corrosion Inhibitors to Amlguard Corrosion Prevention Compound," Corrosion Inhibitors Symposium, 202nd Meeting of the Electrochemical Society- Salt Lake City, UT, October, 2002.
66. H. Wang, W. Gan, F. J. Presuel, R. G. Kelly, R. G. Buchheit, "Modeling of Inhibitor Release in Epoxy Coating with Hydrotalcites Using Finite Element Method," Corrosion Inhibitors Symposium, 202nd Meeting of the Electrochemical Society- Salt Lake City, UT, October, 2002.
67. F. Presuel, R. G. Kelly, "Modeling of Corrosion Protection Provided by an Aluminum-Based Clad Exposed to Atmospheric Conditions," 2003 MRS Spring Meeting, Symposium Z (Mechanisms in Electrochemical Deposition and Corrosion), San Francisco, April 21-25, 2003.
68. R. G. Kelly, R. C. Kinzie, "Current State of Corrosion Prevention Compounds," 7th Joint DOD/FAA/NASA Conference on Aging Aircraft, Joint Council on Aging Aircraft, New Orleans, LA, Sept 11, 2003.
69. M. Ciccone, R. P. Gangloff, R. G. Kelly, "Test Environment Selection for Corrosion Fatigue Testing of AA7075-T6," Symposium D3, Corrosion and Protection of Light Metal Alloys, The 204th Meeting of the Electrochemical Society, Inc., Orlando, FL, October 13-14, 2003.
70. F. Preseul-Moreno, M. Goldman, R. G. Kelly, J. R. Scully, "Electrochemical Sacrificial Protection Provided by Al-Co-Ce Metal Coating Coupled to AA2024-T3," Symposium D3, Corrosion and Protection of Light Metal Alloys, The 204th Meeting of the Electrochemical Society, Inc., Orlando, FL, October 13-14, 2003.
71. F. Preseul-Moreno, F. Cui, G. Kelly, "Modeling of Corrosion Protection Provided by an Aluminum-based Clad: Water Layer Effect," Symposium D3, Corrosion and Protection of Light Metal Alloys, The 204th Meeting of the Electrochemical Society, Inc., Orlando, FL, October 13-14, 2003.
72. F. Gui, R. G. Kelly, "Development of a Quantitative Protocol for Evaluating Corrosion Prevention Compounds for Use in Lap Joints," 6th International Workshop on Aircraft Corrosion, Solomons Island, MD, August 24-27, 2004.
73. F. Cui, F. Preseul-Moreno, R. G. Kelly, "Experimental and Computational Evaluation of the Corrosion of Alclad AA2024-T3 Exposed at a Seacoast Environment," *Corrosion in Marine and Saltwater Environments II Symposium*, The 206th Meeting of the Electrochemical Society, Honolulu, HI, October 2-8, 2004.
74. F. Gui, R. G. Kelly, "Characterization of Wicking and Wetting Ability of Corrosion Prevention Compounds," *Corrosion in Marine and Saltwater Environments II*

Symposium, The 206th Meeting of the Electrochemical Society, Honolulu, HI, October 2-8, 2004.

75. O. M. Schneider, G. O. Ilevbare, R. G. Kelly, J. R. Scully, "Localized Coating Failure on AA2024-T3 in Different Electrolyte Environments," *Pits and Pores III Symposium*, The 206th Meeting of the Electrochemical Society, Honolulu, HI, October 2-8, 2004.
76. O. M. Schneider, G. O. Ilevbare, R. G. Kelly, J. R. Scully, "In-situ Confocal Laser Scanning Microscopy of the Galvanic Corrosion Processes in Aluminum Alloy AA2024-T3," Proc. Of GDCH Jahrestagung 2003 (Annual meeting of the German Chemical Society), Munich, 2004.
77. F. Gui, R. G. Kelly, "A Protocol for the Quantitative Evaluation of Corrosion Prevention Compounds" Eighth Joint NASA/FAA/DoD Conference on Aging Aircraft, Palm Springs, CA, Jan. 31 - Feb. 3, 2005.
78. S. E. Galyon, F. Cui, R. G. Kelly, "The Effects of CPC Coatings on the Corrosion/Fatigue Behavior of AA7075-T6", Abstract 293, 208th Meeting of the Electrochemical Society, Los Angeles, CA, October 16-21, 2005.
79. C. Taylor, M. Neurock and R. Kelly, "First Principles Calculations of Electrochemically Controlled Hydrogen Mobility and Uptake at the Ni(111)/H₂O Interface," Abstract 862, 208th Meeting of the Electrochemical Society, Los Angeles, CA, October 16-21, 2005.
80. C. Taylor, M. Neurock, R. Kelly, "Beyond Bilayers: Interfacial Water Dynamics and Aggregation from First Principles," Abstract 1264, 208th Meeting of the Electrochemical Society, Los Angeles, CA, October 16-21, 2005.
81. F. Presuel, M. Jakab, R. Kelly and J. Scully, "Computational Modeling of Active Corrosion Inhibitor Release from an Al-Co-Ce Metallic Coating: Protection of Exposed 2024-T3", Abstract 289, 208th Meeting of the Electrochemical Society, Los Angeles, CA, October 16-21, 2005.
82. F. Presuel, F. Cui and R. Kelly, "Computation Modeling of Localized Corrosion Stability on Wetted SS316L at 25 and 95C," Abstract 1088, 208th Meeting of the Electrochemical Society, Los Angeles, CA, October 16-21, 2005.
83. A. Agarwal, U. Landau, J. H. Payer, R. G. Kelly, F. Cui, F. J. Presuel-Moreno, "Considerations of the Role of the Cathodic Region in Localized Corrosion," 2006 International High Level Radioactive Waste Management Conference, Las Vegas, NV, May 1, 2006.
84. S. Policastro, R. G. Kelly, "Modeling the Influence of the Electrolyte on the Selective Dissolution of the Least Noble Component from a Binary Alloy," Abstract

795, 210th Meeting of the Electrochemical Society, Cancun, MX, October 29 - November 3, 2006.

85. Z. Y. Chen, F. Cui, R. G. Kelly, "An Analytical Modeling Method for Calculating the Current Delivery Capacity of a Thin-Film Cathode and the Stability of Localized Corrosion under Atmospheric Environments," Abstract 913, 210th Meeting of the Electrochemical Society, Cancun, MX, October 29 - November 3, 2006.
86. F. J. Presuel-Moreno, F. Bocher, J. Scully and R. G. Kelly, "Modeling of Crevice Corrosion Stability and Stifling of a NiCrMo Alloy and Stainless Steel," Abstract 914, 210th Meeting of the Electrochemical Society, Cancun, MX, October 29 - November 3, 2006. First Principles Calculations of the Energetics of Hydrogen/Aluminum Interactions - M. F. Francis, R. Kelly and M. Neurock, Symposium D4: Modeling and Simulation of Dissolution and Corrosion Processes, 212th Meeting of the Electrochemical Society, Washington, DC, October 8-11, 2007.
87. S. Policastro, R. G. Kelly and J. Carnahan, "Investigating the Role of the Electrolyte in the Microstructural Evolution of Electrochemically Dealloyed Metals Through Simulation and Coercion," Symposium D4: Modeling and Simulation of Dissolution and Corrosion Processes, 212th Meeting of the Electrochemical Society, Washington, DC, October 8-11, 2007.
88. F. J. Presuel, F. Bocher, J. Scully and R. G. Kelly, "Modeling of Crevice Corrosion of a NiCrMo Alloy Assuming Various Chemistries Along the Crevice Length," Symposium D4: Modeling and Simulation of Dissolution and Corrosion Processes, 212th Meeting of the Electrochemical Society, Washington, DC, October 8-11, 2007.
89. E. Rouya, G. Stafford, C. Beauchamp, M. Reed, R. Kelly, H. Bart-Smith, M. Begley and G. Zangari, "In-Situ Stress Measurements During Electrodeposition and Dealloying of Amorphous Au-Ni Films on Au," Symposium F3: Stress Related Phenomena in Electrochemical Systems, 212th Meeting of the Electrochemical Society, Washington, DC, October 8-11, 2007.
90. E. Seker, J. Gaskins, J. Zhu, M. Begley, H. Bart-Smith, G. Zangari, R. G. Kelly and M. Reed, "Relationships Between the Morphology and Stress-State of Gold-Silver Alloys and Nanoporous Gold Structures Under Mechanical Constraints," Symposium F3: Stress Related Phenomena in Electrochemical Systems, 212th Meeting of the Electrochemical Society, Washington, DC, October 8-11, 2007.

D. Meetings and Conferences in which you were an organizer or a presiding officer.

(Please summarize your specific activity and impact)

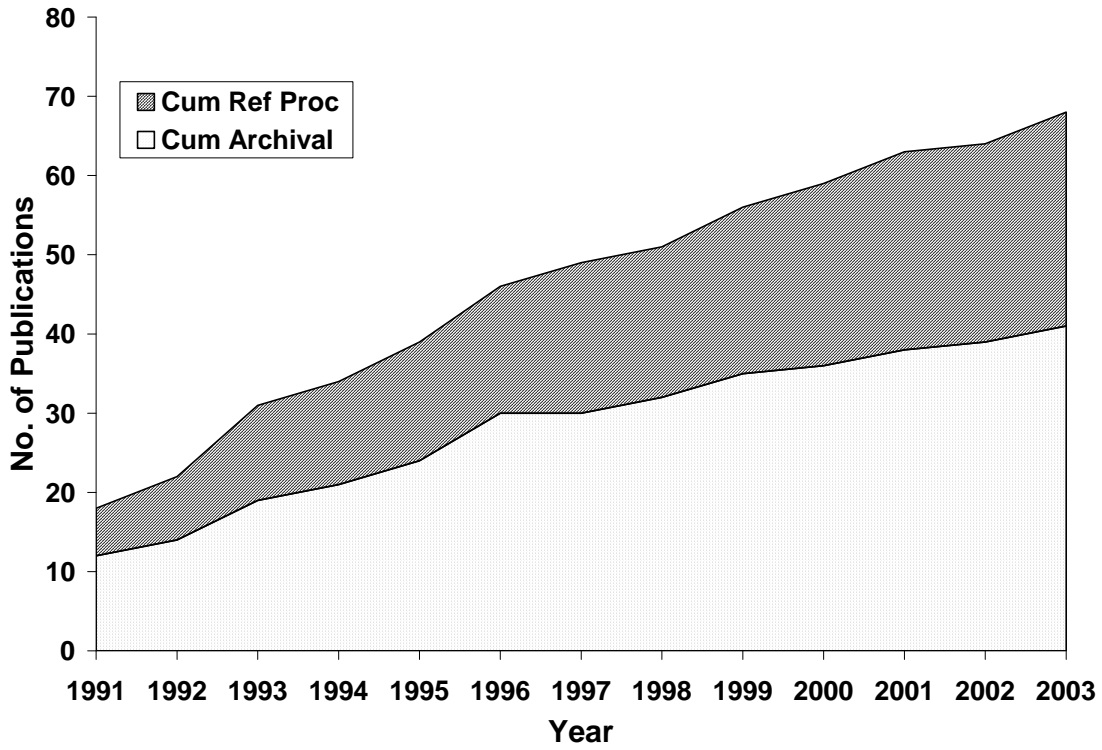
212th Meeting of the Electrochemical Society, Symposium D4: Modeling and Simulation of Dissolution and Corrosion Processes—R. G. Kelly, J. Meyers, F. Presuel-Moreno and B. Tribollet, organizers.

First Principles Calculations of the Energetics of Water and Oxygen Interacting with Aluminum, M. F. Francis, R. Kelly and M. Neurock, Aging Aircraft 2008, NASA/DOD/JCAA, Phoenix, AZ, April 21-24, 2008.

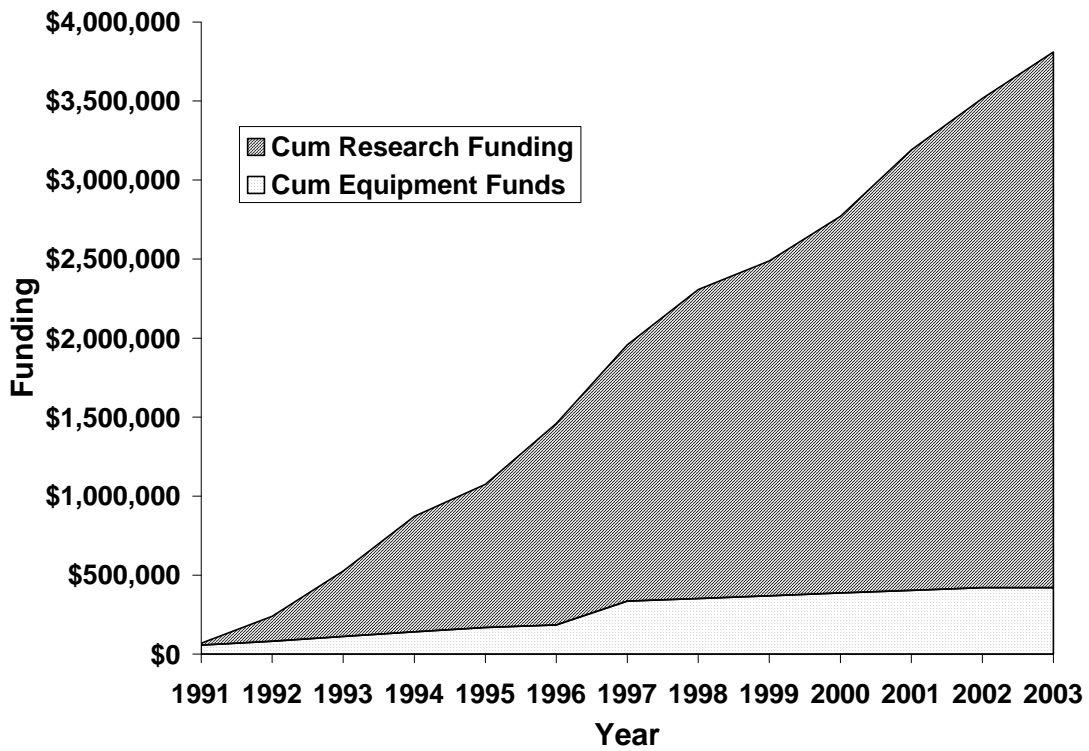
Role of Reactive Species in Atmospheric Corrosion of Silver, D. Liang, G. Ma, B. Wyslouzil, H. C. Allen, G. S. Frankel, J. D. Fuentes, Z. Y. Chen, W. C. Keene, R. G. Kelly, Research in Progress Symposium, Corrosion '08, New Orleans, March 16-20, 2008.

91.

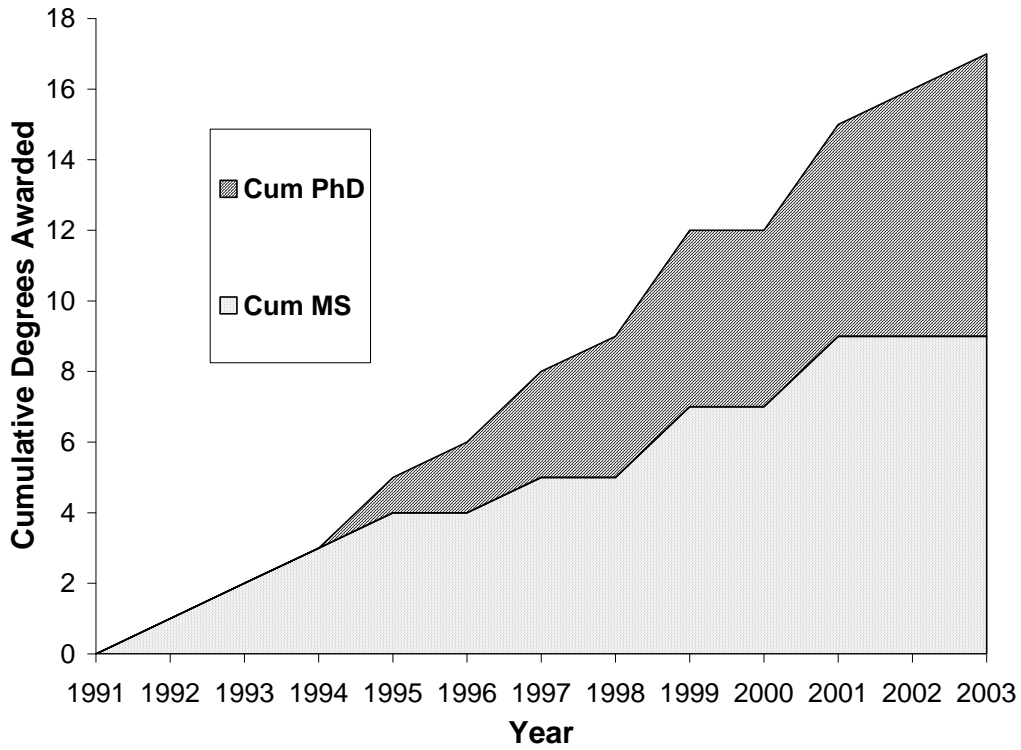
G. Graphs depicting cumulative trends



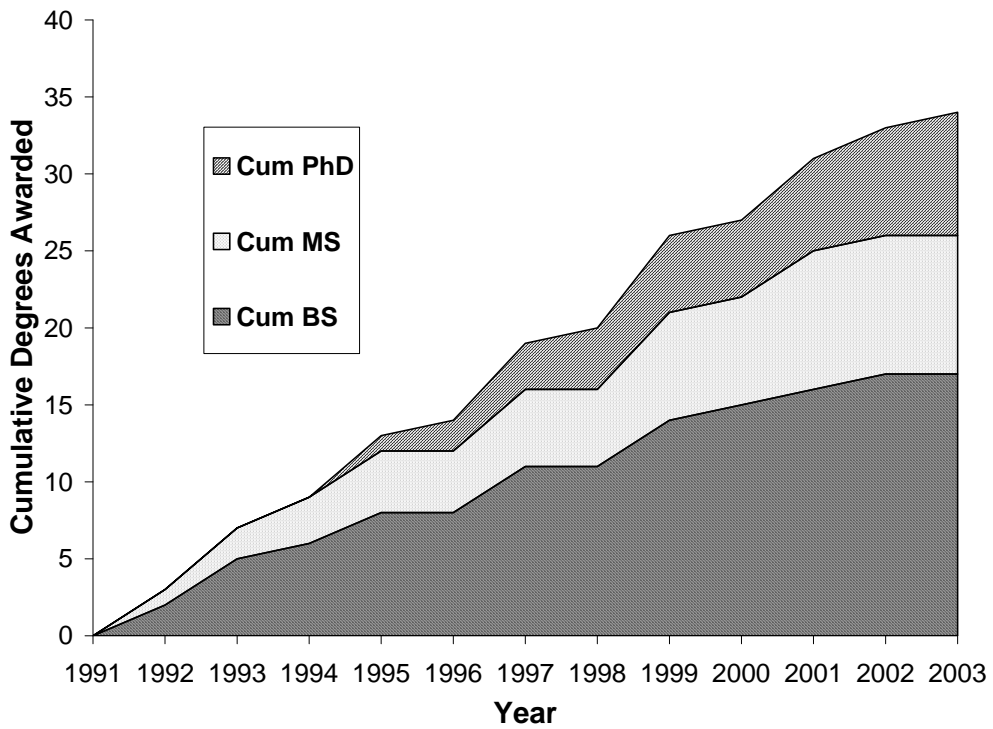
Archival Publications



Research Funding



Graduate Degrees Conferred



Graduate Degrees Conferred and Senior Theses Supervised

H. A list of patents and formal copyrights awarded or pending

1. Robert G. Kelly, Robert A. Ross, Josef K. Hudson, Stephen H. Jones, "Embeddable Corrosion Monitoring Instrument for Steel Reinforced Structures," U.S. and China Patents 09/899,908 (2000). Received Notice of Allowance, issuance by 12/26/03.
2. Kevin Cooper, Fritz Friedersdorf, Keith Furrow, Jackie Williams, Amanda Owen, Robert Kelly, "A Corrosion Inhibitor Derived from Tobacco" U.S. Provisional Application 60/ 428,740 (2002).

I. Professional Service

University

- University Committee on Information Technology (2004-present)
- Mentor, Excellence in Diversity Program, 2004-05
- Provost's On-Line Course Evaluation Advisory Committee (2003-present)
- Presentation on use of Socratic Method in TRC/SEAS GTA Course (Fall, 2001, 2002)
- Conducted workshop on graduate student advising at request of TRC (March 1, 1999)
- Selection Committee for University Teaching Fellows (1998-present)
- Selection Committee for University Teaching + Technology Fellows (1999)
- UTF Mentor for Matthew Begley, Civil Engineering (2002-03)
- Judging for Fall Undergraduate Research Symposium
- Coached for preparers of Teaching Portfolios via TRC.
 - Denise Newman (Psychology, 2001)
 - Melinda Schmidt (PhD student in Psychology, 2003)
 - Mark Kirk (Asst Prof, Medical Toxicology, 2003)

School of Engineering and Applied Science (SEAS)

- Conducted workshop on graduate student advising at request of Dean (2006)
- Co-Chair, Rankings and Recognition Committee (2004-present)
- TCC Faculty Search Committee (2002)
- Director, Rodman Scholars Program (1999- 2004)
- Faculty Advisor, Tau Beta Pi Chapter (1997-2000)
- CHEM 151-152 Advisory Committee (1995-1999)
- Committee for the Evaluation of Rodman Core Courses (1995)
- Rodman Scholars Committee (1994 - 1999)
- ENGR 160 Advisory Committee (1996 - 1998)
- SEAS Undergraduate Curriculum Committee (1996-1998)
 - Chair, Physics Task Force (1997)
- Participated in the SEAS Common Reading Experience (1995 - present)
- Judge, 1994 Undergraduate Research & Design Symposium

Department of Materials Science and Engineering

- Graduate Recruiting Committee, Chair (2004-present)
- Award Committee, Chair (2004-2005)

EP Materials Comprehensive Examination Preparation (2000-present)
Written exam and oral exams for EP students selecting MSE as topic
Building Committee (2002-present)
MURI Hiring Committee (2001)
Mechanical Properties Hiring Committee (2000)
Computational Materials Hiring Committee (2001)
Student Recruiting Committee, Chair (1997-2002)
Undergraduate MSE Option Committee
Represented Materials Science and Engineering at various SEAS Open Houses
and other functions

The Electrochemical Society (ECS)

Ways and Means Committee (2003-2005)
Representative to Federation of Materials Societies (2003-2005)
Honors and Awards Committee (2001-2003)
2001, 2003 Olin Palladium Award Committees (Chair)
2000 H. H. Uhlig Award Committee
Morris Cohen Award Committee (1999-2000)
Norman Hackerman Young Authors Award Committee (1999-present)
National Honors and Awards Committee (Member 99-03)
Selection Committee, ECS Student Poster Session (Fall and Spring)
National Meetings Committee of the Electrochemical Society 1996 - 98

Executive Committee, Corrosion Division

Past Chair (2006 – present)
Chair (2004-2006)
Vice-Chair (2002-2004)
Secretary/Treasurer (2000-2002)
Member at Large (1998-2000)
Newsletter Editor (1998-present)
Advisory Board of *Interface* (1998-2003)

Executive Committee, National Capital Section of the Electrochemical Society,
1993- 1998

Secretary, Program Chairman, Science Fair Chairman, Chairman, Past Chairman

Co-chair, Critical Factors in Localized Corrosion IV A Symposium in Honor of
the 65th Birthday of Hans Bohni, Session on Propagation of Localized Corrosion
Processes, Fall, 2002

Co-organized "Passivity and Localized Corrosion, An International Symposium in
Honor of Prof. Norio Sato (1999).

M. Seo, B. Macdougall, H. Takahashi, R. G. Kelly, *Passivity and
Localized Corrosion*, PV 99-27, The Electrochemical Society, Inc.,
Pennington, NJ (1999). A 729-page conference proceedings

Lead organizer, "Critical Factors in Localized Corrosion III, A Symposium in Honor of the 70th Birthday of Jerome Kruger (1998)

R. G. Kelly, G. S. Frankel, P. M. Natishan, R. C. Newman, *Critical Factors in Localized Corrosion III*, PV 98-17, The Electrochemical Society, Inc., Pennington, NJ (1998). A 725-page conference proceedings.

Vice-chairman and co-organizer of Stress-Corrosion Cracking Symposium, 1990

Chairman of a session of the Symposium on Critical Issues in Localized Corrosion, 1991

Chairman of a session of the General Corrosion Symposium, 1991, 1992

Chairman and organizer of Corrosion in Batteries and Fuel Cells Symposium, 1993

Chairman and co-organizer of Critical Factors in Localized Corrosion II Symposium, 1995

Session Chair, Symposium on Prediction of Passivity Breakdown and Localized Corrosion: Experimental and Modeling Approaches, 1996.

The National Association of Corrosion Engineers (NACE)

Session Organizer, NACE Research in Progress Symposium, 1994, 1995, 1997

Vice Chair, NACE Research in Progress Symposium, 1999

H.H. Uhlig Educator Award Subcommittee (2001-present)

A. B. Campbell Awards Subcommittee (1998-2002)

Chair, Research in Progress Symposium, Corrosion '00, Orlando, March, 2000.

Session Chair, "Advanced Methods Applied to Corrosion Measurements,"

Research in Progress Symposium, Corrosion '00, Orlando, FL, March, 2000.

Materials Research Society

Session Chair, Localized Corrosion, Symposium H, MRS Spring Meeting, San Francisco, April, 2000.

Tau Beta Pi

Faculty advisor for University of Virginia Chapter (1999)

Consulting

Newport News Shipbuilding and Drydock Company, 1991

ARCO Oil and Gas, 1991

Innovative Solutions for Advanced Technology, 1991

Valence Technology, 1992

Siemens Automotive, 1992

Waters Corporation, 1994-98

Optimetrics, 1995
Bettis Atomic Power Laboratory, 1995
Knolls Atomic Power Laboratory, 1995
MetalSpray, 1995-6
Trident Engineering Associates, 1995
Wright Patterson AFB, 1996
Faraday Technology, 1996
Luna Innovations/F&S, Inc., 1997- 1999
NCI Information Systems, 1997-2000
Metal Container Corp., 1999
S&K Technologies, Inc., 2000 – present
Swales Aerospace (for NASA Engineering Safety Center), 2004-06
CCI, Inc (2006-present)
Valdez Internation (2006)
Scribner Associates (2007)
Advanced Energy Industries, Inc (2007)

Other significant professional activities

Session Chairman for Passivation, Advances in Corrosion and Protection, Manchester, UK, June 29, 1992.

Organizing Committee, 1993 Intl. Ion Chromatography Symposium, Baltimore, September 12-15, 1993.

Discussion Leader, “Oxide Films and Breakdown,” Gordon Conference on Aqueous Corrosion, Colby-Sawyer College, New London, NH, July 7-11, 1996.

External Review Panel, Total Performance Assessment Code ver 3.2, Center for Nuclear Waste and Regulatory Analyses, San Antonio, 1999.

External Review Panel, Applied Science Department, Brookhaven National Laboratory, 1999.

Waste Package Materials Performance Peer Review Panel, Dept. of Energy, 2001-2002.

Technical Assistance to *Columbia* Accident Investigation Board, 2003.

Technical Assistance to the 9/11 Pentagon Memorial design team, 2003.

Technical Assistance to the International Space Station, 2004.

Reviewer

U.S. Editor, *Corrosion Science, Engineering, and Technology (IOM, UK)* (2003- present)
Editorial Board, *J. Corrosion Science and Engineering* (1998- present)

Reviewer for *J. Electrochemical Society*, *Corrosion*, *Corrosion Science*, ASTM, National Science Foundation, *J. Chromatography*, *The Physical Review*, *Metallurgical Transactions*, *Electrochimica Acta*, *Nature*.