

William G. Fahrenholtz

Work Address

Materials Science and Engineering
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Academic Experience

- Ph.D.** Chemical Engineering, University of New Mexico, December 1992
Dissertation: *Particle Size and Mixing Effects on the Crystallization and
Densification of Sol-Gel Mullite*
Advisor: Dr. Douglas M. Smith
- M.S.** Ceramic Engineering, University of Illinois at Urbana-Champaign, May 1989
Thesis: *Preparation of $YBa_2Cu_3O_{7-x}$ from Homogeneous Metal-Alkoxide Solution*
Advisor: Dr. David A. Payne
- B.S.** Ceramic Engineering, University of Illinois at Urbana-Champaign, May 1987
Graduated with Highest Honors, GPA 4.85/5.0

Work Experience

University of Missouri-Rolla
Associate Professor of Ceramic Engineering 9/05 to present
Assistant Professor, Department of Ceramic Engineering 7/99 to 9/05
Research Investigator, Graduate Center for Materials Research 9/99 to present
Missouri State Coordinator, WYSE Academic Challenge 5/01 to present

University of New Mexico
Research Assistant Professor 1/93 to 6/99
Department of Chemical and Nuclear Engineering

Los Alamos National Laboratory 5/90-8/90
Summer Intern, Exploratory Research and Development Ctr. 5/91-8/91

Sandia National Laboratories Outstanding Student Summer Program 5/87-8/87

Professional Societies

American Ceramic Society Member since 1986
Chair, Education Integration Committee for 2005-2006
President, Ceramic Educational Council for 2004-2005
Also served as President-elect, Vice Pres, and Secretary
Chair, New Mexico Section 1996
Also served as Vice-Chair (1994), and Treasurer (1995)

National Institute of Ceramic Engineers Member since 1992
Keramos (Ceramic Engineering Professional Fraternity) Elected 1985
Tau Beta Pi Elected 1986
American Society for Engineering Education Member since 2000
Sigma Xi Member since 2004

Honors and Awards

MSM/UMR Alumni Association Outstanding Student Advisor Award, 2005.
NSF CAREER Award 2004: Reactive Processing of High Temperature Materials
School of Mines and Met. Award for Sustained Excellence in Laboratory Instruction, 2004
MSM/UMR Alumni Association Class of 1942 Outstanding Teaching Award, 2003
UMR Outstanding Teaching Award, 2002-2003
School of Mines and Metallurgy Award for Sustained Teaching Excellence, 2003
UMR Faculty Excellence Awards, 2001, 2003, 2004
Ceramic Engineering Outstanding Faculty Member, 2000-2001, 2001-2002, and 2004-2005
Co-author, Atofina Chemicals Best Paper Award, 29th International Waterborne, High-Solids, and Powder Coatings Symposium, New Orleans, LA, February 6-8, 2002
Research Investigator, the Graduate Center for Materials Research at UMR, 9/99
Los Alamos National Laboratory/UNM Ph.D. Fellowship, 9/89 to 12/92
Chem. Eng. Outstanding Grad. Student of the Year, 1991-1992
Awarded ISHM Educational Foundation Fellowship, Fall 1988
Illinois British Petroleum Fellow, Spring/Summer 1988
Outstanding Student Summer Program, Sandia National Labs, Summer 1987
Keramos, Tau Beta Pi, Phi Kappa Phi Honor Societies

University Service

Budgetary Affairs Committee	2003-present
Faculty Conduct Committee	2003-present
Chancellor's Scholarship Committee	2003-present
Academic Assessment Committee (Chair 2002-2003)	2001-2003
SOMM Distance Learning Committee	2001-2002
Interviewer for Chancellor's Scholarship	Dec. 2001 and 2002
Preview, Registration, and Orientation Advisor	2002 and 2003

Teaching Activities

University of Missouri-Rolla 1999-present

Current Courses

Ceramic Materials Laboratories, sophomore level each semester (10 times)
Thermodynamics, junior level, each WS (5 times)
Characterization lecture and laboratory, junior level each FS (2 times)
Thermodynamics, graduate level, each WS (3 times)

Previous Courses

Phase Equilibria, junior level, FS (1 time)
Senior Design Lab, senior level, each semester (4 times)
Structure-Property Relations, graduate level (1 time)

University of New Mexico 1993-1999

Previous Courses

Introduction to Ceramic Materials, senior/graduate level (5 times)

Publications and Other Scholarly Contributions

Peer-Reviewed Journal Articles (21 published)

1. A.L. Chamberlain, W.G. Fahrenholtz, and G.E. Hilmas, "Pressureless Sintering of Zirconium Diboride," Submitted to the Journal of the American Ceramic Society, April 22, 2005.

2. W.G. Fahrenholtz, "The ZrB₂ Volatility Diagram," Accepted for publication in the Journal of the American Ceramic Society, May 8, 2005.
3. A. Rezaie, W.L. Headrick, and W.G. Fahrenholtz "Refractory Selection for High Temperature Black Liquor Gasification," submitted to the Journal of the American Ceramic Society, January 2005.
4. A.L. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "Oxidation of ZrB₂-SiC Ceramics Under Atmospheric and Reentry Conditions," Refractories Applications Transactions, 1(2) 1-8 (2005).
5. A.L. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "High Strength ZrB₂-Based Ceramics," Journal of the American Ceramic Society, 87(6) 1170-1172 (2004).
6. W.G. Fahrenholtz, G.E. Hilmas, A.L. Chamberlain, and J.W. Zimmermann, "Processing and Characterization of ZrB₂-Based Monolithic and Fibrous Monolithic Ceramics," Journal of Materials Science, 39(19) 5951-5957 (2004). (UMR photo selected for cover of issue)
7. B.F. Rivera, B.Y. Johnson, M.J. O'Keefe, and W.G. Fahrenholtz, "Deposition and Characterization of Cerium Oxide Conversion Coatings on Aluminum Alloy 7075-T6," Surface and Coatings Technology, 176(3) 349-356 (2004).
8. W.G. Fahrenholtz, "Reactive Hot Pressing of Al₂O₃-Ni Composites," Journal of Materials Science, 38(14) 3073-3080 (2003).
9. W.G. Fahrenholtz, M.J. O'Keefe, H. Zhou, and J.T. Grant, "Characterization of Cerium-Based Conversion Coatings for Corrosion Protection of Aluminum Alloys," Surface and Coatings Technology, 155 208-213, (2002).
10. W.G. Fahrenholtz, R.E. Loehman, and K.G. Ewsuk, "Reactive Hot Pressing of Al₂O₃-MoSi₂ Composites," Journal of the American Ceramic Society, 85(1) 258-260 (2002).
11. W.G. Fahrenholtz, D.T. Ellerby, and R.E. Loehman, "Al₂O₃-Ni Composites with High Strength and Toughness," Journal of the American Ceramic Society, 83(5) 1279-1280 (2000).
12. W.G. Fahrenholtz, D.T. Ellerby, K.G. Ewsuk, and R.E. Loehman "Forming Al₂O₃-Al Composites with Controlled Compositions by Reactive Metal Penetration of Dense Aluminosilicate Preforms," Journal of the American Ceramic Society, 83(5) 1293-1295 (2000).
13. P. Lu, R.E. Loehman, K.G. Ewsuk, and W.G. Fahrenholtz, "Transmission Electron Microscopy Study of Interfacial Microstructure Formed by Reacting Al-Mg Alloy with Mullite at High Temperature," Acta Materialia, 47(10) 3099-3104 (1999).
14. W.G. Fahrenholtz, K.G. Ewsuk, R.E. Loehman, and Ping Lu "Kinetics of Composite Formation by Reactive Metal Penetration," Journal of the American Ceramic Society, 81(10) 2533-2541 (1998).
15. P. Lu, T.B. Du, R.E. Loehman, K.G. Ewsuk, and W.G. Fahrenholtz, "Interfacial Microstructure Formed by Reactive Metal Penetration Between Al and Mullite," Journal of Materials Research, 14(9) 3530-3537 (1999).
16. K.G. Ewsuk, S.J. Glass, R.E. Loehman, A.P. Tomsia, and W.G. Fahrenholtz, "Microstructure and Properties of Al₂O₃-Al Composites Formed by In Situ Reaction of Aluminum and Mullite," Metallurgical and Materials Transactions A, 27A(8) 2100-2104 (1996).

17. W.G. Fahrenholtz, K.G. Ewsuk, D.T. Ellerby, and R.E. Loehman, "Near-Net-Shape Processing of Metal-Ceramic Composites by Reactive Metal Penetration," *Journal of the American Ceramic Society*, 79(9) 2497-2499 (1996).
18. Y. Gao, J. Jia, R.E. Loehman, K.G. Ewsuk, and W.G. Fahrenholtz, "Microstructure and Composition of Al-Al₂O₃ Composites Made by Reactive Metal Penetration," *Journal of Materials Science*, 31 4025-4032 (1996).
19. W.G. Fahrenholtz, K.G. Ewsuk, R.E. Loehman, and A.P. Tomsia, "Formation of Structural Intermetallics by Reactive Metal Penetration of Ti and Ni Oxides and Aluminates," *Metallurgical and Materials Transactions A*, 27A(8) 2122-2129 (1996).
20. W.G. Fahrenholtz and D.M. Smith, "Densification and Microstructure of Sodium-Doped Colloidal Mullite," *Journal of the American Ceramic Society*, 77(5) 1377-1380 (1994).
21. W.G. Fahrenholtz, D.M. Smith, and J. Cesarano III, "Effect of Precursor Particle Size on the Densification and Crystallization Behavior of Mullite," *Journal of the American Ceramic Society*, 76(2) 433-437 (1993).
22. G.P. Johnston, R.E. Muenchausen, D.M. Smith, W.G. Fahrenholtz, and S.R. Foltyn, "Reactive Laser Ablation Synthesis of Nanosize Alumina Powder," *Journal of the American Ceramic Society*, 75(12) 3293-3298 (1992).
23. W.G. Fahrenholtz, D.M. Smith, and D.W. Hua, "Formation of Microporous Silica Gels from a Modified Silicon Alkoxide: 1. Base Catalyzed Gels," *Journal of Non-Crystalline Solids*, 144 45-52 (1992).
24. W.G. Fahrenholtz, S.L. Hietala, P. Newcomer, N.R. Dando, D.M. Smith, and C.J. Brinker, "Effect of Physical Structure on the Phase Development of Aluminosilicate Gels," *Journal of the American Ceramic Society*, 74(10) 2393-2397 (1991).

Refereed Conference Proceedings (25 published)

1. A.R. Rezaie, W.L. Headrick, and W.G. Fahrenholtz, "Refractory Selection for Black Liquor Gasification," submitted to UNITECR 2005, the 9th Biennial Congress on Refractories, November 8-11, 2005, Orlando, FL.
2. A. R. Rezaie, W.G. Fahrenholtz, and W.L. Headrick, "Thermodynamics of Refractories for Black Liquor Gasification," pp. 53-61 in *Surfaces, Interfaces, and the Science of Ceramic Joining*, Ceramic Transactions Volume 158, ed. by K.S. Weil, I.E. Reimanis, and C.A. Lewinsohn, the American Ceramic Society, Westerville, OH (2004).
3. A.L. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "Characterization of Zirconium Diboride Ceramics for Thermal Protections Systems," *Key Engineering Materials*, 264-268, 493-496 (2004).
4. J.M. Soto, J.D. Smith, and W.G. Fahrenholtz, "Interaction of Aluminum with Silica-Based Ceramics," pp. 221-234 in *Advances in Refractories of the Metallurgical Industries IV*, Proceedings of the 4th International Symposium on Advances in Refractories fo the Metallurgical Industries, Hamilton, Ontario, Augus 22-25, 2004.
5. M. Bengisu and W.G. Fahrenholtz, "Reactive Joining of Alumina by Oxidation of Al Interlayers," *Key Engineering Materials*, 264-268, 655-658 (2004).

6. A. Rezaie, W.L. Headrick, and W.G. Fahrenholtz, "Refractories for Black Liquor Gasification," pp. 92-103 in the Proceedings of the Tehran International Conference on Refractories, Tehran, Islamic Republic of Iran, May 4-6, 2004.
7. A. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "Characterization of Zirconium Diboride-Molybdenum Disilicide Ceramics," pp. 299-308 in Advances in Ceramic Matrix Composites IX, Ceramic Transactions, Volume 153, ed. by N.P. Bansal, J.P. Singh, W.M. Kriven, and H. Schneider, The American Ceramic Society, Westerville, OH (2003).
8. T.P. Sander, J.D. Smith, J.W. Zimmermann, and W.G. Fahrenholtz, "Permeability of Ceramic Tubes for Low Pressure Casting of Aluminum," pp. 58-61 in the Proceedings of UNITECR 2003 Congress, 8th Biennial Worldwide Conference on Refractories, Osaka, Japan, October 19-22, 2003.
9. S. Menon and W.G. Fahrenholtz, "Microstructure and Mechanical Properties of Alumina-Copper Composites," pp. 285-295 in Innovative Processing and Synthesis of Ceramics, Glasses, and Composites IV, Ceramic Transactions Vol. 154, ed. by N.P. Bansal and J.P. Singh, The American Ceramic Society, Westerville, OH (2003).
10. W.G. Fahrenholtz, R.K. Brow, and A.L. Young, "Recruiting a New Generation of Ceramic Engineers," Proceedings of the American Society of Engineering Education Annual Conference, June 22-25, 2003, Nashville, TN.
11. W.G. Fahrenholtz, R.J. Bieniek, and S.W. Graham, "Multi-Campus New Faculty Development to Improve the Culture of Teaching," Proceedings of the American Society of Engineering Education Annual Conference, June 22-25, 2003, Nashville, TN.
12. W.G. Fahrenholtz, M.J. O'Keefe, and H. Zhou, "Characterization of Spontaneously Formed Cerium-Based Conversion Coatings on Aluminum," Ceramic Engineering and Science Proceedings, 23(4), 469-476 (2002).
13. W.G. Fahrenholtz, C.A. Click, and R.K. Brow, "Laboratory Experiences in Glasses and Traditional Ceramics," Proceedings of the 2002 American Society for Engineering Education Conference, June 16-20, 2002, Montreal, Canada.
14. W.G. Fahrenholtz, H.R. Bentley, and R.M. Smith, "Tutorial Modules for the Study of Phase Equilibrium Diagrams," Proceedings of the 2001 American Society for Engineering Education Conference and Exposition, Albuquerque, NM, June 24-27, 2001.
15. W.G. Fahrenholtz, D.T. Ellerby, and R.E. Loehman, "Ceramic-Metal and Ceramic Intermetallic Composites by Reactive Hot Pressing," Ceramic Engineering and Science Proceedings, 21(3), 667-674 (2000).
16. D.T. Ellerby, R.E. Loehman, and W.G. Fahrenholtz, "Strength and Toughness of Ceramic-Metal Composites Prepared by Reactive Hot Pressing," Ceramic Engineering and Science Proceedings, 21(3) 659-666 (2000).
17. M.N. Rahaman and W.G. Fahrenholtz, "A Model Laboratory Experience for Ceramic Engineering," in the Proceedings of the 2000 ASEE (American Society for Engineering Education) Annual Meeting and Exposition, St. Louis MO, June 18-21, 2000.
18. W.G. Fahrenholtz, K.G. Ewsuk, and R. E. Loehman, "Reactive Processing, Microstructure, and Mechanical Properties of Al₂O₃-MoSi₂ Composites," Ceramic Engineering and Science Proceedings, 19(3) 373-380 (1998).

19. W.G. Fahrenholtz, K.G. Ewsuk, A.P. Tomsia, and R.E. Loehman, "Reaction Mechanisms and Microstructures of Ceramic-Metal Composites Made by Reactive Metal Penetration," pp. 749-759 in Proceedings of the International Materials Symposium on Ceramic Microstructures '96: Control at the Atomic Level, ed. by A.P. Tomsia and A.M. Glaeser, Plenum Press 1998.
20. R.E. Loehman, K.G. Ewsuk, W.G. Fahrenholtz, and B.B. Lakshman, "Ceramic-Metal Composite Formation by Reactive Metal Penetration," pp. 431-438 in Proceedings of the First International Conference on Ceramic and Metal Matrix Composites, Ed. by M. Fuentes, J.M. Martínez-Esnaola, and A.M. Daniel, Transtech Publications, 1997.
21. D.T. Ellerby, B.D. Flinn, W.D. Scott, R.K. Bordia, K.G. Ewsuk, R.E. Loehman, and W.G. Fahrenholtz, "Investigation of the Effect of Microstructure on the R-Curve Behavior of Metal-Ceramic Composites," pp. 703-710 in Proceedings of the 10th International Conference on Composite Materials, Vol. IV, Ed. by A. Poursartip and K. Street, Woodhead Publishing, Ltd., 1995.
22. W.G. Fahrenholtz, K.G. Ewsuk, R.E. Loehman, and A.P. Tomsia, "Synthesis and Processing of Al₂O₃/Al Composites by In Situ Reaction of Aluminum and Mullite," pp. 99-109 in *In-Situ* Reactions for Synthesis of Composites, Ceramics, and Intermetallics, Ed. by E.V. Barrera et. al., The Minerals, Metals, and Materials Society, Warrendale, PA (1995).
23. W.G. Fahrenholtz and D.M. Smith, "Characterization of Microporous Silica Gels Prepared from Modified Silicon Alkoxides," pp. 705-710 in Better Ceramics Through Chemistry V, Materials Research Society Symposium Proceedings Vol. 271, Ed. by M.J. Hampden-Smith, W.G. Klemperer, and C.J. Brinker, The Material Research Society, Pittsburgh (1992).
24. W.G. Fahrenholtz, S.R. Foltyn, K.C. Ott, M. Chadwick, and D.M. Smith, "Laser Ablation Synthesis of Ceramic Powders," pp. 489-494 in Chemistry and Beam-Solid Interactions, Materials Research Society Symposium Proceedings Vol. 201, Ed. by H.A. Atwater, F.A. Houle, and D.H. Lowndes, The Materials Research Society, Pittsburgh (1991).
25. W.G. Fahrenholtz, S.L. Hietala, D.M. Smith, A.J. Hurd, C.J. Brinker, and W.L. Earl, "Solution Chemistry in the Al₂O₃-SiO₂ System," pp. 229-234 in Better Ceramics Through Chemistry IV, Materials Research Society Symposium Proceedings Vol. 180, Ed. by B.J.J. Zelinski, C.J. Brinker, D.E. Clark, and D.R. Ulrich, The Materials Research Society, Pittsburgh (1990).
26. W.G. Fahrenholtz, D.M. Millar, and D.A. Payne, "Preparation of YBa₂Cu₃O_{7- δ} From Homogeneous Metal Alkoxide Solution," in Ceramic Superconductors II: Research Update 1988, Ed. by M.F. Yan, The American Ceramic Society, Columbus, OH (1988).

Book Chapters and Reports (3 total)

1. W.G. Fahrenholtz and G.E. Hilmas, "NSF-AFOSR Joint Workshop on Future Ultra-High Temperature Materials," Final Report for NSF Project DMR-0403004 for workshop held January 13 and 14, 2004.
2. W.G. Fahrenholtz, "Clays," to appear in Handbook of Ceramics and Glasses, Kluwer Academic Publishers, anticipated publication date in 2004.
3. J.D. Smith and W.G. Fahrenholtz, "Refractory Oxides," to appear in Handbook of Ceramics and Glasses, Kluwer Academic Publishers, anticipated publication date in 2004.

Non-Refereed Conference Proceedings and Other Publications (6 total)

1. W.G. Fahrenholtz and G.E. Hilmas, "Report on the "NSF-AFOSR Joint Workshop on Future Ultra-High Temperature Materials," *Refractories Applications and News*, 10(1) (2005).

2. A. Rezaie, W.L. Headrick, W.G. Fahrenholtz, R.E. Moore, M. Velez, and W.A. Davis, "Interaction of Refractories and Alkaline Containing Corrodants," *Refractories Applications and News*, 9(5) 26-31 (2004).
3. B.F. Rivera, E.L. Morris, B.Y. Johnson, M.J. O'Keefe, and W.G. Fahrenholtz, "Cerium Oxide-Based Conversion Coatings for Corrosion Protection of Aluminum Alloy 7075-T6," *Proceedings of the 5th International Aircraft Corrosion Workshop*, August 20-23, 2002, Solomons, MD.
4. J. Stoffer, T. O'Keefe, M. O'Keefe, T. Schuman, W. Fahrenholtz, S. Hayes, P. Yu, E. Morris, A. Williams, B. Rivera, and B. Johnson, "Cerium/Water Equilibrium for Precipitation of Cerium Oxide Nanoparticles," *Proceedings of the AFOSR Workshop on Nanoscience Approaches to Multifunctional Coatings*, August 11-16, 2002, Keystone, CO.
5. J. Stoffer, T. O'Keefe, M. O'Keefe, W. Fahrenholtz, T. Schuman, P. Yu, E. Morris, S. Hayes, A. Williams, A. Shahin, and B. Rivera, "Cerium-Based Conversion Coatings for Aluminum Alloys," *Proceedings of the 29th Annual International Waterborne, High-Solids, and Powder Coatings Symposium*, New Orleans, LA, February 6-8, 2002.
6. E.L. Morris, J.O. Stoffer, T.J. O'Keefe, M. O'Keefe, W. Fahrenholtz, T. Schuman, P. Yu, S. Hayes, A. Williams, B. Rivera, and C. Singelton, "Cerium-Based Corrosion Protection Systems for Aluminum Alloys," *Proceedings of the Tri-Service Corrosion Conference*, San Antonio, TX, January 2002.

Invited Presentations (Past 5 Years)

1. W.G. Fahrenholtz, "Ultra-High Temperature Ceramics," *Global Research Learning Community of the UMR Residential College*, University of Missouri-Rolla, April 26, 2005.
2. W.G. Fahrenholtz, "Reactive Processing in Ceramic-Based Systems," *107th Annual Meeting of the American Ceramic Society*, April 10-13, 2005, Baltimore, MD.
3. W.G. Fahrenholtz, "Ultra-High Temperature Ceramics for Hypersonic Applications," *Department of Chemical Engineering Seminar*, Oklahoma State University, March 24, 2005.
4. W.G. Fahrenholtz and G.E. Hilmas, "Ultra-High Temperature Ceramics and Ceramic Composites," *High Temperature Materials Group*, Boeing-St. Louis, July 15, 2004.
5. W.G. Fahrenholtz, G.E. Hilmas, A.L. Chamberlain, and J.W. Zimmermann, "Processing and Characterization of ZrB₂-Based Monolithic and Fibrous Monolithic Ceramics," *AFOSR Ultra-High Temperature Ceramics Workshop*, November 5-7, 2003, Wintergreen, VA.
6. W.G. Fahrenholtz, "In the Heat of It," *Courses Without Quizzes*, UMR Homecoming, October 10, 2003.
7. W.G. Fahrenholtz, "Reactive Processing of High Temperature Materials," *The Gordon Conference on High Temperature Materials, Processes, and Diagnostics*, Colby College, Waterville, Maine, August 4-8, 2002.
8. W.G. Fahrenholtz, "Cerium-based Conversion Coatings for Corrosion Protection of Aluminum Alloys," *Ceramics Colloquium*, University of Illinois at Urbana-Champaign, Department of Materials Science and Engineering, October 25, 2001.
9. W.G. Fahrenholtz, "Reactive Processing of Ceramic-Metal Composites," *Ceramics Colloquium*, University of Illinois at Urbana-Champaign, Department of Materials Science and Engineering, March 29, 2001.
10. W.G. Fahrenholtz, "Reactive Hot Pressing and Properties of Al₂O₃-Ni Composites," *Advanced Materials Technologies Group*, Caterpillar, Inc., Peoria, IL, March 30, 2001.

Other Presentations Given (Past 5 Years)

1. W.G. Fahrenholtz, R.K. Brow, and A.L. Young, "Recruiting a New Generation of Ceramic Engineers," American Society of Engineering Education Annual Conference, June 22-25, 2003, Nashville, TN.
2. W.G. Fahrenholtz, R.J. Bieniek, and S.W. Graham, "Multi-Campus New Faculty Development to Improve the Culture of Teaching," American Society of Engineering Education Annual Conference, June 22-25, 2003, Nashville, TN.
3. W.G. Fahrenholtz, "Educational Benefits of Tutorial Modules," 13th Teaching Renewal Conference, University of Missouri-Columbia, Columbia, MO February 27-March 1, 2003.
4. W.G. Fahrenholtz, B.F. Rivera, E.L. Morris, B.Y. Johnson, and M.J. O'Keefe, "Soft Solution Processing of Cerium Oxide Coatings for Corrosion Protection of Aluminum," Pacific Coast Regional Meeting of the American Ceramic Society, October 1-4, 2002, Seattle, WA.
5. Berny F. Rivera, Eric L. Morris, Benedict Y. Johnson, Matthew J. O'Keefe, and William G. Fahrenholtz, "Cerium Oxide-Based Conversion Coatings for Corrosion Protection of Aluminum Alloy 7075-T6," 5th International Aircraft Corrosion Workshop, August 20-23, 2002, Solomons, MD.
6. W.G. Fahrenholtz, R.K. Brow, and C.A. Click, "Laboratory Experiences in Glasses and Traditional Ceramics," presented at the 2002 American Society for Engineering Education Conference, June 19-22, 2002, Montreal, Canada.
7. W.G. Fahrenholtz, "Useful Ideas and Tips Gleaned from Workshops and Seminars on Engineering Education," presented to the UMR New Faculty Forum, March 21, 2002.
8. W.G. Fahrenholtz and S. Menon, "Strength and Toughness of Alumina-Copper Composites," presented at the 104th Annual Meeting of the American Ceramic Society, April 28-May 1, 2002, St. Louis, MO.
9. W.G. Fahrenholtz, H. Zhou, and M.J. O'Keefe, "Characterization of Spontaneously Formed Cerium-Based Conversion Coatings on Aluminum," 26th Annual Cocoa Beach Meeting, Engineering Ceramics Division, American Ceramic Society, January 14-18, 2002.
10. W.G. Fahrenholtz, H.R. Bentley, and R.M. Smith "Tutorial Modules for the Study of Phase Equilibrium Diagrams," Proceedings of the 2001 American Society for Engineering Education Conference and Exposition, Albuquerque, NM, June 24-27, 2001.
11. W.G. Fahrenholtz, H. Zhou, and M.J. O'Keefe, "Characterization of Cerium-Based Conversion Coatings," UMR Ceramic Engineering Department Seminar, 5/3/01.
12. Session Chair for the Symposium Honoring David A. Payne on his 60th Birthday, 4/21/01, Urbana, IL.
13. W.G. Fahrenholtz, D.T. Ellerby, and R.E. Loehman, "Reactive Processing of Ceramic-Metal and Ceramic-Intermetallic Composites," presented at the 103rd Annual Meeting of the American Ceramic Society, April 21-25, 2001, Indianapolis, IN.
14. W.G. Fahrenholtz, H. Zhou, and M.J. O'Keefe, "Characterization of cerium-based conversion coatings for corrosion protection of aluminum," presented at the 103rd Annual Meeting of the American Ceramic Society, April 21-25, 2001, Indianapolis, IN.
15. W.G. Fahrenholtz, H. Zhou, J.R. Sigman, and M.J. O'Keefe, "Characterization of Cerium-Based Conversion Coatings for the Corrosion Protection of Aluminum," presented at the Pacific Coast

Regional Meeting and Basic Science Division Meeting of the American Ceramic Society, San Francisco, CA, September 6-9, 2000.

16. W.G. Fahrenholtz, D.T. Ellerby, and R.E. Loehman, "Processing of High-Strength, High-Toughness Al_2O_3 -Ni Composites," presented at the Pacific Coast Regional Meeting and Basic Science Division Meeting of the American Ceramic Society, San Francisco, CA, September 6-9, 2000.
17. M.N. Rahaman and W.G. Fahrenholtz, "Undergraduate Laboratory Experience for Ceramic Engineering," Proceedings of the 2000 American Society of Engineering Educators Conference and Exposition, St. Louis, MO, June 18-21, 2000.
18. W.G. Fahrenholtz and R.K. Brow, "Graduate Education at UMR," presented in the Graduate School Forum at the 102nd Annual Meeting of the American Ceramic Society, April 30-May 3, 2000, St. Louis, MO.
19. W.G. Fahrenholtz, D.T. Ellerby, and R.E. Loehman, "Reactive Processing of Alumina-Ni Composites," presented at the 102nd Annual Meeting of the American Ceramic Society, April 30-May 3, 2000, St. Louis, MO.
20. W.G. Fahrenholtz, "Reactive Processing of Ceramic-Metal Composites," Chemical Engineering Department Seminar, University of Missouri-Rolla, February 15, 2000.
21. W.G. Fahrenholtz, "Reactive Processing of Ceramic-Metal Composites," Materials Research Center Seminar Series, February 8, 2000.
22. W.G. Fahrenholtz, D.T. Ellerby, and R.E. Loehman, "Ceramic-Metal and Ceramic-Intermetallic Composites by Reactive Processing," 24th Annual Cocoa Beach Meeting, Engineering Ceramics Division of the American Ceramic Society, January 24-28, 2000, Cocoa Beach, FL.
23. D.T. Ellerby, R.E. Loehman, and W.G. Fahrenholtz, "Strength and Toughness of Ceramic-Metal Composites Prepared by Reactive Hot Pressing," 24th Annual Cocoa Beach Meeting, Engineering Ceramics Division of the American Ceramic Society, January 24-28, 2000, Cocoa Beach, FL.
24. W.G. Fahrenholtz, D.T. Ellerby, and R.E. Loehman, "Ceramic-Metal and Ceramic-Intermetallic Composites by Reactive Hot Pressing," 11th Annual Rio Grande Regional Symposium on Advanced Materials, Albuquerque, NM, October 11, 1999.
25. W.G. Fahrenholtz, "Mullite and Mullite Nanocomposites," Presented at the Advanced Materials Technology Center, Caterpillar, Inc. Peoria, IL, September 9, 1999.
26. W.G. Fahrenholtz, "Composite Formation by Reactive Metal Penetration," Ceramic Engineering Department Seminar, University of Missouri-Rolla, September 2, 1999.

Presentations by Students and Others (Past Five Years)

1. A. Rezaie, W.G. Fahrenholtz, and G.E. Hilmas, "Effect of Hot Pressing Time and Temperature on Microstructure, Mechanical Properties, and Oxidation of ZrB_2 -SiC," 107th Annual Meeting of the American Ceramic Society, April 10-13, 2005, Baltimore, MD.
2. S. Ricca, W.G. Fahrenholtz, and G.E. Hilmas, "Effect of W Additions on the Properties and Microstructure of Hot-Pressed ZrB_2 ," 107th Annual Meeting of the American Ceramic Society, April 10-13, 2005, Baltimore, MD.
3. A. Rezaie, W.G. Fahrenholtz, and G.E. Hilmas, "Effect of Hot Pressing Time and Temperature on Microstructure and Mechanical Properties of ZrB_2 -SiC," 29th Annual International Conference of Advanced Ceramics and Composites, January 23-27, 2005, Cocoa Beach, FL.

4. A.L. Chamberlain, W.G. Fahrenholtz, and G.E. Hilmas, "Pressureless Sintering of ZrB_2 ," 29th Annual International Conference of Advanced Ceramics and Composites, January 23-27, 2005, Cocoa Beach, FL.
5. S. Landwehr, G.E. Hilmas, W.G. Fahrenholtz, and M. Fulcher, "Characterization of Tantalum Carbide with Refractory Metal Additions," Annual Conference on Ceramics, Metal and Carbon Composites Materials and Structures, 29th Conference on Composites, Materials, and Structures, January 24-28, 2005, Cocoa Beach, FL.
6. S. Landwehr, G.E. Hilmas, W.G. Fahrenholtz, and M. Fulcher, "Characterization of Tantalum Carbide with Refractory Metal Additions," Annual Conference on Ceramics, Metal and Carbon Composites Materials and Structures, 29th Conference on Composites, Materials, and Structures, January 24-28, 2005, Cocoa Beach, FL.
7. J.W. Zimmerman, G.E. Hilmas, and W.G. Fahrenholtz, "UHTC Fibrous Monolithic Ceramics with a Carbon-Modified Interphase," 29th Annual International Conference of Advanced Ceramics and Composites, January 23-27, 2005, Cocoa Beach, FL.
8. A.A. Buchheit, G.E. Hilmas, and W.G. Fahrenholtz, "Characterization and Evaluation of Hot Pressed SiC for Improved Thermal Shock," Annual Conference on Ceramics, Metal and Carbon Composites Materials and Structures, 29th Conference on Composites, Materials, and Structures, January 24-28, 2005, Cocoa Beach, FL.
9. J.W. Zimmermann, G.E. Hilmas, and W.G. Fahrenholtz, "Non-Catastrophic UHTC Fibrous Monolith Composites," Pacific Coast Regional Meeting of the American Ceramic Society, Seattle, WA, September 12-16, 2004.
10. A.L. Chamberlain, W.G. Fahrenholtz, and G.E. Hilmas, "Phase Equilibria in the Zirconium-Boron System," Pacific Coast Regional Meeting of the American Ceramic Society, Seattle, WA, September 12-16, 2004.
11. A.A. Buchheit, W.G. Fahrenholtz, and G.E. Hilmas, "Microstructure-Processing-Property Relationships in Hot Pressed SiC," Pacific Coast Regional Meeting of the American Ceramic Society, Seattle, WA, September 12-16, 2004.
12. A.L. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and J.W. Zimmermann, "Performance of Zirconium Diboride-Silicon Carbide Composites," Gordon Research Conference on High Temperature Materials, Processes, and Diagnostics, Waterville, ME, August 1-6, 2004.
13. A.L. Chamberlain, J.W. Zimmermann, W.G. Fahrenholtz, and G.E. Hilmas, "Particulate and Functionally Engineered Zirconium Diboride Based Composites for Enhanced Mechanical Behavior," presented at the National Space and Missile Materials Symposium, Seattle, WA, June 21-25, 2004.
14. G. Morrison, T Vojta, and W. Fahrenholtz, "Tips for Being a Successful Teacher-Scholar in an Evolving University," presented to the UMR New Faculty Teaching Scholars program, April 14, 2004.
15. A.L. Chamberlain, J.W. Zimmermann, W.G. Fahrenholtz, and G.E. Hilmas, "Ultra-High Temperature Ceramics," presented at the UMR Technology Showcase, May 24, 2004.
16. J.M. Soto, J.D. Smith, and W.G. Fahrenholtz, "Interaction of Aluminum with Silica-Based Ceramics," presented at the Conference of Metallurgists, August 22-25, 2004, Hamilton, Ontario, Canada

17. A.A. Buchheit, W.G. Fahrenholtz, and G.E. Hilmas, "Microstructure-processing-property relationships of hot pressed SiC," presented at the 106th Annual Meeting of the American Ceramic Society, April 18-21, 2004, Indianapolis, IN.
18. Rezaie, W.L. Headrick, and W.G. Fahrenholtz, "Thermodynamics of Refractories for Black Liquor Gasification," presented at the 106th Annual Meeting of the American Ceramic Society, April 18-21, 2004, Indianapolis, IN.
19. J. Soto, J.D. Smith, and W.G. Fahrenholtz, "Wetting and Reaction of Fused Silica Riser Tubes with Aluminum Alloy A356," presented at the 106th Annual Meeting of the American Ceramic Society, April 18-21, 2004, Indianapolis, IN.
20. J.W. Zimmermann, W.G. Fahrenholtz, and G.E. Hilmas, "Processing and Properties of ZrB₂-SiC/Porous ZrB₂ Fibrous Monoliths," 28th Annual International Conference of Advanced Ceramics and Composites, January 25-29, 2004, Cocoa Beach, FL.
21. A.L. Chamberlain, W.G. Fahrenholtz, and G.E. Hilmas, "Processing Effects on ZrB₂-SiC Ceramics," 28th Annual International Conference of Advanced Ceramics and Composites, January 25-29, 2004, Cocoa Beach, FL.
22. A.L. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "Oxidation of Zirconium Diboride-Silicon Carbide Ceramics Under Atmospheric and Reentry Conditions," presented at the 28th Meeting on Composites, Materials, and Structures, January 25-29, 2004, Cocoa Beach, FL.
23. A.L. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "Characterization of Zirconium Diboride Based Composites," Pacific Coast Regional Meeting of the American Ceramic Society, October 19-22, 2003, Oakland, CA.
24. J.W. Zimmermann, G.E. Hilmas, and W.G. Fahrenholtz, "Zirconium Diboride Fibrous Monolith Composites," Pacific Coast Regional Meeting of the American Ceramic Society, October 19-22, 2003, Oakland, CA.
25. A.L. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "Characterization of Zirconium Diboride Ceramics for Thermal Protections Systems," presented at the 8th meeting of the European Ceramic Society, June 29-July 3, 2003, Istanbul, Turkey.
26. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "Characterization of Zirconium Diboride with Molybdenum Disilicide Additives," presented at the 105th Annual Meeting of the American Ceramic Society, April 27-April 30, 2003, Nashville, TN.
27. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "Characterization of Zirconium Diboride with Silicon Carbide Additives," presented at the 105th Annual Meeting of the American Ceramic Society, April 27-April 30, 2003, Nashville, TN.
28. S. Menon and W.G. Fahrenholtz, "Microstructure and Mechanical Properties of Alumina-Copper Composites," to be presented at the 105th Annual Meeting of the American Ceramic Society, April 27-April 30, 2003, Nashville, TN.
29. V. Dongre, and W.G. Fahrenholtz, "Soft Solution Processing of Cerium Oxide Coatings on Aluminum Alloy Substrates," presented at the 105th Annual Meeting of the American Ceramic Society, April 27-April 30, 2003, Nashville, TN.
30. Chamberlain, W.G. Fahrenholtz, G.E. Hilmas, and D.T. Ellerby, "Characterization of Zirconium Diboride with Molybdenum Disilicide Additives," presented at the 27th Meeting on Composites, Materials, and Structures, January 27-30, 2003, Cocoa Beach, Florida

31. D.E. Ragland and W.G. Fahrenholtz, "The Effect of Powder Processing on the Microstructure of Al₂O₃-Ni Composites formed by Reactive Hot Pressing," presented at the 104th Annual Meeting of the American Ceramic Society, April 28-May 1, 2002, St. Louis, MO.
32. B.F. Rivera, E.L. Morris, M.J. O'Keefe, and W.G. Fahrenholtz, "Cerium Oxide Based Coatings for Corrosion Protection of Aluminum," presented at the 104th Annual Meeting of the American Ceramic Society, April 28-May 1, 2002, St. Louis, MO.
33. D.E. Ragland and W.G. Fahrenholtz, "The Effect of Powder Processing on the Microstructure of Al₂O₃-Ni Composites formed by Reactive Hot Pressing," 26th Annual Cocoa Beach Meeting, Engineering Ceramics Division, American Ceramic Society, January 14-18, 2002.
34. E.L. Morris, J.O. Stoffer, T.J. O'Keefe, M. O'Keefe, W. Fahrenholtz, T. Schuman, P. Yu, S. Hayes, A. Williams, B. Rivera, and C. Singelton, "Cerium-Based Corrosion Protection Systems for Aluminum Alloys," The Tri-Service Corrosion Conference, San Antonio, Texas, January 14-18, 2002.
35. J. Stoffer, T. O'Keefe, M. O'Keefe, W. Fahrenholtz, T. Schuman, P. Yu, E. Morris, S. Hayes, A. Williams, A. Shahin, and B. Rivera, "Cerium-Based Conversion Coatings for Aluminum Alloys," 29th Annual International Waterborne, High-Solids, and Powder Coatings Symposium, New Orleans, La, February 6-8, 2002.
36. J. Stoffer, T. O'Keefe, M. O'Keefe, W. Fahrenholtz, T. Schuman, P. Yu, E. Morris, S. Hayes, A. Williams, A. Shahin, and B. Rivera, "Cerium-Based Conversion Coatings for Aluminum Alloys," The Tri-Service Corrosion Conference, San Antonio, Texas, January 14-18, 2002.
37. Shyam Menon and W.G. Fahrenholtz, "Interfacial chemistry of alumina-Cu composites with interpenetrating microstructure," presented at the 103rd Annual Meeting of the American Ceramic Society, April 21-25, 2001, Indianapolis, IN.

Author or co-author on ~40 other presentations at international technical meetings.

Grants

Summary of grant activity

18 grants as PI, co-PI, or co-investigator

Generated over \$1,400,000 shared credit grant activity to date

1. Naval Surface Warfare Center
Graduate Student Research Support
\$7200, 6/05-11/05
Co-Principal Investigator, 50% Shared Credit (G. Hilmas PI).
2. Air Force Research Laboratory
Fabrication and Testing of UHTC Components for Thermal Protection and Propulsion Applications
\$120,000, 5/05-4/07
Co-Principal Investigator, 50% Shared Credit (G. Hilmas PI)
3. Defense University Research Instrumentation Program
Acquisition of a High Temperature Mechanical Testing System
\$135,000, 4/05-3/06
Principal Investigator, 50% shared credit (G. Hilmas co-PI)

4. Advanced Ceramics Research (MDA STTR program)
TaC-Based Fibrous Monolithic Ceramics
\$30,000, 8/04-2/05
Co-Principal Investigator, 50% shared credit (G. Hilmas PI)
5. National Science Foundation
CAREER: Reactive Processing of High Temperature Materials
\$400, 000, 6/04-5/09
Principal Investigator, 100% shared credit
6. U.S. Department of Education
Fellowship Program in Graduate Education in Interdisciplinary Materials Engineering
\$750,000, 8/04-8/07
Co-investigator, 5% shared credit (R. Schwartz PI)
7. Air Force Research Laboratory
Development of Scale-Up Processes to Enable the Production of Ceramic Composites for
Service Temperatures in Excess of 2000°C
\$113,500, 6/04-5/06
Co-Principal Investigator, 50% shared credit (G. Hilmas PI)
8. Air Force Research Laboratory
Environmentally Friendly Corrosion Resistant Coating System
\$539,272, 6/04-5/06
Co-Principal Investigator, 5% shared credit (M. O'Keefe PI)
9. National Science Foundation
NSF-AFOSR Joint Workshop on Future Ultra-High Temperature Materials
\$31,340, 1/04-12/04
Principal Investigator, 50% shared credit (G. Hilmas co-PI)
10. Air Force Office of Scientific Research
Reactive Processing and Co-Extrusion of Ultra-High Temperature Ceramics
\$300,000, 1/03-12/05
Principal Investigator, 50% shared credit (G. Hilmas co-PI)
11. U.S. Army Space and Missile Defense Command
Processing-Property-Microstructure Relationships in SiC-based Ceramics
\$400,000, 8/03-7/06
Co-Principal Investigator, 50% shared credit (G. Hilmas PI)
12. U.S. Department of Energy and Pyrotek, Inc.
Low Permeability Ceramics for Low Pressure Casting of Aluminum
\$214,129, 6/02-5/04
Co-Principal Investigator, 40% shared credit (J. Smith PI)
13. Air Force Research Laboratory
Environmentally Sound Aircraft Coatings
\$1,775,094, 9/02-6/05
Co-investigator, 5% shared credit (J. Stoffer PI)

14. University of Missouri Research Board
Reactive Processing of Ultra-High Temperature Materials
\$15,160, 1/03-5/03
Principal Investigator, 100% shared credit
15. Universal Technology Corporation
Research to Enhance Aircraft Structural Integrity
\$1,120,080, 6/01-11/02
Co-investigator 12% shared credit (J. Stoffer PI)
16. University of Missouri Research Board
Interfacial Adhesion in Alumina-Cu Composites
\$29,100, 6/00-5/01
Principal Investigator, 100% shared credit
17. Caterpillar, Inc.
Development of Strong, Tough Ceramic-Metal Composites for Diesel Engine Applications
\$11,921, 8/00-7/01
Principal Investigator, 100% shared credit
18. UMR Appleyard Endowment
Mullite-Al(Cu) Reaction Kinetics
\$2100, 8/00-12/00
Principal Investigator, 100% shared credit

Outreach Activities

Instituted a new math and science competition for high school students in Missouri called the WYSE Academic Challenge. Worked with Worldwide Youth in Science and Engineering (WYSE) based at University of Illinois to expand their competition outside Illinois for the first time. Named to the WYSE Board of Advisors in May 2001. Coordinate the competition statewide in Missouri, which includes recruiting testing sites, setting procedures and standards for competition, collecting participation fees from high schools, and training new site coordinators. The competition has grown from a just a few schools at one site in 2000 to seven sites and over 30 schools in 2004.