

Curriculum Vitae - MACIEJ S. KUMOSA

March 2019

Research Interests

- Physical Properties, Life Prediction, and Manufacturing of Advanced Materials and Structures for Extreme Applications including High Voltage (HV), High Temperature (HT), High Strain (HS), combined HVTS and others
- Multiscale Modeling of HVT Materials and Structures
- Structural Integrity of HV Non-ceramic Composite Insulator, Polymer Based Composite Transmission Conductors and other HV, HT and HVT Advanced Transmission Structures

Teaching Interests

Introductory/Advanced Composite Materials, General Materials Science, Nanotechnology for Engineers, Mechanics of Materials, Finite Element Method, Machine Design, Fracture Mechanics, Mechanical Behavior of Solids, Stress Analysis of Structures, and others

Education

- BS/MS and Ph.D., Applied Mechanics and Materials Science, Tech. University of Wroclaw, 1978 and 1982, Poland.

Current Employment

- John Evans Professor of the University of Denver, Department of Mechanical and Materials Engineering, University of Denver, 2390 South York Street, Denver, Colorado 80208, tel: (303) 871-3807, fax: (303) 871-4450; mkumosa@du.edu
- National Science Foundation Industry/University Cooperative Research Center for Novel High Voltage/High Temperature Materials and Structures, Overall Center Director (www.HVTCenter.org); one of 50 IUCRC in Engineering in the U.S. in 2016/17

Academic Honors

- Editorial Board member of
 - *Composites Science and Technology* (#1 int. journal in composites)
 - *Structural Durability & Health Monitoring*
 - *Fibers*

Awards

- John Evans Professor, the highest recognition at the University of Denver (DU) for outstanding research or other creative, scholarly achievement, April, 06.
<http://www.du.edu/news/06-19-06facultyawards.html>
- Best Scholar Award of the School of Eng. and Computer Science, DU, December 2004.
- Distinguished Teaching Award, Oregon Graduate Institute (OGI), Portland, OR, 92-93

General Interests

Gardening, Bicycling, Mountain living in Cuchara, Investment, Piano, Fly Fishing, World History and Politics, and several others

Previous Positions

- August 1981 - August 1983
Senior Research Assistant
Institute of Materials Science and Applied Mechanics, Technical University of Wroclaw
Wroclaw, Wyb. Wyspianskiego 27, Poland

- January 1981 - March 1981
Visiting Scientist
Department of Materials Science and Engineering, University of California - Los Angeles

- August 1983 - January 1985
Assistant Professor
Department of Materials Science and Applied Mechanics, Technical University of
Wroclaw, Wroclaw, Wyb. Wyspianskiego 27, Poland

- January 1984 - December 1984
Visiting Research Fellow
Department of Materials Science and Engineering, University of Liverpool
Liverpool, England

- December 1984 - March 1990
Senior Research Associate
Department of Materials Science and Metallurgy, University of Cambridge
Cambridge, UK

- October 15 - November 15, 1994
Visiting Professor
Department of Mechanical Engineering, University of Paderborn
Paderborn 33095, Germany

- May 1, 1990 - September 1, 1998
Associate Professor
Department of Materials Science and Engineering and Department of Electrical
Engineering and Applied Physics, OGI, Portland, Oregon.

- April 1996 – September 1997, Research Professor
September 1997- September 1999, Associate Professor
September 1999-present, Full Professor with tenure, since 2006, John Evans Professor
Department of Engineering, University of Denver
Denver, Colorado

- Between April 1996 and September 1998 Dr. Kumosa had a dual appointment both at DU
and OGI.

- September 15, 2006 - September 14, 2009
Guest Professor of Harbin Engineering University, Harbin, China

Administrative Duties

1. **Chair**, Mechanical and Materials Engineering (MME) Department at DU, between September 1, 2007- November 1, 2009; first Chair, built the department, stepped down in 2009 to concentrate on research and to manage the Center for Nanoscale Science and Engineering (see below).
2. **Director**, Center for Advanced Materials and Structures, between 1996 and 2007, built the Center jointly with Drs. P. Predecki and S. Carpenter, internationally recognized through composite research for NSF, AFOSR, EPRI, NASA, DoE and several major US industries.
3. **Director**, Center for Nanoscale Science and Engineering, 2007-2012, built the "Nano-Center" involving seven DU departments/units engaging appr. 25 faculty. Elected in 2007 for two years, unanimously re-elected in 2009 for two more years.
4. **Overall Center Director**, since March 2014 for five years, National Science Foundation Industry/University Cooperative Research Center for Novel High Voltage/High Temperature Materials and Structures, also called the "HVT Center".

The Center includes the University of Denver (leading site), Michigan Technological University, the University of Illinois at Urbana-Champaign, and the University of Connecticut (added in Feb 2017) and 18 supporting major US industries since its inception.

To learn more about the HVT Center, please see Current and Pending Support and Biographical Sketch.

Graduate Student Advising

Ph.D. Graduate Students

1. Jun Ding, Structure Property Relationship of Advanced High-Temperature Materials, Ph.D., October 1994, OGI (hired after graduation by Intel Corporation, Hillsboro, OR).
2. Shiliang Ding, Mixed Mode Failure Analysis of Adhesively Bonded Composite Systems using the Modified Iosipescu Test Method, Ph.D., March 1995, OGI (hired after graduation by Bradcom, San Diego, CA)
3. Qiong Qiu, Brittle Fracture Mechanisms of Glass-Fiber Reinforced Polymer Insulators, Ph.D., September 1995, OGI (hired by Komatsu Silicon America, Hillsboro, OR).
4. Anurag Bansal, Finite Element Simulation and Mechanical Characterization of Composite Insulators, Ph.D., November 1995, OGI (hired by Altera Corporation, presently senior manager at Applied Materials).
5. Gregory M. Odegard, Shear-Dominated Biaxial Failure Analysis of Polymer-Matrix Composites at Room and Elevated Temperatures, Ph.D., Department of Engineering, University of Denver, June 2000 (hired by NASA Langley)
6. Kevin Searles, The Elastic and Inelastic Behavior of Woven Graphite Fabric Reinforced Polyimide Composites, Ph.D., OGI, October 2000 (hired by Exxon-Mobile Corporation – Upstream Research, Kingwood, TX).

7. Bart Benedikt, Analysis of Residual Stresses in Graphite Fiber/PMR-15 Composites, Ph.D., May 2003 (hired by Los Alamos National Laboratory, Los Alamos, NM).
8. Mark Gentz, Mechanical Response of Graphite/polyimide Composites at Elevated Temperatures, Ph.D., Department of Engineering, University of Denver, August 2004, completed (hired by ATK, Utah).
9. Peter Rupnowski, Multiscale Stress and Damage Initiation Analyses of Graphite Fiber/Polyimide Composites, Ph.D., Department of Engineering, University of Denver, May 2005, completed (hired by NREL, Golden Colorado).
10. Brian Burks, The Effect of Atmospheric Aging on a Hybrid Polymer Matrix Composites' Material Properties, PhD thesis in Mechanical Engineering, Department of Mechanical and Materials Engineering, completed in May 2012 (hired by NIST in Boulder).
11. Zachary Loftus, Electron Beam Direct Manufacturing of Ti-6Al-4V for Space Applications, PhD; University of Denver and Lockheed Martin Corporation, completed in October 2013 (Lockheed Martin Technical Fellow since 2015).
12. James Middleton, Aging of a Polymer Core Composite Conductor under Combined Ozone and Temperature Conditions, PhD in Materials Science, DU, completed in July 2014.
13. Joseph Hoffman, On Thermal Aging Prevention in Polymer Core Composite Conductor Rods, PhD in Nanoscale Science and Engineering, DU, completed in Sept. 2015.
14. Eva Hakansson, Galvanic Corrosion of Aluminum/Carbon Composite Systems, PhD in Mechanical Engineering, DU, completed in June 2016.
15. Monika Bleszynski, Nanoengineering of Next Generation Silicone Rubber Materials for Extreme Applications, PhD in Mat Sci, MME Dept, DU, completed in June 28, 2018.
16. Tianyi Lu, Synergistic Aging of GRP Composites, PhD in Mat Sci, MME Dept., DU, successfully defended in Nov 2018.

Master Graduate Students

1. Natarajan Sukumar, Finite Element Analysis of Mixed Mode Fracture and Failure in Iosipescu Specimens, MS in Materials Science, Oregon Graduate Institute, October 1992.
2. Ibrahim Erdinc, Singular Stress Fields at Interfaces and Sharp Notches, M.S. in Materials Science, July 1992, Oregon Graduate Institute and University of Paderborn, Germany.
3. Andreas Schubert, Comprehensive Numerical and Experimental Studies of Internal Stresses in Composite (GRP) Substation Insulators, M.S. in Materials Science, October 1994, OGI and University of Paderborn, Germany.
4. M. V. Balakrishnan, Application of the Biaxial Iosipescu Test Fixture for the Mechanical Characterization of Unidirectional Composites, M.S. in Materials Science, September 1995, OGI.
5. Yong Zhao, An Electrical Study of the Brittle Fracture Failure of Composite Insulators, M.S. in Mechanical Engineering, Department of Engineering, University of Denver, November 1997.

6. Yongyu Han, Finite Element Analyses of Advanced Composite Structures, MS in Mechanical Engineering, Department of Engineering, University of Denver, November 1997.
8. Gregory M. Odegard, Biaxial Failure Investigation of Polymer Matrix Composites, M.S. in Mechanical Engineering, Department of Engineering, University of Denver, July 1998.
9. Joe Stowe, Material Property Predictions of Polymers Using Molecular Dynamics Simulations, Ms in ME, MME Dep., DU, completed in May 2008.
10. Brian Burks, Short-Term Failure Analysis of Aluminum Conducting Composite Core Transmission Lines, MS in ME, MME Dep., DU, completed in July 2009.
11. Rebekah Kovarik, An Experimental Study of Optical Adhesive Bonds Subjected to Thermal Cyclic Environments, MME Dep., DU, University of Denver, completed in August 2010.
12. Bruce Allen, New Open Source Software for Building Molecular Dynamics Systems, MS thesis in Materials Science, MME Dep., DU, completed in May 2012.
13. Eva Hakansson, Galvanic Corrosion of High-Temperature Low Sag (HTLS) Conductors: New Materials - New Challenges, MME Dep., DU, completed in May 2013.
14. James Kosak. Stress Corrosion Cracking in Polymer Matrix Glass Fiber Composites. MS Thesis in Mechanical Engineering, MME Dep., DU, completed in May 2014.
15. Tianyi Lv, Degradation of High Voltage Glass Fiber-Reinforced Polymer Matrix Composites by Aggressive Environmental Conditions, MS in Materials Science, Department of Mechanical and Materials Engineering, DU, completed in July 2014.
16. Monika Bleszynski, Aging Assessment of High Voltage Single Component Room Temperature Vulcanized Silicone Rubber (RTV-1) Subjected to Aqueous Salt, MS in Engineering, MME Dep., DU, completed Dec 9, 2015.
17. Daniel Waters, Low-Velocity Impact to High-Temperature Low-Sag Overhead Conductors, MS in Mechanical Engineering, MME Dep., DU, completed in Feb 2016.
18. Edward Clark, Variable Oxidation & Defects in Ti-6Al-4V Material in Electron Beam Melting Additive Manufacturing, MME Dep., DU, completed in March 2017.
19. Robert Woll, Ice Adhesion Analysis of Severely Aged PDMS Rubbers; MS in Materials Science, MME Dept. , DU, completed in June, 2018.

Graduate Student Co-Advising

1. Barnes J. A, Torsion Testing of Filament Wound Composite Cylinders, Ph.D., 1986, University of Cambridge (with D. Hull; M. Kumosa provided full time academic advising).
2. Broughton W. R., Shear Properties of Unidirectional Carbon-Fibre Composites, Ph.D., November 1989, University of Cambridge (with D. Hull; M. Kumosa provided full time academic advising).

3. Huang Xue-Ning, Mode I and Mode II Intralaminar Fracture of Unidirectional Composites, Ph.D., October 1990, University of Cambridge (with D. Hull; M. Kumosa provided full time academic advising).
4. Tom Ely, Depth Profiling Residual Stresses in Thin Tungsten Films Using X-ray Diffraction, Ph.D., August 1999, University of Denver (with P. K. Predecki; M. Kumosa provided part time financial and academic support).
5. Danut Dragoi, Residual Stress Analysis of Graphite/Polyimide Composites using the Concept of the Metallic Inclusions, Ph.D., June 1999, Department of Engineering, University of Denver (with P.K. Predecki; M. Kumosa provided major financial support and part time academic advising).

Most Accomplished Graduate Students Advised by M. Kumosa

1. **Professor N. Sukumar**, MS at OGI in 1992; presently Professor of Computational Mechanics, University of California, Davis
2. **Dr. A. Bansal**, PhD at OGI in 1995; presently Senior Manager at Applied Materials Inc.
3. **Professor G. Odegard**, PhD at DU in 2000; presently
 - Professor of Computational Mechanics at MTU
 - HVT Site Director at MTU since March 2014
 - Director of the NASA Institute for Ultra-Strong Composites by Computational Design; since August 2017, \$15M grant from NASA for five years
4. **Dr. K. Searles**, PhD at OGI in 2000; presently Senior Research Engineer at Exxon-Mobil Corporation – Upstream Research, Kingwood, TX
5. **Dr. B. Benedikt**, PhD at DU in 2003; presently Senior Scientist at Los Alamos National Laboratory
6. **Dr. P. Rupnowski**, PhD at DU in 2005; presently Senior Scientist at NREL in Golden, CO
7. **Dr. Z. Loftus**, PhD at DU in 2013; presently Lockheed Martin Technical Fellow, Denver Colorado
8. **Dr. B. Burks**, PhD at DU in 2012; presently VP Engineering at Digital Wave Corp., Englewood, CO

Current Research Group

PhD and MS Graduate Students

1. Chrissy Henderson, third year PhD in Engineering, permanent employment at US Bureau of Reclamation, expected completion in 2019
2. Daniel Waters, third year PhD in Mechanical Engineering, expected completion in 2019/20

3. Billy Grell, second year PhD in Mechanical Engineering, permanent employment with Lockheed Martin; expected completion in 2020
4. Sabuj Khadka, second year PhD in Mechanical Engineering; expected completion in 2020
5. Edward Clark, second year PhD student in Materials Science

Postdoctoral Workers

1. Dr. Euri Solis-Ramos, Research Scientist, since September 2013
2. Dr. Joe Hoffman, Research Scientist and Deputy Director of DU HVT Center, since Dec. 2015
3. Dr. Monika Bleszynski, Research Scientist and Junior Program Manager in HVT Center
4. Tianyi Lu, Junior scientist in HVT Center, PhD defended in Feb 2018 without revisions, graduation pending.

Courses Taught

- Introduction to Composites (Part I) and Advanced Composites (Part II),
- Introduction to Finite Elements (Part I) and Advanced Finite Elements (Part II)
- Introduction to Nanotechnology for Engineers (Part I) and Advanced Topics in Nanotechnology (Part II)
- Materials Science; Part I and Part II,
- Machine Design, Strength of Materials, Mechanical Behavior of Solids, Mechanics of Materials, etc.

Comments:

1. Course evaluations usually higher than department averages; can be provided on request.
2. Several courses were taught outside of DU (for example; Nanotechnology I and II at Lockheed Martin, Fall 2008, Introduction to Composites, Lockheed Martin, Fall 2008, others).

Short Courses for Industry

1. Fracture and Fatigue: Principles and Analysis, M. Kumosa (OGI) with G. Glinka (University of Waterloo) and R. Gordon (EWI), April 10-11, 1991, 16 participants, course evaluation - excellent.
2. Fracture and Fatigue of Advanced Materials, M. Kumosa (OGI) with G. Glinka, S. Hudak (Southwest Research Institute), F.G. Buchholz (Univ. of Paderborn) and R. Stephens (Univ. of Iowa), 15 participants, course evaluation - excellent.
3. Structural Integrity of Composite Structures, M. Kumosa, F. G. Buchholz (University of Paderborn) and M. Kunze, October 25-October 29, 1994, University of Paderborn, Germany 18 participants.

4. Non-Ceramic Insulators; Applications, Design, Testing and Analysis, M. Kumosa, E. Bennett (BPA), J.M. Braun (Ontario Hydro, Canada), T.S. McQuarrie (Glasforms, Inc.), course evaluation - very good, 35 participants (from 9 countries).

Invited Lectures, Conference Presentations and Seminars

Since 1982, Dr. Kumosa has given approximately 400 presentations (including numerous invited lectures) at various academic and industrial institutions in several countries including Poland, United Kingdom, France, Germany, United States of America, Austria, Japan, Singapore, Canada and China.

Total Competitive Research Funding between 1990 and Present

- Total – approx. \$7M (both federal and private)
- Federal: \$2,49M (5 NSF and 3 AFOSR Grants)
- Private: \$4,53M (including multiple BPA, WAPA and NASA Glenn awards)
- Average per Year: appr \$250k.

Previous Research Programs between 1990 and 2016

1. High Temperature Fatigue Crack Growth in Cast Superalloys, M. S. KUMOSA PI, sponsored by G.E. Aircraft Engines and Precision Castparts Corp., \$165,000 for one year (1990-1991).
2. High Temperature Fatigue Crack Growth in Cast Superalloys, M. S. KUMOSA PI, sponsored by G.E. Aircraft Engines and Precision Castparts Corp., \$105,000 for one year (1991-1992).
3. Deformation and Fracture of Titanium Aluminides, M. KUMOSA PI, \$105,000 for 9 months, starting date January 1, 1992, sponsored by Precision Castparts Corp., and the Oregon Metal Initiative (OMI).
4. Interfacial Fracture Phenomena in Advanced Metallic Systems, M. KUMOSA PI, Precision Castparts Corp., \$75,000 for one year, starting date July 1, 1992, including support from GE. Aircraft Engines (\$15,000) and Rockwell International (\$5,000).
5. Mixed Mode Failure Analysis of a Unidirectional Carbon/Epoxy Composite and Adhesively Bonded Composite Systems, M. KUMOSA PI, \$120,000 for two years and six months, sponsored by the National Science Foundation, Solid and Geomechanics Program, starting date July 1, 1991.
6. Failure of Composite Insulators Caused by the Combined Action of Electrical, Mechanical and Chemical Environments, M. KUMOSA PI, Bonneville Power Administration, DOE, \$260,441 for two years (including support from EPRI, (\$80,000) and WAPA (\$50,000), starting date July 1, 1992.
7. Microstructure Studies of Titanium Aluminides, M. KUMOSA PI, Precision Castparts Corp. \$25,000 for one year, starting date July 1, 1993.
8. Analytical and Experimental Studies of Substation NCIs, M. KUMOSA PI, Bonneville Power Administration, \$54,000 for one year, starting date Dec. 15, 1993.
9. Suitable Crimping Techniques for Composite Insulators, M. KUMOSA PI, NGK (Japan), \$20,000 for seven months, starting date, October 1, 1996.

10. Fracture Analysis of Composite Insulators, M. KUMOSA PI, Electric Power Research Institute, \$345,157 total, July 1, 1994 - February 28, 1998.
11. Fracture Analysis of Composite Insulators, M. KUMOSA PI, Electric Power Research Institute, \$128,000 total, March 1, 1998 - February 28, 1999.
12. Biaxial Analysis of Unidirectional Graphite Reinforced/Polyimide Composites, M. KUMOSA PI, Air Force Office of Scientific Research, \$173,648 total, March 1, 1995 - June 30, 1999.
13. Micro-Fracture Mechanisms in Glass/Polymer Insulator Materials under the Combined Effect of Mechanical, Electrical and Environmental Stresses, M. KUMOSA PI, jointly sponsored by the Bonneville Power Administration (DOE), Western Area Power Administration (DOE), Alabama Power Company, Pacific Gas & Electric, and the National Rural Electric Power Association, \$215,000, July 1996 - December 1998.
14. Failure Analysis of Unidirectional Composite Materials and Adhesive Joints Subjected to Biaxial Loadings, M. KUMOSA PI, National Science Foundation, Civil and Mechanical Systems, \$200,000 total, October 1, 1994 - December 31, 1999.
15. Biaxial Failure Analysis of Graphite Reinforced Polyimide and Epoxy Fabric Composites, M. KUMOSA PI and P. Predecki, CO-PI, Air Force Office of Scientific Research, \$101,000 total, June 1, 1997 - May 31, 2001.
16. Micro-Fracture Mechanisms in Glass/Polymer Insulator Materials under the Combined Effect of Mechanical, Electrical and Environmental Stresses, M. KUMOSA PI, Western Area Power Administration, \$20,000 for one year, starting April 1, 2000.
17. Micro-Fracture Mechanisms in Glass/Polymer Insulator Materials under the Combined Effect of Mechanical, Electrical and Environmental Stresses, M. KUMOSA PI, Western Area Power Administration, \$20,000 for one year, starting April 1, 2001.
18. Acquisition of Instrumentation for Research on Component Failure under High Temperature, Mechanical and Environmental Stress, M. KUMOSA PI, National Science Foundation, \$422,170, September 1, 1999 – August 31, 2003.
19. Fundamental Issues Regarding the High Temperature Failure Properties of Graphite/Polyimide Fabric Composites, M. KUMOSA, PI, Air Force Office of Scientific Research and NASA Glenn Research Center, \$415,000, February 15, 2000 – October 31, 2004.
20. Failure Analysis of Composite High Voltage Insulators, M. KUMOSA PI, Electric Power Research Institute, \$523,256, July 1, 2000 - December 31, 2003.
21. Investigation of Long-Term Structural Integrity of High-Temperature, Low-Sag Composite Conductors, Western Area Power Administration, Tri-State Generation and Transmission Association and Bonneville Power Administration, M. KUMOSA PI, approx. \$750,000, 6/1/2008-9/1/2014.
22. Environmental Testing and Modeling of Composites, Polymer Coatings and RTV Sealants used in HV Transmission Line Insulators, MacLean Power Systems; M. KUMOSA PI, \$190,000; Oct. 1, 2012 – June 30, 2014.
23. Titanium Electron Beam Direct Manufacturing, Lockheed Martin Corporation, M. KUMOSA PI, \$165,500, September 1, 2012- March 31, 2015.

24. Investigation of Galvanic Reaction Barriers in High Temperature High Voltage Conductors, Principal Investigator: M. KUMOSA PI, National Science Foundation, Grant Opportunities for Academic Liaison with Industry (GOALI); Total Award Amount: \$357,338; September 1, 2012 – September 30, 2017.
24. Membership Funds for the HVT Center at DU only; M. KUMOSA PI, between May 2014 and May 2019
 - Bonneville Power Administration - \$400k
 - Western Area Power Administration - \$500k
 - Tri-State Generation and Transmission - \$280k
 - Lockheed Martin - \$170k (with \$50k still pending) plus \$250k in kind
 - John Crane - \$20k in cash and \$20k in kind for 2014-2015
 - Composites Technology Corporation - \$200k
 - Composites Technology Development – \$5k and \$35k in-kind in 2014-2015
 - US Bureau of Reclamation - \$400k/year in-kind between 2015 and 2018

Total DU membership HVT funding between June 1, 2014 and May 30, 2019

Approx. \$1,575 in cash and \$600k in-kind.

Current and Pending Support

Federal

1. **"Collaborative Research: I/UCRC for Novel High Voltage/Temperature Materials and Structures"**, Principal Investigator: M. KUMOSA PI, current
Source of Support: National Science Foundation

Original Award Amount: \$602,660 (plus \$600k for UIUC and MTU) as of March 15, 2014 for 5 years, \$300k was added in Feb 2017 for UConn for 2 years

Additional \$128k was added in August 2018 until March 2019 for DU; therefore, corrected total grant amount for DU and M. Kumosa – aprox. \$730k

Period Covered: March 15, 2014 – February 28, 2020 (with one year no cost extension)
Project Location: University of Denver, Michigan Technological University, University of Illinois at Urbana-Champaign, and the University of Connecticut (since Jan 2017)
Main Site: University of Denver, M. KUMOSA overall Center director

Private

2. **"Industry Membership Funds"** for the DU site and others of the HVT I/UCRC between June 1, 2018 and May 31, 2019; Principal Investigator: M. KUMOSA, current

- Bonneville Power Administration, DU - \$0.0k, current
- Western Area Power Administration, DU - \$100k, current
- Tri-State Generation and Transmission, DU - \$50k, current
- Lockheed Martin, DU - \$50k plus \$50k in-kind, pending
- Composites Technology Corporation, DU - \$40k, current
- General Cable - \$40k, current – \$20k for MTU
- Marmon – \$40k, current, \$40k for UConn
- Eversource, \$40k, current, \$40k for UConn

- G&W Electric – 40k current , \$20k for UIUC and \$20k for UConn
- US Bureau of Reclamation, DU - \$100k/year in kind, current

Sabbaticals

Sabbatical 2005

Between January 1 and August 31, 2005, M. Kumosa was on sabbatical, which he spent in Denver and in Europe. In Europe, he spent two months visiting the University of Cambridge, the University of Bristol in the UK and in Poland. In Poland he visited the Technical University of Wroclaw and the Technical University of Poznan. During his sabbatical, Dr. Kumosa gave five invited lectures and presentations at Cambridge

(http://www.msm.cam.ac.uk/gordon/seminars_lent05.html), Bristol, Poznan and Wroclaw. He also made major efforts to establish collaborative research programs with several leading European researchers.

Sabbatical 2013

M. Kumosa spent it at DU building the HVT I/UCRC. The Center was formally awarded on March 15, 2014.

Patents

1. "Testing Procedure for Evaluating Diffusion and Leakage Currents in Insulators" by Armentrout, D., Kumosa, L., and Kumosa, M., US Patent, US 7327132 b2, 2008.
2. "Fault Detection in Composite Core Transmission Lines using Electric Reflectometry" by Hakansson, E. and KUMOSA, M., Provisional Patent, 62/333,776, conf. 5855, May 2016.
3. "Silicone Rubber Sealant" by M. Bleszynski, M. Kumosa. Provisional Patent No. 62/457661 "Silicone February 10, 2017, by DU.

Books

1. "High Voltage/Temperature Materials", M. KUMOSA (potentially with others), in preparation, expected completion in 2020.

Dissertations

1. KUMOSA, M., TEM Investigation of Dislocations in Fe-3% Si, M.S. Thesis, Institute of Materials Science and Applied Mechanics, Technical University of Wroclaw, 1978, Poland.
2. KUMOSA, M., Crack and Slip Phenomena at the Tip of a Terminated Twin, Ph.D. Thesis, Institute of Materials Science and Applied Mechanics, Technical University of Wroclaw, 1982, Poland.

Published Papers in Refereed International Journals

Between 1980 - 1990

1. Golaski, L., KUMOSA, M. and Hull, D., Acoustic Emission Testing of Filament Wound Pipes under Repeated Loading, Journal of Acoustic Emission, Vol. 1, No. 2, (1982) pp. 95-101.

2. KUMOSA, M., Stress and Strain Fields around Inclusions, Prace Naukowe Instytutu Materialoznawstwa i Mechaniki Technicznej Politechniki Wrocławskiej Nr. 39, Studia i Materiały Nr 26, (1983) pp. 42-60 (in Polish).
3. Jerzyk, I. and KUMOSA, M., Influence of Fibre Orientations on Acoustic Emission from Filament Wound Pipes, J. Materials Science, Vol. 20 (1985) pp. 3661-3667.
4. Hull, D., KUMOSA, M. and Price, J. N., Stress Corrosion of Aligned Glass-Fibre Polyester Composite Materials, Materials Science and Technology, Vol. 1 (1985) pp. 177-182.
5. KUMOSA, M., Crack and Slip Phenomena at the Tip of a Terminated Twin, Materials Science and Engineering, Vol. 77 (1986) pp. 37-44.
6. KUMOSA, M., Hull, D. and Price J. N., Acoustic Emission from Stress Corrosion Cracks in Aligned GRP, Journal of Materials Science Vol. 22 (1987) pp. 331-336.
7. KUMOSA, M., Acoustic Emission Monitoring of Stress Corrosion Cracks in Aligned GRP, Journal of Physics D: Applied Physics, Vol. 20 (1987) pp. 69-74.
8. Barnes, J., KUMOSA, M. and Hull, D., Development of Iosipescu Shear Test, Composites Science and Technology, Vol. 28, (1987) pp. 251-268.
9. KUMOSA, M. and Hull, D., Mixed Mode Fracture of Composites using Iosipescu Shear Test, International Journal of Fracture, Vol. 35 (1987) pp. 83-102.
10. KUMOSA, M. and Hull D., Finite Element Analysis of a Circumferentially Cracked Cylindrical Shell under Uniform Tensile Loading, Engineering Fracture Mechanics, Vol. 31, No. 5 (1988) pp. 817-826.
11. KUMOSA, M. and Hull, D., Finite Element Analysis of a Circumferentially Cracked Cylindrical Shell Loaded in Torsion, Engineering Fracture Mechanics, Vol. 32, No. 1 (1989) pp. 123-136.
12. Broughton, W. R., KUMOSA, M. and Hull D., Analysis of the Iosipescu Shear Test as Applied to Unidirectional Carbon-Fibre Reinforced Composites, Composites Science and Technology, Vol. 38 (1990) pp. 299-325.

Between 1990 – 1996

13. Sigalas, J., KUMOSA, M. and Hull, D., Trigger Mechanisms in Energy Absorbing Glass Cloth /Epoxy Tubes, Composites Science and Technology, Vol. 40 (1991) pp. 265-287.
14. Wojnar, L. and KUMOSA, M., Quantitative Analysis of Overlapped Fracture Surfaces, Engineering Fracture Mechanics, Vol. 36, No. 4 (1990) pp. 597-609.
15. Wojnar, L. and KUMOSA, M., Advanced Quantitative Analysis of Fracture Surfaces, Materials Science and Engineering, Vol. A 128 (1990) pp. 45-53.
16. KUMOSA, M., Bulging Effects in Circumferentially Cracked Orthotropic Cylindrical Shells, Engineering Fracture Mechanics, Vol. 38, No. 4/5 (1991) pp. 255-262.
17. KUMOSA, M., Strain Energy of a Mechanical Twin in a -Iron, Journal of Physics D: Applied Physics, Vol. 24 (1991) pp. 1816-1821.

18. Sukumar, N. and KUMOSA, M., Application of the Finite Element Iterative Method to Cracks and Sharp Notches in Isotropic and Orthotropic Media, International Journal of Fracture, Vol. 58 (1992) pp. 177-192.
19. Sukumar, N. and KUMOSA, M., Stress Singularities at Sharp Notches: Interpolation Formulas, International Journal of Fracture Vol. 58, No. 3 (1992.) pp. R45-R49.
20. Sukumar, N. and KUMOSA, M., Finite Element Analysis of Axial Splits in Composite Iosipescu Specimens, Int. J. Fracture Vol. 62 (1993) pp. 55-85.
21. Korusiewicz, L., Ding, J. and KUMOSA, M., High Temperature Crack Growth Behavior in a Precipitate-Hardened Nickel Base Superalloy under Constant K Conditions, Scripta Metallurgica, Vol. 29-5 (Sept. 1993).
22. Ding, S. and KUMOSA, M., Singular Stress Behavior at an Adhesive Interface Corner, Engineering Fracture Mechanics, Vol. 47, No. 4 (1994) pp. 503-519.
23. Ding, S., Meekisho, L. and KUMOSA, M., Analysis of Singular Stress Fields at a Bimaterial Wedge Corner, Engineering Fracture Mechanics, Vol. 49 (1994) pp. 569-585.
24. Bansal, A. and KUMOSA, M., Experimental and Analytical Studies of Failure Modes in Iosipescu Specimens under Biaxial Loadings, J. Composite Materials, Vol. 29, No. 3 (1995) pp. 334-358.
25. Bansal, A. and KUMOSA, M., Application of the Biaxial Iosipescu Test Method to Mixed Mode Fracture of Unidirectional Composites, International Journal of Fracture, Vol. 71 (1995) 131-150.
26. Bansal, A., Schubert, A., Balakrishnan, M. V. and KUMOSA, M., Finite Element Analysis of Composite Substation Insulators, Composite Science and Technology, Vol. 55 (1995) pp. 375-389.
27. Ding, S., Erdinc, I., Buchholz, F. G. and KUMOSA, M., Optimization of the Adhesive Joint Iosipescu Specimen for Pure Shear Test, Int. J. Fracture, Vol. 76 (1996) pp. 1-20.

In 1997

28. Balakrishnan, M. V., Bansal, A. and KUMOSA, M., Biaxial Testing of Unidirectional Carbon-epoxy Composite using Biaxial Iosipescu Fixture, J. Composite Materials, Vol. 31, No. 5 (1997) pp. 486-508.
29. Bansal, A. and KUMOSA, M., Analysis of Double Edge-Cracked Iosipescu Specimens under Biaxial Loads, Engineering Fracture Mechanics, Vol. 59, No. 1 (1997) pp. 89-100.
30. Bansal, A. and KUMOSA, M., Finite Element Simulation of Composite Insulators with Crimped End-Fittings, J. Composite Materials, Vol. 31 (1997) pp. 2074-2104.
31. KUMOSA, M., Shankara Narayan, H., Qiu, Q. and Bansal, A., Brittle Fracture of Non-Ceramic Suspension Insulators with Epoxy Cone End-Fittings, Composites Science and Technology, Vol. 57 (1997) pp. 739-751.
32. Qiu, Q. and KUMOSA, M., Corrosion of E-Glass Fibers in Acidic Environments, Composites Science and Technology, Vol. 57 (1997) pp. 497-507.

33. KUMOSA, M., Hull, D. and Price, J. N., Acoustic Emission from Stress Corrosion Cracks in Aligned GRP, NDT and E International, Vol. 30, No. 2 (April 1997) pp. 117-117.

In 1998

34. Han, Y. and KUMOSA, M., Adhesively Bonded Composite Iosipescu Specimens Without Singular Stress Fields, Mechanics of Composite Materials and Structures, Vol. 5, No. 2 (1998) pp. 127-151.
35. Searles, K., McCarthy, J. and KUMOSA, M., An Image Analysis Technique for Evaluating Internal Damage in Graphite/Polyimide Fabric Composites, Composites Science and Technology, Vol. 58 (1998) pp. 1607-1619.
36. Chughtai, A., Smith, D. and KUMOSA, M., Chemical Analysis of a Failed Composite Suspension Insulator, Composites Science and Technology, Vol. 58 (1998) pp. 1641-1647.
37. Armentrout, D., Ely, T. and KUMOSA, M., An Investigation of Brittle Failure in Composite Materials used for High Voltage Insulators, J. Acoustic Emission, Vol. 16, No. 1 (1998) s10-s18.

In 1999

38. KUMOSA, M. and Han, Y., Non-Linear Finite Element Analysis of Iosipescu Specimens, Composites Science and Technology, Vol. 59 (1999) pp. 561-573.
39. Searles, K., Odegard, G., Castelli, M. and KUMOSA, M., Failure Investigation of Graphite-Polyimide Fabric Composites at Room and Elevated Temperatures using the Biaxial Iosipescu Test, Journal of Composite Materials, Vol. 33, No. 22 (1999) 2038-2080.
40. KUMOSA, M., Response to the Article “ Discussion of the Article: “Biaxial Testing of Unidirectional Carbon-Epoxy Composite using Biaxial Iosipescu Test Fixture” by Fabrice Pierron, Journal of Composite Materials, Vol. 33 (1999) pp. 688-694.
41. Odegard, G., Searles, K. and KUMOSA, M., A Critical Examination of the Iosipescu Shear Test as Applied to 0° Unidirectional Composite Materials, Journal of Mechanics of Composite Materials and Structures, Vol. 6 (1999) pp. 229-256.
42. Odegard, G. and KUMOSA, M., Elasto-Plastic Analysis of the Iosipescu Shear Test, J. Composite Materials , Vol. 33, No. 21 (1999) pp. 1981-2002.

In 2000

43. Ely, T. and KUMOSA, M., The Stress Corrosion Experiments on an E-glass/Epoxy Unidirectional Composite, Journal of Composite Materials, Vol. 34, No. 10 (2000) pp. 841-878.
44. Carpenter, S. H. and KUMOSA, M., An Investigation of Brittle Fracture of Composite Insulator Rods in an Acidic Environment with Static or Fatigue Loading, J. Materials Science, Vol. 35, Issue 17 (2000) pp. 4465-4476.

45. Odegard, G., Searles, K. and KUMOSA, M., Non-Linear Analysis of Woven Fabric-Reinforced Graphite/PMR-15 Composites Under Shear-Dominated Biaxial Loads, J. Mechanics of Composite Materials and Structures, Vol. 7, No. 2 (2000) pp. 129-152.
46. Odegard, G. and KUMOSA, M., Determination of Shear Strength of Unidirectional Composite Materials with the Iosipescu and 10° Off Axis Shear Tests, Composites Science and Technology, Vol. 60, No. 16 (2000) pp. 2917-2943.
47. Odegard, G. and KUMOSA, M., Elastic-Plastic and Failure Properties of a Unidirectional Graphite/PMR-15 Composite at Room and Elevated Temperatures, Composites Science and Technology, Vol. 60, No. 16 (2000) pp. 2979-2988.

In 2001

48. Ely, T., Armentrout, D. and KUMOSA, M., Evaluation of Stress Corrosion Properties of Pultruded Glass Fiber/Polymer Composite Materials, J. Composite Materials, Vol. 35, No. 9 (2001) pp. 751-773.
49. Megel, M., Kumosa, L., Ely, T., Armentrout, D. and KUMOSA, M., Initiation of Stress Corrosion Cracking in Unidirectional Glass/Polymer Composite Materials, Composites Science and Technology, Vol. 61, No. 2 (2001) pp. 231-246.
50. Kumosa, L., Armentrout, D. and KUMOSA, M., An Evaluation of the Critical Conditions for the Initiation of Stress Corrosion Cracking in Unidirectional E-Glass/Polymer Composites, Composites Science and Technology, Vol. 61, No. 4 (2001) pp. 615-623.
51. Searles, K., Odegard, G. and KUMOSA, M., Micro- and Mesomechanics of 8 Harness Satin Woven Fabric Composites: I Evaluation of Elastic Behavior, Composites Part A, Vol. 31, No. 11 (2001) pp. 1627-1655.
52. Odegard, G., Armentrout, D., Searles, K., Kumosa, L. and KUMOSA, M., Failure Analysis of ±45° Off-Axis Woven Fabric Composite Specimens, Journal of Composites Technology & Research, Vol. 23, No. 3 (2001) pp. 205-224.
53. Benedikt, B., KUMOSA, M., Predecki, P.K., Kumosa, L. and Sutter, J.K., An Analysis of Residual Stresses in a Unidirectional Graphite/PMR-15 Composite Based on the X-Ray Diffraction Measurements, Composites Science and Technology, (2001), Vol. 61, No. 14 (2001) pp. 1977-1994.
54. Benedikt, B., Predecki, P., Kumosa, L., Armentrout, D., Sutter, J.K. and KUMOSA, M., The use of X-ray Diffraction Measurements to Determine the Effect of Bending Loads on Internal Stresses in Aluminum Inclusions Embedded in a Unidirectional Carbon-Fiber/PMR-15 Composite, Composites Science and Technology, Vol. 61, No. 14 (2001) pp. 1995-2006.
55. Odegard, G., Searles, K. and KUMOSA, M., A Continuum Elastic-Plastic Model for Woven Fabric/Polymer Matrix Composite Materials under Biaxial Stresses, Composites Science and Technology, Vol. 61, No. 16 (2001) pp. 2501-2510.

In 2002

56. KUMOSA, M., Odegard, G., Armentrout, D., Kumosa, L., Searles, K. and Sutter J.K., Comparison of the ±45° Off-Axis and Iosipescu Shear Tests for Woven Fabric Composite Materials, Journal of Composites Technology & Research, Vol. 24, (2002) pp. 3-16.

57. Searles, K., Odegard, G. and KUMOSA, M., The Effect of Eccentric Loads on the Macroscopic Strain and Stress Distributions in Woven Fabric Iosipescu Specimens, J. Composite Materials, Vol. 36, No. 5 (2002) pp. 571-588.
58. KUMOSA, M., Han, Y. and Kumosa, L., Fracture Analyses of Composite Insulators with Crimped End-Fittings: Part I - Non-Linear Finite Element Computations, Composites Science and Technology, Vol. 62, No. 9 (2002) pp. 1191-1207.
59. KUMOSA, M., Armentrout, D., L. Kumosa, Han, Y. and Carpenter, S.H., Fracture Analyses of Composite Insulators with Crimped End-Fittings: Part II - Suitable Crimping Conditions, Composites Science and Technology, Vol. 62, No. 9 (2002) pp. 1209-1221.
60. Benedikt, B., Rupnowski, P., Kumosa, L., Sutter J.K., Predecki, P.K. and KUMOSA, M., Determination of Interlaminar Residual Thermal Stresses in a Woven 8HS Graphite/PMR-15 Composite using X-Ray Diffraction Measurements, Mechanics of Advanced Materials and Structures, Vol. 9 (2002) pp. 375-394.
61. Kumosa, L., Armentrout, D. and KUMOSA, M., The Effect of Sandblasting on the Initiation of Stress Corrosion Cracking in Unidirectional E-Glass/Polymer Composites Used in High Voltage Composite (Non-Ceramic) Insulators, Composites Science and Technology, Vol. 62, No. 15 (2002) pp. 1999-2015.

In 2003

62. Gentz, M. Armentrout, D., Rupnowski, P., Kumosa, L., Sutter, J.K., and KUMOSA, M., Mechanical Behavior of a Woven Graphite/PMR-15 Composite at Room and Elevated Temperatures Determined from the $\pm 45^\circ$ Tensile and Iosipescu Shear Tests, Journal of Composites Technology & Research, Vol. 25, Issue 1 (2003) pp. 22-34.
63. Kumosa, L., KUMOSA, M. and Armentrout, D., Resistance to Stress Corrosion Cracking of Unidirectional Glass/Polymer Composites Based on Low and High Seed ECR-glass Fibers for High Voltage Composite Insulator Applications, Composites Part A, Vol. 34, No. 1 (2003) pp. 1-15.
64. Rupnowski, P. and KUMOSA, M., Meso- and Micro-Stress Analyses in an 8HS Graphite/Polyimide Woven Composite Subjected to Biaxial In-Plane Loads at Room Temperature, Composites Science and Technology, Vol. 63, No. 6 (2003) pp. 785-799.
65. Benedikt, B., Rupnowski, P. and KUMOSA, M., Visco-Elastic Stress Distributions and Elastic Properties in Unidirectional Composites with Large Volume Fractions of Fibers, Acta Materialia, Vol. 51, No. 12 (2003) pp. 3483-3493.
66. Armentrout, D., KUMOSA, M. and McQuarrie, T., Boron Free Fibers for Prevention of Acid Induced Brittle Fracture of Composite Insulator GRP Rods, IEEE Transactions on Power Delivery, Vol. 18, No. 3, July 2003, pp. 684-693.
67. KUMOSA, M., An Investigation of Damage Initiation in Woven Graphite Fiber/Polyimide Composites Subjected to Shear, Key Engineering Materials, Vols. 251-252 (2003) pp. 447-456. (also in Advances in Fracture and Damage Mechanics, Proceedings of the 3rd International Conference on Fracture and Damage Mechanics, FDM 2003, 2-4 September, 2003, Paderborn, Germany, edited by F.G. Buchholz, H.A. Richard and M. H. Aliabadi, Trans Tech Publications Ltd).
68. Armentrout, D., Gentz, M., Kumosa, L., Benedikt, B. and KUMOSA, M., Stress Corrosion Cracking in a Unidirectional E-glass/Polyester Composite Subjected to Static

and Cyclic Loading Conditions, Composite Technology & Research, Vol. 25, No. 4, October 2003, pp. 202-218.

In 2004

69. Gentz, M., Armentrout, D., Rupnowski, P., Kumosa, L. Shin, E., Sutter, J.K., and KUMOSA, M., In-Plane Shear Testing of Woven Graphite/Polyimide Composites with Medium and High Modulus Graphite Fibers at Room and 316°C Temperatures, Composites Science and Technology, Vol. 64, No. 2 (2004) pp. 203-220.
70. Benedikt, B., KUMOSA, M., Armentrout, D., Kumosa, L., Sutter, J.K., and Predecki, P.K., Analysis of Stresses in Aluminum Particles Embedded Inside Unidirectional and Woven Graphite/Polyimide Composites Subjected to Large Bending Loads, Mechanics of Advanced Materials and Structures, Vol. 11, Issue 1, (2004) pp. 31-49.
71. Benedikt, B., Gentz, M., Kumosa, L., Rupnowski, P., Sutter, J. K., KUMOSA, M., X-ray Diffraction Experiments on Aged Graphite Fiber/Polyimide Composites with Embedded Aluminum Inclusions, Composites Part A, Vol. 35, No. 6 (2004) pp. 667-681.
72. Gentz, M., Benedikt, B., J. K. Sutter, and KUMOSA, M., Residual Stresses in Unidirectional Graphite Fiber/Polyimide Composites as a Function of Aging, Composites Science and Technology, Vol. 64, No. 10-11 (2004) pp. 1671-1677.
73. Kumosa, L., Benedikt, B., Armentrout, D. and KUMOSA, M., Moisture Absorption Properties of Unidirectional Glass/Polymer Composites Used in Non-Ceramic Insulators, Composites Part A, Vol. 35, no. 9 (2004) pp. 1049-1063.
74. KUMOSA, M., Kumosa, L. and Armentrout, D., Can Water Cause Brittle Fracture Failures of Composite Non-Ceramic Insulators in the Absence of Electric Fields?, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 11, No. 3 (2004) pp. 523-533.
75. Armentrout, D., KUMOSA, M. and Kumosa, L., Water Diffusion into and Electrical Testing of Composite Insulator GRP Rods, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 11, No. 3 (2004) pp. 503-522.
76. Chughtai, A. R., Smith, D. M., Kumosa, L., and KUMOSA, M., FTIR Analysis of Non-Ceramic Composite Insulators, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 11, No. 4 (2004) pp. 585-596.
77. Rupnowski, P. Gentz, M. and KUMOSA, M., Mechanical Response of a Woven Graphite/Polyimide Composite to In-Plane Shear Dominated Biaxial Loads at Room and Elevated Temperatures, Acta Materialia, Vol. 52, No. 19 (2004) pp. 5603-5613.
78. KUMOSA, M., Kumosa, L. and Armentrout, D., Causes and Potential Remedies of Brittle Fracture Failures of Composite (Non-Ceramic) Insulators, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 11, No. 6 (2004) pp.1037-1048.

In 2005

79. Rupnowski, P., Gentz, M., Sutter, J. K. and KUMOSA, M., An Evaluation of Elastic Properties and Coefficients of Thermal Expansion of Graphite Fibers from Macroscopic Composite Input Data, Proceedings of the Royal Society: Mathematical, Physical and Engineering Sciences, Vol. 461 (2005) pp. 347-369.

80. Rupnowski, P., Gentz, M., Sutter, J. K. and KUMOSA, M., An Evaluation of the Elastic Properties and Coefficients of Thermal Expansion of Medium and High Modulus Graphite Fibers, Composites Part A, Vol. 36 (2005) pp. 327-338.
81. KUMOSA, M., Kumosa, L. and Armentrout, D., Response to the Discussion by R. S. Gorur and B. Mobasher on Paper "Can Water Cause Brittle Fracture Failures of Non-Ceramic Insulators in the Absence of Electric Field" by Kumosa et al., IEEE Trans. DEI, Vol. 11, pp. 323-333, 2004, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 12, Issue 3 (2005) pp. 621-626.
82. KUMOSA, M., Kumosa, L. and Armentrout, D., Failure Analyses of Non-Ceramic Insulators: Part I - Brittle Fracture Characteristics, IEEE Electrical Insulation Magazine, Vol. 21, Issue 3 (2005) pp. 14-27.
83. KUMOSA, M., Kumosa, L. and Armentrout, D., Failure Analyses of Non-Ceramic Insulators: Part II - The Brittle Fracture Model and Failure Prevention, IEEE Electrical Insulation Magazine, Vol. 21, Issue 4 (2005) pp. 28-41.
84. Benedikt, B., KUMOSA, M. and Predecki, P., An Evaluation of Residual Stresses in Graphite/PMR-15 Composites by X-ray Diffraction, Acta Materialia, Vol. 53, No. 17 (2005) pp. 4531-4543.
85. Rupnowski, P., Gentz, M., Armentrout, D., Sutter, J. K. and KUMOSA, M., The Response of a Woven Graphite Fiber Polyimide Composite to Aging in Nitrogen, Acta Materialia, Vol. 53, No. 17 (2005) pp. 4555-4565.
86. Kumosa, L., Armentrout, D., Benedikt, B. and KUMOSA, M., An Investigation of Moisture and Leakage Currents in GRP Hollow Core Composite Cylinders, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 12, No. 5 (2005) pp. pp.1043-1059.
87. Kumosa, L., KUMOSA, M. and Armentrout, D., Resistance to Brittle Fracture of Glass Reinforced Polymer Composites Used in Composite (Non-Ceramic) Insulators, IEEE Transactions on Power Delivery, Vol. 20, No. 4 (2005) pp. 2657-2666.

In 2006

88. Rupnowski, P. Gentz, M. and KUMOSA, M., Mechanical Response of a Unidirectional Graphite Fiber/Polyimide Composite as a Function of Temperature, Composites Science and Technology, Vol. 66. No. 7-8 (2006) pp 1045-1055.
89. Benedikt, B., Lewis, M., Ramgaswamy, P., KUMOSA, M., Predecki, P., Kumosa, L., and Gentz, M., Residual Stress Analysis in Aged Graphite/PMR-15 Composites Using X-ray Diffraction, Materials Science and Engineering A, Vol. 421, 1-2, Sp. Iss. (2006) pp. 1-8.
90. KUMOSA, M., Damage Mechanisms in Polymer Matrix Composites in Extreme Environments, Key Engineering Materials, Vol. 324/325 (2006) pp. 663-666.

In 2007

91. KUMOSA, M., Structural Integrity and Durability of High Voltage Composite (Non-Ceramic) Insulators, Int. Journal on Structural Integrity and Durability, Vol. 3, (2007) pp. 35-50.

In 2009

92. Stowe, J., Predecki, P., Laz, P., Burks, B. and KUMOSA, M., Probabilistic Molecular Dynamics Evaluation of the Stress-Strain Behavior of Polyethylene, Acta Materialia, Vol. 57 (2009) pp. 3615-3622.
93. Burks, B., Armentrout, D., Baldwin, M. Buckley, J., and KUMOSA, M., Hybrid Composite Rods Subjected to Excessive Bending Loads, Composites Science and Technology, Vol 69 (2009) pp. 2625-2632.

In 2010

94. Burks, B., Armentrout, D. and KUMOSA, M., Failure Prediction Analysis of an ACCC Conductor Subjected to Thermal and Mechanical Stresses, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 17, Issue 2 (2010) pp. 588-596.
95. Burks, B., Middleton, J., Armentrout, D. and KUMOSA, M. (2010) Effect of Excessive Bending on Residual Tensile Strength of Hybrid Composite Rods, Composites Science and Technology, 70, (2010) pp.1490-1496.

In 2011

96. Burks, B., Armentrout, D. and KUMOSA, M., Characterization of the Fatigue Properties of a Hybrid Composite Utilized in High Voltage Electric Transmission, Comp. Part A, Vol. 42, pp. 1138-1147, 2011.

In 2012

97. Burks, B. and KUMOSA, M., The Effects of Atmospheric Aging on a Hybrid Polymer Matrix Composite, Composites Science and Technology, Vol. 72 (2012), pp. 1803-1811.
98. Burks, B., Middleton, J. and KUMOSA, M., Micromechanics Modeling of Fatigue Failure Mechanisms in a Hybrid Polymer Matrix Composite, Composites Science and Technology, Vol. 72 (2012) pp. 1863-1869.

In 2013

99. Middleton, J., Burks, B, Wells, T, Setters A. M., Jasiuk, I., Predecki, P., Hoffman J. and KUMOSA, M., The Effect of Ozone on Polymer Degradation in Polymer Core Composite Conductors, Polymer Degradation and Stability, Vol. 98 (Jan. 2013) pp. 436-445.
100. Middleton, J., Burks, B., Wells, T., Setters, A. M., Jasiuk, I. and KUMOSA, M., The Effect of Ozone and High Temperature on Polymer Degradation in Polymer Core Composite Conductors, Polymer Degradation and Stability, Vol. 98, Issue 11 (Nov. 2013) pp. 2282-2290.

In 2014

101. Burks, B. and KUMOSA, M., A Modal Acoustic Emission Signal Classification Scheme Derived from the Finite Element Simulation; Int. J. Damage Mechanics, Vol. 23, No. 1 (2014) pp. 43-62.
102. Guo, X., Yi, Yun-Bo, and KUMOSA, M., "A Reduced Computational Model for Prediction of Electrical Resistance in Fibrous Composites", Int. J. Multiscale Computational Engineering, Vol. 12, Issue 5 (2014) pp. 451-463.
103. Allen, B., Predecki, P. and KUMOSA, M., Integrating Open-Source Software Applications for Building Molecular Dynamics Systems, J. Computational Chemistry, Vol. 23, No. 1 (April 2014) pp. 43-62.

In 2015

104. Middleton, J., Hoffman, J., Burks, B. and KUMOSA, M., Aging of a Polymer Core Composite Conductor; Mechanical Properties and Residual Stresses, Composites Part A, Vol. 69 (2015), pp. 159-167.
105. Hoffman, J., Middleton, J. and KUMOSA, M., Effect of a Surface Coating on Flexural Performance of Thermally Aged Hybrid Glass/Carbon Epoxy Composite Rods, Composites Science and Technology, Vol. 106 (2015) pp. 141-148.
106. Hakansson, E., Predecki, P. and KUMOSA, M., Comparison of Galvanic Corrosion Performance of HTLS ACCC and Conventional ACSR Conductors, IEEE Transactions on Reliability, Vol. 64, Issue 3 (2015) pp. 928-934.
107. Allen B., Bleszynski, M., Willis, E., and KUMOSA, M., Investigation into the Effects of Environmental Stressors on RTV-1 Silicone-Based Caulk Materials, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 22, Issue 5 (October 2015) pp. 2978-2986.

In 2016

108. Hakansson, E., Ricker, R., Predecki, P. and KUMOSA, M., Electrochemical In-situ Assessment Method for Galvanic Corrosion in Bare Overhead Transmission Line Conductors, CIGRE Science and Engineering, June 2016, No 5, pp. 38-49.
109. Lu, T., Solis-Ramos, E., Yi, Y., and KUMOSA, M., Synergetic Environmental Degradation of High Voltage Glass Reinforced Polymer Composites, Polymer Degradation and Stability, Vol. 131, Sep. 2016, pp. 1-8.
110. Bleszynski, M. and KUMOSA, M., Silicone Rubber RTV Aging in the Presence of Aqueous Salt, IEEE Transactions on Dielectrics and Electrical Insulation, Vol. 23. No. 5 (2016) pp. 2822-2829.
111. Hakansson, E, Hoffman, J., Predecki, P. and KUMOSA, M., The Role of Corrosion Product Deposition in Galvanic Corrosion, Corrosion Science, Vol. 114 (2016) pp. 10-16.

In 2017

112. Solis-Ramos, E. and KUMOSA, M., Synergistic Effects in Stress Corrosion Cracking of Glass Reinforced Polymer Composites, J. Polymer Degradation and Stability, Vol. 136 (2017) pp. 146-157.
113. Waters, D., Hoffman, J., Hakansson, E. and KUMOSA, M., Low Velocity Impact To Transmission Line Conductors, Int. J. Impact Engineering, Vol. 106 (2017) pp. 64-72.
114. Grell, W., E. Solis-Ramos, E., Clark, E., Lucon, E. Garboczi, E., Predecki, P., Loftus, Z., and KUMOSA, M., Effects of Powder Oxidation on Impact Toughness of Electron Beam Melt Ti-6Al-4V, J. Additive Manufacturing, Vol. 17 (2017) pp. 123-134.
115. Bleszynski, M and KUMOSA, M., Silicone Rubber Aging in Electrolyzed Aqueous Salt Environments, Polymer Degradation and Stability, Vol. 146 (2017) pp. 61-68.
116. Lu, T., Solis-Ramos, E., YI, Y., and KUMOSA, M., Particle Removal Mechanisms in Synergistic Aging of Polymers and Glass Reinforced Polymer Composites under Combined UV and Water, Composites Science and Technology, Vol. 153 (2017) pp. 273-181.

In 2018

117. Bakir, M., Henderson, NC, Meyer, J. J., Oh, J., Miljkovic, N., KUMOSA, M., Economy, J., and Jasiuk, I., Effects of Environmental Aging on Physical Properties of Aromatic Thermosetting Copolyester Matrix Neat and Nanocomposite Foams, Polymer Degradation and Stability, Vol. 147 (2018) pp. 49-56.
118. Bleszynski, M. and KUMOSA, M., Aging Resistant TiO₂/Silicone Rubber Composites, Composites Science and Technology, Vol. 164 (2018) pp. 74-81.
119. Lu, T., Solis-Ramos, E., YI, Y., and KUMOSA, M., UV Degradation Model for Polymers and Polymer Matrix Composites, Polymer Degradation and Stability, Vol 154 (2018) pp. 2013-210.
120. Henderson, C., DeFrance, C., Hoffman, J., Predecki, P. and KUMOSA , M., Ballistic Fragmentation Confinement of Coated Brittle Transformer Bushing Models, Int. J. Impact Engineering, Vol. 122 (Dec 2018) pp. 363-373.

In 2019

121. Waters, D., Hoffman, J. and KUMOSA, M., Monitoring of Overhead Transmission Conductors Subjected to Static and Impact Loads using Fiber Bragg Grating Sensors, IEEE Transactions on Instrumentation and Measurement, Vol. 68, No. 2 (2019, pp. 595-605.
122. Hoffman, J., Waters, D., Khadka, S., and KUMOSA, M., Shape Sensing of Modern Electrical Transmission Lines Using FBG Sensors, IEEE Transactions on Instrumentation and Measurement. DOI: 10.1109/TIM.2019.2894045
123. Henderson, C., DeFrance, C., Predecki, P. and KUMOSA, M., Damage Prevention in Transformer Bushings Subjected to High-Velocity Impact, Int. J. Impact Engineering, in press, March 2019.

124. Bleszynski, M., Woll, R., Middleton, J. and KUMOSA, M. Effect of Crosslinking, Embedded TiO₂ particles and aging on PDMS Icephobic Barriers, Polymer Degradation and Stability, submitted in March. 2019.
125. Bleszynski, M. and KUMOSA, M., New Approach to Moisture Accumulation Assessment, Materials Today Advances, submitted in March 2019.

Manuscripts in Preparation

126. C. Henderson, M. KUMOSA, et al, Protection of Borosilicate Glass Plates by an Elastomeric Coating against Impact in Drop Tower Testing, Int. J. Impact Engineering, to be submitted in April 2019.
127. S. Khadka, J. Hoffman, E. Solis-Ramos and M. KUMOSA; In Site Curing Monitoring of Single Fiber Composites Using FBG Sensors, Composites Science and Technology, to be submitted in Winter/Spring 2019.
128. M. Bleszynski, R. Woll, J. Middleton and M. KUMOSA, Issues with Ice Adhesion Testing on Soft Low Surface Energy Materials, Applied Materials and Interfaces, to be submitted in Spring 2019.

Articles and Interviews with Dr. M. Kumosa Published in Major Marketing Magazines/Journals

1. Interview with Maciej Kumosa of the University of Denver, Research of Brittle Fractures in Composite Insulators, Insulator News & Market Report, July/August 1997, pp. 47-51.
2. Research Program on Brittle Fracture Concludes at University of Denver; Interview with Maciej Kumosa, Insulator News and Market Report, July/August 2005, pp. 78-83.
3. Composite Insulator Failures Lead to Improved Designs, Composite Insulator Failures Lead to Improved Designs, Transmission and Distribution World, January 2006 pp. 42-48.
4. Maciej Kumosa: Pioneering High-Voltage Research, Transmission and Distribution World, October 2012. http://tdworld.com/etrain/featured_instructor/kumosa-hv-research-1012/
5. University of Denver Professor: New Transmission Line Product Would Save Lives, Denver Business Journal, May 24, 2013
<http://www.bizjournals.com/denver/print-edition/2013/05/24/university-of-denver-professor-new.html?page=all>
6. Icing Prevention for High Voltage Powerlines; Monika Bleszynski, Joe Hoffman and Maciej KUMOSA, Transmission and Distribution World, Dec 10, 2018.
<https://www.tdworld.com/overhead-transmission/icing-prevention-high-voltage-powerlines>
7. Monitoring of Overhead Transmission Systems Using Embedded Optical Fibers, Daniel Waters, Joe Hoffman and Maciej KUMOSA, Transmission and Distribution World, January 21, 2019.
<https://www.tdworld.com/overhead-transmission/monitoring-overhead-transmission-systems-using-embedded-optical-sensors>

8. Improving the Lifespan of Non-Ceramic Insulators near Coastlines, Monika Bleszynski, Joe Hoffman and Maciej KUMOSA, T&DWorld, submitted in Feb 2019.
9. Aging Resistant TiO₂/Silicone Rubber Composites, Monika Bleszynski and Maciej KUMOSA, Advances in Engineering, published in Feb 2019.
<https://advanceseng.com/aging-resistant-tio2-silicone-rubber-composites/>

Published Papers in Conference Proceedings/Websites

1. Golaski, L., Hull, D. and KUMOSA, M., Acoustic Emission from Filament Wound Pipes under Long-Term Loading Conditions, in the Proceedings of the Fourth International Conference of Mechanical Behavior of Materials, Royal Institute of Technology, Stockholm, Sweden, August 15-19, 1983, Oxford: Pergamon Press 1983, pp. 557-563.
2. KUMOSA, M. and Hull, D., Mixed Mode Fracture of Composites using Iosipescu Shear Test, in the Proceedings of the 4th International Conference on Numerical Methods in Fracture Mechanics, San Antonio, Texas, 22-26 March 1987, pp. 657-667.
3. KUMOSA, M. and Hull D., FEM Analysis of Mixed Mode Fracture in the Iosipescu Shear Test, in the Proceedings of the ICCM VI/ECCM 2 Conference, Vol. 3, London, 20-24 July 1987, pp. 243-253.
4. Barnes, J., KUMOSA, M. and Hull, D., Mixed Mode Crack Propagation in Hoop Wound Composite Cylinders Tested in Torsion, in the Proceedings of the ICCM VI/ ECCM 2 Conference, Vol. 3, London, 20-24 July 1987, pp. 429-439.
5. KUMOSA, M. and Hull, D., Fracture of Isotropic and Orthotropic Cylindrical Shells Containing a Circumferential Crack, in the Proceedings of the 3rd International Conference, Fibre Reinforced Composites, University of Liverpool, 1988.
6. KUMOSA, M. and Hull, D., Fracture of Cylindrical Shells Containing a Circumferential Crack, in the Proceedings of the Int. Conf. on Fracture ICF 7, Vol. 1, Houston 1989, pp. 75-81.
7. Broughton, W. R., KUMOSA, M. and Hull, D., An Experimental-Analytical Investigation of Intralaminar Shear Properties of Unidirectional CFRP, in the Proceedings of the 3rd European Conference on Composite Materials, ECCM-3, Bordeaux, 1989, pp. 741-746.
8. Huang Xue-Ning, KUMOSA, M. and Hull, D., Fracture of Circumferentially Cracked Filament Wound GRP Tubes under Uniform Tensile Loading, in the Proceedings of the ICCM7, Vol. 2. Beijing, 1989, pp. 578-583.
9. Broughton, W. R., KUMOSA, M. and Hull, D., An Investigation of Stress Distribution in CFRP Iosipescu Shear Specimen, in the Proceedings of the ICCM7, vol. 3. Beijing, 1989, pp. 123-127.
10. Sigalas, I., KUMOSA, M. and Hull, D. Trigger Mechanisms in Energy Absorbing Glass Cloth/Epoxy Tubes, in the Proceedings of the 3rd European Conference on Composite Materials, ECCM-3, Bordeaux, 1989, pp. 657-662.
11. Buchholz, F-G., KUMOSA, M. and Burger, M., Finite Element Analysis of Mixed Mode Fracture of Orthotropic Iosipescu Specimens, the Conf. Proc., 10. Reutlinger

- Arbeitstagung Finite Elemente in der Praxis, April 1989, Fed. Rep. of Germany, pp. 353-376.
12. Buchholz, F.-G., Burger, M., KUMOSA, M. and Eggers H., Mixed-Mode Fracture Analysis of Orthotropic Laminates by Local and Global Energy Methods, in the Proceed., Fifth Int. Conf. on Numerical Methods in Fracture Mechanics, Freiburg, April 1990, W. Germany.
 13. KUMOSA, M., Qiu, Q., Bennett, E., Ek, C., McQuarrie, T. S. and Braun J. M., Brittle Fracture of Non-Ceramic Insulators, in the Proceed. Fracture Mechanics for Hydroelectric Power Systems Symposium'94, Canadian Committee for Research on the Strength and Fracture of Materials (CSFM), BC Hydro, Sept. 1, 1994, pp. 235-254.
 14. Bansal, A. and KUMOSA, M., Mixed-Mode Failure of Unidirectional Composite Materials for Electrical Applications, in the Proceed. Fracture Mechanics for Hydroelectric Power Systems Symposium'94, Canadian Committee for Research on the Strength and Fracture of Materials (CSFM), BC Hydro, Sept. 1, 1994, pp. 255-267.
 15. Ding, S., Buchholz, F.G., Buerger, M., and KUMOSA, M., 3D-Effects on Strain Energy Release Rates, Stresses and Stress Singularities Adjacent to Crack Front Edges, in the Proc. Int. Conference on Computational Eng. Sci. Vol. 2 (1995) pp. 2039-2044.
 16. Erdinc, I., Ding, S., Buchholz, F.G., and KUMOSA, M., Stress Singularities at Sharp Notch Tips and Bimaterial Interface Wedges, 7th Int. Conf. Mechanical Behavior of Materials, May 28-June 2, 1995, Netherlands.
 17. Ding, S., Buchholz, F. G., Burger, M., and KUMOSA, M., 3-D Effects on Strain Energy Release Rates, Stresses and Stress Singularities Adjacent to Crack Front Edges, in Computational Mechanics 95, Theory and Applications, Vol. II (Eds. S. N. Atluri et al.) Proc. of the Int. Conf. on Computational Engineering Science (ICES 95), Hawaii, USA, August 95, Springer Verlag, Berlin, 95, pp. 2039- 2044.
 18. Fujimoto, N., Braun, J. M., KUMOSA, M., and Ek, C., Critical Fields in Composite Insulators; Effect of Voids and Contaminations, 9th International Symposium on High Voltage Engineering, August 29-September 1, 1995, Graz, Austria.
 19. KUMOSA, M., Mechanical Aspects of Non-Ceramic Insulators, Symposium on Non-Ceramic Insulator Technology (Worldwide Experience & Technology), June 12- 14, 1996, Singapore.
 20. KUMOSA, M., Searles, K. H., and Odegard, G., Biaxial Failure Analysis of Graphite Reinforced Polyimide Composites, HITEMP Conference, April 29-30, 1997.
 21. KUMOSA, M., Searles, K. H., Odegard, G. and Castelli, M., Biaxial In-Plane Testing of High Temperature Graphite/Polyimide Fabric Composites, High Temple Workshop XVIII, January 20-January 22, 1998, Hilton Resort, South Carolina, pp. R1-R-22.
 22. Armentrout, D., Ely, T., Carpenter, S. and KUMOSA, M., An Investigation of the Brittle Fracture in Composite Materials used for High Voltage Insulators, in the Proc. 14th Int. Acoustic Emission Symposium and 5th Acoustic Emission World Meeting, August 9-14, 1998 Big Island, Hawaii, pp. S10-S18.
 23. Searles, K., and KUMOSA, M., Analysis of Nonlinear Behavior in 8-Harness Satin Woven Fabric Composites Subjected to In-Plane Biaxial Shear Deformation, Proc. of the High Temple Workshop XIX, February 1-4, 1999, Denver, Colorado, pp. X1-X25

24. Odegard, G., KUMOSA, M. and Castelli, M., Shear Dominated Biaxial Elastic-Plastic Analysis of Unidirectional Graphite/PMR-15 Composites at Room and Elevated Temperatures, Proc. of High Temple Workshop XIX, February 1-4, 1999, Denver, Colorado, pp. M1-M15.
25. Dragoi, D., Predecki, P., KUMOSA, M. and Castelli, M., Stress-Strain Microsensors in Graphite/Polyimide Composites, Proc. of the High Temple Workshop XIX, February 1-4, 1999, Denver, Colorado, pp. K1-K18.
26. M. KUMOSA et al., Fundamental Issues Regarding the High Temperature Failure Properties of Graphite/Polyimide Fabric Composites, Proc. of the Contractor's Meeting in Mechanics of Materials & Devices and Structural Mechanics, Air Force Office of Scientific Research, October 12-14, 2000, Columbus, OH.
27. M. KUMOSA et al., Fundamental Issues Regarding the High Temperature Failure Properties of Graphite/Polyimide Fabric Composites, Proc. of the Contractor's Meeting in Mechanics of Materials & Devices and Structural Mechanics, Air Force Office of Scientific Research, October 18-20, 2001, Washington, DC.
28. KUMOSA, M., Predecki, P., Odegard, G., Searles, K., Benedikt, D., Armentrout, D., Kumosa, L., Gentz, M. and Sutter J.K., Analysis of Failure Mechanisms and Residual Stresses in Unidirectional and Woven Graphite/PMR-15 Composites Subjected to Shear Dominated Biaxial Loads, Proc. of High Temple Workshop XXI, Edit. DOD/NASA Laboratories and University of Dayton Research Institute, February 13- 15, 2001, Clearwater Beach, Florida, Z1- Z16.
29. KUMOSA, M., Fracture Analysis of Composite High Voltage Insulators, Proc. of the 7th Summer School of Fracture Mechanics, Pokrzywna 18-22 June, 2001, Poland, Zeszyty Naukowe Politechniki Opolska, ISSN 1429-6055, pp. 125-145.
30. KUMOSA, M., Shear Dominated Failure Mechanisms in High Temperature Polymer Matrix Composites, Proc. of the 7th Summer School of Fracture Mechanics, Pokrzywna 18-22, June, 2001, Poland, Zeszyty Naukowe Politechniki Opolska, ISSN 1429-6055, pp. pp. 147-162.
31. Benedikt, B., Predecki, P.K., Kumosa, L. and KUMOSA, M., Measurement of Residual Stresses in Polymer Matrix Fiber Reinforced Composites Based on X-Ray Diffraction, Advances in X-ray Analysis-Volume 45, Proceedings of the 50th Annual Conference on Applications of X-ray Analysis [Denver X-ray Conference], 30 July – 3 August 2001, Steamboat Springs, Colorado, USA ICDD 2002 ISSN 1097-002, pp. 218-224.
32. KUMOSA, M. P.K. Predecki, Armentrout, D., Benedikt, B., Rupnowski, P., Gentz, M., Kumosa, L., and Sutter, J.K., Fundamental Issues Regarding the High Temperature Failure Properties of Graphite/Polyimide Fabric Composites Subjected to Biaxial Shear Dominated Loads, in the Proceedings of the 22nd High Temple Workshop, Edit. DOD/NASA Laboratories and University of Dayton Research Institute, 21024 January 2002, Santa FR, New Mexico, pp. L.1-L.15.
33. M. KUMOSA et al., Fundamental Issues Regarding the High Temperature Failure Properties of Graphite/Polyimide Fabric Composites, Proc. of the Contractor's Meeting in Mechanics of Materials & Devices and Structural Mechanics, Air Force Office of Scientific Research, September 25-27, 2002, Washington, DC.
34. Benedikt, B., Gentz, M., Kumosa, L., Predecki, P.K., Armentrout, D., KUMOSA, M. and Sutter, J.K., The Use of X-ray Diffraction Measurements to Determine the Effect of Aging on Residual Stresses in Unidirectional and Woven Graphite/Polyimide Composites, the

- 51st Annual Denver X-Ray Conference, Colorado Springs, August 2002, International Center for Diffraction Data, Advances in X-ray Analysis, Volume 46, pp. 112-118.
35. KUMOSA, M., Gentz, M., Armentrout, D., Rupnowski, P., Kumosa, L., Shin, E. and Sutter, J.K., Analysis of Failure Mechanisms in Woven Graphite/Polyimide Composites with Medium and High Modulus Graphite Fibers Subjected to In-Plane Shear, Proceedings of the High Temple Workshop XXIII, Edit. DOD/NASA Laboratories and University of Dayton Research Institute, 10-13 February 2003, Jacksonville, Florida, pp. E1-E13.
 36. KUMOSA, M., Gentz, M., Rupnowski, P., Armentrout, D., Kumosa, L., Shin, E., and Sutter, J.K., Mechanical Behavior of Woven Graphite/Polyimide Composites with Medium and High Modulus Graphite Fibers Subjected to Biaxial Shear Dominated Loads, Proceedings of the 14th International Conference on Composite Materials (ICCM-14), July 14-18, 2003, San Diego, California, 2003, paper #1493.
 37. KUMOSA, M., An Investigation of Damage Initiation in Woven Graphite Fiber/Polyimide Composites Subjected to Shear, 3rd International Conference on Fracture and Damage, 2-4 September 2003, Paderborn, Germany (see also item #67 of published papers in international journals).
 38. KUMOSA, M., Predecki, P., Armentrout, D., Benedikt, B., Gentz, M., Rupnowski, P., Kumosa, L., Shin, E., and Sutter, J. K., Fundamental Issues Regarding the High Temperature Failure Properties of Graphite/Polyimide Fabric Composites, in the Proceedings of the AFOSR Contractors' Meeting in Mechanics of Materials and Devices and Structural Mechanics, Santa Fe, New Mexico, September 8-11, 2003.
 39. Eugene, E., Thesken J. C., Sutter, J. K., Chuang, K., KUMOSA, M., et. al, Effects of Fiber Reinforcement Architecture on the Hydrothermal-Mechanical Performance of Polyimide Matrix Composites for Aeropropulsion Applications Proc. 14th International Conference on Composite Materials (ICCM-14), July 14-18, 2003, San Diego, California, 2003, paper #1429.
 40. Gentz, M., Benedikt, B., KUMOSA, M. and J. Sutter, Residual Stresses in Unidirectional Carbon Fiber/Polyimide Composites as a Function of Aging, Proc. 8th Japan International SAMPE Symposium, Nov. 18-21, 2003, pp. 565-568.
 41. KUMOSA, M., Rupnowski, P., Gentz, M. and Sutter, J. K., An Evaluation of Elastic Properties and Coefficients of Thermal Expansion of Medium and High Modulus Graphite Fibers, High Temple Workshop XXIV, Sacramento, California, 2-5 February, 2004, pp. CC1-CC11.
 42. Shin, E. E., Sutter, J., Bubnick, J., Thesken, J., and KUMOSA, M., Property-Performance Assessment of Polymer Matrix Composites for Rapid Heat-up Aeropropulsion Applications, High Temple Workshop XXIV, Sacramento, California, 2-5 February, 2004, pp. M1- M18.
 43. Rupnowski, P. and KUMOSA, M., Determination of the Elastic and Thermal Properties of Graphite Fibers from the Unidirectional and Woven Composite Data, Eleventh International Conference on Composites or Nano Engineering, August 8-14, 2004, Hilton-Head Island, South Carolina, USA.
 44. Gentz, M., Rupnowski, P., KUMOSA, M. and Sutter, J. K., Residual Stress in High Temperature Unidirectional Graphite Fiber/PMR-II-50 Polyimide Composites Aged in Air and Nitrogen, High Temple Workshop XXV, Point Clear Alabama, Feb.14-17, 2005.

45. KUMOSA, M., Damage Mechanisms in Polymer Matrix Composites in Extreme Environments, Proc. 5th Int. Conf. Fracture and Damage, Harbin, China, Sept. 13-15, 2006, submitted (Keynote speaker presentation).
46. KUMOSA, M and Sutter, J. K. Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures, High Temple Workshop 27/DoD-NASA, Sedona, AZ, United States, 12-15 Feb. 2007, Document ID: 20070022361.
47. Burks, B, KUMOSA, M. et al, [Analysis of Drake Sized ACCC Subjected to Bending, IEEE PES meeting, July 2009, Calgary, Canada.](#)
http://www.oocities.org/ieee_tpc/ieee_presents/presentations.htm.
48. KUMOSA, M., Polymer Core Composite Conductor Research at the University of Denver, IEEE PES meeting, July 2009, Calgary, Canada
http://www.oocities.org/ieee_tpc/ieee_presents/presentations.htm.
49. Burks, B., Middleton, J., and KUMOSA, M., Effect of Geometric Variability on the Flexural Properties of the ACCC/TWTM Core, Proceedings of the International Conference on Overhead Lines, March 29-April 1, 2010, Fort Collins.
50. KUMOSA, M. et al, High Temperature Conductor Research at University of Denver; Recent Developments, IEEE PES Meeting, 25-29 July, 2010, Minnesota, USA
[ieee-tpc.org/ieee_presents/KumosaMinnesota.pdf](http://www.oocities.org/ieee_tpc/ieee_presents/KumosaMinnesota.pdf).
51. KUMOSA, M. et al, HT Conductor Research at the University of Denver: Recent Accomplishments, IEEE PES meeting, July 27, 2011, Detroit, USA, posted on line.
52. KUMOSA, M., et al. Polymer Matrix Composites in High Voltage Transmission Line Applications, Proceedings of ICCM 18, Jeju, South Korea, August 2011,
<http://www.iccm-central.org/Proceedings/ICCM18proceedings/iccm.htm>.
53. Burks, B and KUMOSA, M., A Probabilistic Approach to Account for the ‘Wear-in’ Scatter of a Hybrid Composite Material”, Proceedings of ICCM 18, Jeju, South Korea, August 2011, http://www.iccm-central.org/Proceedings/ICCM18_proceedings/iccm.htm.
54. Hoffman, J. and KUMOSA, M., Thermal Aging Prevention in Polymer Matrix Composites, in the Proceedings of International Conference on Composite Materials (ICCM 20), Denmark, July 2015.
55. Hakansson, E., Predecki, P. and KUMOSA, M., Numerical Model of Galvanic Corrosion in Polymer Composite Core Conductors, in the Proceedings of International Conference on Composite Materials (ICCM 20), Denmark, July 2015.
56. KUMOSA, M., Research on Advanced Materials and Structures in HVT I/UCRCenter, IEEE PES Annual Meeting, Denver, Colorado, July 29, 2015, presentation given to OHL/ESMOL subcommittee, available on line.
57. Hoffman, J., Khadka, S. and KUMOSA. M., In Situ Single Fiber Composites Manufacturing Using FBG Sensors, 22nd Int. Conference on Composite Materials (ICCM22), August 2019, submitted
58. Bleszynski, M. and KUMOSA, M., Composite TiO₂ PDMS Silicone Rubbers for Reduced Ice Adhesion, ICCM22, August 2019, submitted.
59. Waters, D., Hoffman, J., and KUMOSA, M., Monitoring of Overhead Composite Transmission Systems using Embedded Optical Sensors, ICCM22, August 2019, submitted.

60. Lu, T., Solis-Ramos, E., and KUMOSA, M., Particle Removal Mechanisms in Synergistic Aging of Glass Fiber Reinforced Polymers, ICCM22, August 2019, submitted.

Reports

Approximately 300 monthly, quarterly, annual and final reports have been submitted since 1990 to the following organizations: National Science Foundation, Air Force Office of Scientific Research, Electric Power Research Institute, NASA Glenn Research Center, Bonneville Power Administration, Western Area Power Administration, Alabama Power Company, National Rural Electric Cooperative Association, General Electric Aircraft Engines, Precision Castparts Corporation, Pacific Gas & Electric, NGK- Japan, Glasforms Inc., Tri-State Generation and Transmission Association, and others.

Published Reports

Regular research reports

1. M. KUMOSA, Q. Qiu, B. Bansal, S.H. Carpenter, D. Armentrout, M. V. Balakrishnan, Y. Zhao, T. Ely, A. Chughtai and D. Smith, Fracture Analysis of Composite Insulators, Final Report to EPRI, EPRI, Palo Alto, CA; 2001. 1006293 (under contract W08019-21).*
2. M. KUMOSA, L. Kumosa, Y. Han, M. Moyle, S. H. Carpenter, A. Chughtai, T. S. McQuarrie, P.K. Predecki and D. M. Smith, Failure Analysis of Composite High Voltage Insulators, Final Report to the Electric Power Research Institute, EPRI, Palo Alto, CA: 2002. 1007464.*

* can be purchased from the Electric Power Research Institute; \$25,000 per copy

Unpublished Final and Major Annual Reports

1. M. KUMOSA, Micro- and Macro-Structural Aspects of Fatigue Crack Growth Behavior in Structural Casting Superalloys, Final report to Precision Castparts Corp. and GE Aircraft Engines, Department of Materials Science and Engineering, Oregon Graduate Institute, Portland, Oregon, July 1992 (under contract with PPC and GEAE).
2. M. KUMOSA, Mixed Mode Failure Analysis of a Unidirectional Carbon/Epoxy Composite and Adhesively Bonded Composite Systems, Final report to the National Science Foundation, Oregon Graduate Institute, Portland, Oregon, 1994 (under contract MMS- 9102763).
3. M. KUMOSA et al., Micro-Fracture Mechanisms in Glass/Polymer Insulator Materials under Combined Effects of Electrical, Mechanical and Environmental Stresses, Final Report to the Bonneville Power Administration, Electric Power Research Institute and the Western Area Power Administration, Oregon Graduate Institute, Portland, Oregon, July 1994 (under contract DE-AC79-92BP61873).
4. M. KUMOSA and Q. Qiu, Failure Analysis of Composite Insulators (Failure Investigation of 500 kV Non-ceramic Insulators for Pacific Gas & Electric Company), Final Report to the Pacific Gas and Electric Company, May 1996, Department of Engineering, University of Denver (under contract G31-029-95).
5. M. KUMOSA, A. Bansal, A. Schubert and M.V. Balakrishnan, Analytical and Experimental Studies of Substation NCIs, Final Report to the Bonneville Power

- Administration, Department of Materials Science and Engineering, Oregon Graduate Institute of Science & Technology, Portland, Oregon, December 1994 (under contract 94AC 08103).
6. M. KUMOSA, T. Ely, D. Armentrout, S. H. Carpenter and J. Ma, Micro-Fracture Mechanisms in Glass/Polymer Insulator Materials under Combined Effect of Mechanical, Electrical and Environmental Stresses, Final Report to the Bonneville Power Administration, Western Area Power Administration, Alabama Power Company, Pacific Gas and Electric, National Rural Electric Cooperative Association, and Glasforms, Inc., Department of Engineering, University of Denver, Denver, Colorado, December 1998 (under five separate contracts).
 7. M. KUMOSA, Y. Han, S.H. Carpenter, D. Armentrout and L. Kumosa, Suitable Crimping Conditions in Composite Suspension High Voltage Insulators, Final report to NGK, Department of Engineering, University of Denver, Denver, 1998 (under contract with NGK-Japan).
 8. M. KUMOSA, Failure Analysis of Composite Materials and Adhesive Joints Subjected to Biaxial Loadings, Final Report to the National Science Foundation, Department of Engineering, University of Denver, Denver, Colorado, December 1999 (under contracts CMS-9414740 and CMS -9696160).
 9. M. KUMOSA, K. Searles, G. Odegard, V. Thirumalai and J. McCarthy, Biaxial failure of Graphite Reinforced Polyimide Composites, Final Report to the Air Force Office of Scientific Research, Department of Engineering, University of Denver, Denver, Colorado, July 1999 (under contract F49620-96-1-0314).
 10. M. KUMOSA, P.K. Predecki, B. Benedikt, D. Dragoi, L. Kumosa, P. Rupnowski and D. Armentrout, Biaxial Failure Analysis of Graphite Reinforced Polyimide and Epoxy Fabric Composites, Final Report to the Air Force Office of Scientific Research, Department of Engineering, University of Denver, Denver, Colorado, August 2001 (under contract F49620-97-1-0426).
 11. M. KUMOSA, D. Armentrout, L. Kumosa, B. Benedikt, A. Chughtai and D. Smith, Failure Analysis of Composite High Voltage Insulators, Final Report to the Electric Power Research Institute, Department of Engineering, University of Denver, Denver, Colorado, January 2004 (under contract EP-P2971/C1399).
 12. M. KUMOSA, et al., Fundamental Issues Regarding the High Temperature Failure Properties of Graphite/Polyimide Fabric Composites, Final Report to the Air Force Office of Scientific Research and NASA Glenn Research Center, University of Denver, Denver, Colorado, December 2004 (under contract F49620-00-1-0159).
 13. M. KUMOSA, Application of Pultruded Glass Reinforced Polymer Composites in Cooling Towers, for Arizona Public Service, April 2009.
 14. M. KUMOSA and B. Burks, "DU Report on ACCC In-Service Failures in Poland in 2008", Research performed for Western Area Power Administration, Department of Energy, USA under contract WAPA/HDR 36532A-272803.
 15. M. KUMOSA, "Failure Analysis of a 345kV ACCC Conductor; Materials Testing", Final Report for Populus-Terminal Transmission Partners, under contract #163128.78.0116, May 5, 2011.

16. M. KUMOSA, "Failure Analysis of a 345kV ACCC Conductor", Final Report for Populus-Terminal Transmission Partners, under contract #163128.78.0116, June 2011.
17. M. KUMOSA, "Investigation of Galvanic Reaction Barriers in High Temperature High Voltage Conductors", National Science Foundation, GOALI, Final Report, Sep. 2017.

Annual Reports from the HVT Center

A. Reports to IAB of HVT Center

18. M. KUMOSA, Center Director's Report, Semi-annual Report to IAB of HVT IUCRC, University of Illinois at Urbana-Champaign, November 17-18, 2014.
19. M. KUMOSA, Center Director's Annual Report to IAB of HVT IUCRC, May 19-20, 2015, Michigan Technological University.
20. M. KUMOSA, et al, Annual Progress Reports to IAB of HVT IUCRC, May 19-20, 2015, Michigan Technological University including:
 - 20 a. Corrosion of Transmission Conductors, E. Hakansson, M. KUMOSA, et al., Annual Report to HVT Center.
 - 20 b. Impact Damage to HTLS Conductors, Insulators, Transformers, Substation, D. Waters, M. Kumosa, et al., Annual Report to HVT Center.
 - 20 c. Glass Fibers and their Polymer Based Composites under Excessive Corrosion, UV and Temperature Conditions, E. Solis-Ramos, Taylor, Lu, M. KUMOSA, et al., Annual Report to HVT Center.
 - 20 d. Nanotechnology of HTLS Polymer Core Conductor Materials for Aging Prevention, J. Hoffman, M. KUMOSA, et. al., Annual Report to HVT Center.
 - 20 e. Multiscale Characterization and Modeling of Metal Matrix (Nano)Composites, E. Solis-Ramos, I. Jasiuk (UIUC), M. KUMOSA, et al., Annual Report to HVT Center.
 - 20 f. Diagnostics of RTV1 and RTV2 HV Silicone Rubber Components, Nanocoatings and Silicone Rubber Nanocomposites for HV and other Applications, M. Bleszynski, B. Allen, M. KUMOSA, et al., Annual Report to HVT Center.
21. M. KUMOSA, Center Director's Annual Report to IAB of HVT IUCRC, May 17-18, 2017 University of Illinois at Urbana-Champaign.
22. M. MKUMOSA, et al., Annual Progress Reports to IAB of HVT IUCRC, May 17-18, 2017, University of Illinois at Urbana-Champaign including:
 - 22 a. Physical Damage to HV Transmission Infrastructure, C. Henderson, D. Waters, M. KUMOSA, et al., Annual Report to HVT Center.
 - 22 b. Additive Manufacturing, Novel Alloys and Composites, and Metallic Glasses, B. Grell, E. Clark, E. Solis-Ramos, M. KUMOSA, et al., Annual Report to HVT Center.

- 22 c. Aging Prevention of Polymeric Materials using Nanotechnology and other Methods, J. Hoffman, M. KUMOSA, et. al., Annual Report to HVT Center.
- 22 d. Synergistic Aging of Affordable Polymer Matrix Composite, T. Lu, E. Solis-Ramos, M. KUMOSA, et al., Annual Report to HVT Center.
- 22 e. Galvanic Corrosion of Aluminum/Carbon Composite Systems, E. Hakansson, M. KUMOSA, et al., Annual Report to HVT Center.
- 22 f. Diagnostics of RTV1 and RTV2 HV Silicone Rubber Components, Nanocoatings and Silicone Rubber Nanocomposites for HV and other Applications, M. Bleszynski, B. Allen, M. KUMOSA, et al., Annual Report to HVT Center.
23. M. KUMOSA, Center's Director Annual Report to IAB of HVT I/UCRC, May 17-18, 2017, University of Denver.
24. M. KUMOSA et al, Annual Progress Reports to IAB of HVT I/UCRC, May 17-18, 2017, University of Denver including:
- 24 a. Aging Resistant RTV Silicone Rubbers and their Nanocomposites, M. Bleszynski, B. Allen, M. KUMOSA, et al., Annual Report to HVT Center.
- 24 b. Durability Enhancements of Icephobic Barriers, J. Middleton, T. Woll, M. KUMOSA, et el., Annual Report to HVT Center.
- 24 c. Effect of Powder Oxidation on Mechanical Properties of Ti-6Al-4V Parts Made by Additive Manufacturing, W. Grell, E. Solis-Ramos, M. KUMOSA, et al, Annual Report to HVT Center.
- 24 d. Manufacturing of Materials for Aging Prevention of Fiber Reinforced PMC, J. Hoffman, S. Khadka, M. KUMOSA, et al., Annual Report to HVT.
- 24 e. Synergistic Effects in Environmental Degradation of Glass and Basalt Composites, E. Solis-Ramos, T. Lu, M. KUMOSA, et al., Annual Report to HVT Center.
- 24 f. Prevention of High Velocity Impact Damage to Substations, C. Henderson, C. DeFrance, M. KUMOSA, et al., Annual Report to HVT Center.
- 24 g. HVT Monitoring using Fiber Bragg Gratings and other Techniques, J. Hoffman, D. Waters, S. Khadka, M. KUMOSA, et al., Annual Report to HVT.
25. M. KUMOSA, Center's Director Report to IAB of HVT I/UCRC, May 14 -16, 2018, University of Illinois at Urbana-Champaign
26. M. KUMOSA et al, Annual Progress Reports to IAB of HVT I/UCRC, May 14-16, 2018, University of Illinois at Urbana-Champaign, including:
- 26 a. Aging Resistant Silicone Rubbers and their Composites, M. Bleszynski, B. Allen and M. KUMOSA, Annual Report to HVT Center.
- 26 b. Durability Enhancement of Icephobic Barriers, M. Bleszynski, J. Middleton, R. Woll and M. KUMOSA, Annual Report to HVT Center.

26 c. Current Issues in Metallic Additive Manufacturing, M. KUMOSA, W. Grell, et al, Annual Report to HVT Center.

26 d. Aging Prevention and Sensing of HVT Polymer Matrix Composites, S. Khadka, J. Hoffman and M. KUMOSA, Annual Report to HVT Center.

26 e. Prevention of High Velocity Impact Damage to Substations, C. Henderson and M. KUMOSA, Annual Report to HVT Center.

26 f. Health Monitoring of HVT Structures using FBG Sensors, J. Hoffman, D. Waters and M. KUMOSA, Annual Report to HVT Center.

26 g. Recycling Fiber Reinforced Polymer Matrix Composites, E. Edward and M. KUMOSA, Annual Report to HVT Center.

26 h. Synergistic Effects in Environmental Degradation of Glass and Basalt Polymer Matrix Composites, E. Solis-Ramos, T. Lu and M. KUMOSA, Final Report to HVT Center.

B. NSF Annual HVT Reports from DU

27. M. KUMOSA, Annual Report to NSF from DU, HVT Center, February 2015.

28. M. KUMOSA, Annual Report to NSF from DU, HVT Center, February 2016.

29. M. KUMOSA, Annual Report to NSF from DU, HVT Center, February 2017.

30. M. KUMOSA, Annual Report to NSF from DU, HVT Center, February 2018.

C. NSF Annual Summary Reports from HVT Center

31. M. KUMOSA, Annual Summary Director's Report to the National Science Foundation Industry/University Cooperative Research Center for Novel High Voltage/Temperature Materials and Structures March 1, 2016 - February 28, 2017, copy available.

32. M. KUMOSA, Annual Summary Director's Report to the National Science Foundation Industry/University Cooperative Research Center for Novel High Voltage/Temperature Materials and Structures March 1, 2017- February 28, 2018, copy available.

Maciej S. Kumosa - Biographical Sketch

Education



The Technical University of Wrocław, from which Dr. Kumosa graduated, is one of the largest technical universities in Poland. At the time of his graduation in 1982, the University consisted of approximately 30 large research institutes, 20,000 undergraduate and MS graduate students, and approximately 1,000 graduate Ph.D. students in a variety of technical and scientific disciplines with the exception of life sciences. Since 2002, the Technical University of Wrocław has been usually ranked the #1 among all technical universities in Poland in several national rankings.

Dr. Kumosa's Ph.D. program in Applied Mechanics and Materials Science was jointly sponsored by the Technical University of Wrocław and the National Science Foundation (NSF) of the United States of America (Marie Curie Foundation, International Programs). His Polish academic advisor was Professor L. Golaski, whereas Professor K. Ono from the University of California Los Angeles (UCLA) was his American advisor. As part of Dr. Kumosa's Ph.D. program, he was invited in 1981 by the NSF to visit UCLA as well as other research organizations in the USA. This was his first contact with the United States.

Employment History



After graduating, in 1983, Dr. Kumosa was appointed an Assistant Professor of Applied Mechanics and Materials Science at the University of Wrocław. In January 1984, due to mostly economic reasons, he left Poland and sought academic employment abroad. Initially, between January 1984 and December 1984, he worked as a Visiting Research Fellow at the University of Liverpool. Then, in January 1985, he moved to Cambridge, England where he spent six fascinating years. In the Department of Materials Science and Metallurgy at the University of Cambridge working with Professor D. Hull, FRS, Dr. Kumosa was exposed to state-of-the-art material science research and, in particular, advanced composite research. The knowledge and experience he gained at Cambridge shaped his entire academic career in subsequent years.

In 1990, Dr. Kumosa left Cambridge and accepted an academic appointment at the Oregon Graduate Institute of Science & Technology (OGI) in Portland, Oregon. Between 1990 and 1996 he was an Associate Professor at OGI in two departments; initially in Materials Science and Engineering and then Applied Physics and Electrical Engineering. At OGI, Dr. Kumosa built large research programs in the area of high voltage composite insulators (supported by DOE, EPRI and several large US utilities) and in the area of high temperature polymer based composites for aerospace applications (supported by NSF, AFOSR, the State of Oregon and others).

In 1996, due to family reasons, Dr. Kumosa left OGI and accepted an academic appointment in the Department of Engineering at the University of Denver (DU), where he is presently a tenured Professor of Mechanical Engineering. In 2006, Dr. Kumosa became a John Evans Professor (the highest award at DU for research and scholarly work).

Research Centers and Academic Departments Built by M. Kumosa at OGI and DU

At DU, in 1996, jointly with Dr. Paul Predecki and Dr. Steve Carpenter, Dr. Kumosa created the Center for Advanced Materials and Structures. The Center was internationally recognized attracting significant research funds from major US federal and private funding organizations.

In 2006, jointly with several (about 25) faculty members from the School of Natural Sciences and Mathematics (NSM) and the School of Engineering and Computer Science (SECS) Dr. Kumosa built a new interdisciplinary research center; the Center for Nanoscale Science and Engineering (the “Nano Center”). The Center was in operation until 2011. The Center developed a graduate PhD program in Nanoscale Science and Engineering. It also attracted limited federal (NSF) and private (DU) educational and research funds. In 2011-12, Dr. Kumosa started replacing the “Nano Center” with a much larger and more successful I/UCRC Center (see below)

Between 2011 and 2014, Dr. M. Kumosa jointly with his partners from the University of Illinois at Urbana-Champaign and Michigan Technological University (see below) built the National Science Foundation Industry/University Cooperative Research Center for Novel High Voltage/Temperature Materials and Structures (www.HVTCenter.org). The Center was awarded by NSF on March 15, 2014.

In addition to the research centers, Dr. Kumosa built the Department of Mechanical and Materials Engineering, MME (www.mme.du.edu) as its first Chair between Sep. 2007 and Nov. 2009. The MME department was formed in 2007 after the split of the former Engineering department into the MME department and the Department of Electrical and Computer Engineering.

History

The HVT Center (www.HVT.Center.org) was awarded by the National Science Foundation in March 2014 to three Universities (University of Denver, Michigan Technological University and University of Illinois at Urbana-Champaign) and then expanded in Jan 2017 by adding the University of Connecticut (see below). It was built based primarily on M. Kumosa's research efforts and accomplishments in the areas of HT-HV materials and technologies between 1990 and 2012-3 (see above). The Center combines both the HV and HT aspects of advanced materials and structures and is now rapidly expanding into other areas related to the application of advanced materials and structures in extreme environments.

The Center was evaluated by its members for 2017. For the quality of its research, meetings and management, the Center received 4.1/5, 4.2/5 and 4.2/5, respectively, all noticeably above the national averages. The evaluations for 2016 were very similar (for research 4.8/5).

As of March 2019, the Center graduated 20 PhDs and 14 MS students and is currently supporting 34 graduate students (mostly PhDs) at its 4 sites. It has produced about 100 journal papers, numerous conference papers and 2 patents.

The HVT Center is presently funded by 12 large US corporations and NSF (see the funding section of Dr. Kumosa's CV).

Current Academic Sites

- University of Denver, lead site. Dr. M. Kumosa, overall Center Director
- Michigan Technological University (MTU); one of three original HVT sites
Dr. Gregory Odegard, Professor and HVT Site Director (gmodegar@mtu.edu)
- University of Connecticut (UConn); joined in February 2017
Dr. Yang Cao, Associate Professor and HVT Site Director (yang.cao@uconn.edu)
- University of Illinois at Urbana-Champaign (UIUC); one of three original sites
Dr. Iwona Jasiuk, Professor and HVT Site Director (ijasiuk@illinois.edu)

Funding for the first 5 years from March 15, 2014 to May 14, 2019;

- \$2.60M in industrial fees
- \$1.65M in federal funding
- \$10M-12M in various leveraged funds

Industries (19) supporting HVT from 2014 to the present:

ABB, Boeing, Bonneville Power Administration, BP, CTC Global, Composites Technology Development, Eversource, G&W, General Cable, General Electric, John Crane, Marmon Engineered Wire & Cable, Lockheed Martin Space Systems, Prysmian Group, Southwire, Tri-State Transmission and Distribution, USi, US Bureau of Reclamation, Western Area Power Administration.

Research Goals and Objectives:

The I/UCRC for Novel High Voltage/Temperature Materials and Structures ("HVT Center") works jointly with the electric utility, aerospace, nuclear, military, environmental, automotive, health, and other industries with needs of novel HV/T materials and structures.

The objectives of the Center are: (1) Design of novel and evaluation of existing HV/T energy transmission/transfer multifunctional materials for next generation composite conductors, insulators, underground cables, towers, and other electric power transmission structures; (2)

Design and development of novel advanced high energy transfer materials for aerospace, oil/gas, automotive, and other industrial applications; (3) Failure prediction and prevention of HV/T materials and structures under in-service conditions through state-of-the-art multi-scale modeling and material performance evaluations; (4) Development of new failure monitoring techniques and material repair methods in HV/T materials under laboratory conditions and their subsequent transfer to in-service inspection and repair.

The HVT Center has a diverse and interdisciplinary educational, research and business environment for (1) undergraduate and graduate students, including those from underrepresented groups, funded by the research projects of the Center; (2) faculty members from a variety of disciplines, including junior faculty starting their academic careers; (3) utility, aerospace and national lab engineers and designers developing various types of HV/T materials and structures; and (4) utility managers supervising HV transmission lines across the country.

The Center enhances the reputation of U.S. HV/T manufacturing around the world and, in particular, improves the level of confidence among the potential users of novel HV/T structures. The center targets long-term benefit to infrastructure, manufacturing, energy transport and efficiency of the electric grid, and the durability of other HV/T and high energy transfer structures.

Current HVT Research Projects

Research Area 1. Multiscale Design and Development of Novel HVT Materials

- 1.2 Aluminum Alloys for High Conductivity and Strength (MTU)
- 1.3 Aging Resistant RTV Silicone Rubbers and their Nanocomposites (DU)
- 1.5 Development of Durable Icephobic Barriers (DU)
- 1.6 HVDC/MVDC Cabling: Electronic Structure of Polyolefin (UConn)
- 1.7 HVDC/MVDC Cabling – Space Charge Dynamics (UConn)

Research Area 2. Advanced Manufacturing of HVT Materials

- 2.2 High Temperature/Voltage Polymers and Nanocomposite (UIUC)
- 2.5 Titanium (Ti) Intermetallics, Ti Alloys and Superalloys for Extreme HT Aerospace, Automotive and other Applications (DU)

Research Area 3. Environmental Degradation of HVT Materials and Structures

- 3.4 In-Situ Sensing of Manufacturing and Aging of HVT Polymer Matrix Composites (DU)
- 3.5 Recycling Fiber Reinforced Polymer Matrix Composite Materials (DU)

Research Area 4. Damage Prevention of HVT Materials and Structures

- 4.2 Prevention of High Velocity Impact Damage to Substations (DU)
- 4.4 HVDC Grid Hardening against Geomagnetic Disturbance (UConn)
- 4.5 Discharge Resistant Materials for Circuit Breaker (UConn)

Research Area 5. Monitoring and Diagnosis of HVT Structures/Equipment

- 5.1 Applications of FBG Sensors in HVT Materials and Structures (DU)
- 5.5 Vibration of HVT Cable Structures (UIUC)
- 5.6 Photo-acoustic Based Dissolved Gas Analysis (UConn)
- 5.7 HT FBG Sensors for Temperature and Strain Sensing Applications (DU)
- 5.8 Remote Sensing of HVT Structures Using Hyperspectral Imaging (DU)

