Stephen W. Sofie
Assistant Professor
Department of Mechanical & Industrial Engineering
Montana State University
Bozeman, MT

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Education

Ph. D., Materials Science & Engineering, August 2002
University of Washington, Seattle, WA
Dissertation: "Processing of Doped YBa2Cu3O7-x Melt Textured Single Crystals for Enhanced Superconducting Properties"

MS, Materials Science & Engineering, July 1999
University of Washington, Seattle, WA
Thesis: "Freeze Forming of Alumina in Aqueous and Non-Aqueous Suspension"

BS, Ceramic Engineering, March 1996
University of Washington, Seattle, WA
Senior Thesis: "Re-usable Castable Refractory Molds for the Production of Recycled Glass Decorative Tiles"

AAS, Pre-Engineering, June 1993
Peninsula College, Port Angeles, WA

Professional Experience

August 2005 – current
Montana State University, M&IE Department, Bozeman, MT, Assistant Professor

May 2003 – August 2005
QSS Group, Inc. at NASA Glenn Research Center, Ceramics Branch, Cleveland, OH,
Materials Research Scientist

September 2002 - April 2003
University of Washington, Materials Science & Engineering, Post Doctoral Associate

March 1996 - February 1997
Quest Integrated, Inc., Kent, WA, Materials Engineer

Patents

1. Stephen W. Sofie, "Uni-Cell: High Performance, Textured, Electrolyte Supported Solid Oxide Fuel Cell," Submitted May 2007

2. Thomas L. Cable & Stephen W. Sofie, "Symmetrical, Bi-Electrode Supported Cell for High Power Density Solid Oxide Fuel Cells," Submitted December 2005

3. Thomas L. Cable & Stephen W. Sofie, "Solid Oxide Fuel Stack Design with Bi-Electrode Supported Cells," Submitted December 2005

Publications

1. D. Ator and S.W. Sofie, "Robust Copper Braze for the Hermetic Sealing of Planar Solid Oxide Fuel Cells," J. Mat. Science, submitted

2. P.S. Gentile and S.W. Sofie, "High Performance Interleaved Electrolyte Supported Solid Oxide Fuel Cell," J. Power Sources, submitted

3. S.W. Sofie, P. Gannon and Vladimir Gorokhovsky, "Silver-Chromium Oxide Interactions in SOFC Environments" J. Power Sources, accepted

4. T. Brosten, S. Codd, S.W. Sofie, and J. Seymour, "Magnetic Resonance Microscopy Analysis of Transport in a Novel Tape Cast Porous Ceramic", AIChE Journal, accepted

5. P.E. Gannon, S.W. Sofie, M.C. Deibert, R.J. Smith and V.I. Gorokhovsky, "Thin Film YSZ Coatings on Functionally Graded Freeze Cast Anode Supports," J. Applied Electrochemistry, accepted

6. A. Lussier, S.W. Sofie, J. Dvorak, Y.U. Idzerda, "Hydrogen sulfide induced nickel depletion of SOFC anodes," Proceedings of FuelCell2008 Sixth International Fuel Cell Science, Engineering and Technology Conference June 16-18, 2008, Denver, Colorado, USA

7. S.W. Sofie and D.R. Taylor, "Controlled Thermal Expansion Anode Compositions with Improved strength for Use in Anode Supported SOFC's," Ceramic Engineering and Science Proceedings, v 28, n 4, Advances in Solid Oxide Fuel Cells III - A Collection of Papers Presented at the 31st International onference on Advanced Ceramics and Composites, 215-223 (2008)

8. Lussier, S. Sofie, J. Dvorak, Y.U. Idzerda, "Mechanism for SOFC Anode Degradation from Hydrogen Sulfide Exposure," Int. J. of Hydrogen Energy 33, 3945 (2008)

9. S.W. Sofie and J.M. Buscher, "Copper based Braze for Robust Sealing of Planar Solid Oxide Fuel Cells," Ceramic Engineering and Science Proceedings, v 28, n 4, Advances in Solid Oxide Fuel Cells III - A Collection of Papers Presented at the 31st International Conference on Advanced Ceramics and Composites, 335-342 (2008)

10. T. L. Cable and S.W. Sofie, "Symmetrical, Planar SOFC Design for NASA's High Specific Power Density Requirements," Journal of Power Sources, 174 [1], pp.221-227 (2007)

11. NASA Tech Brief, "Fabrication of Functionally Graded and Aligned Pores Via Tape Cast Processing," LEW-17628-1 (2007)

12. S.W. Sofie, "Fabrication of Functionally Graded and Aligned Porosity in Thin Ceramic Substrates with the Freeze-Tape-Casting Process," J. Amer. Ceram. Soc., 90 [7], pp2024-2031 (2007)

13. P.E. Gannon, V.I. Gorokhovsky, M.C. Deibert, R.J. Smith, A. Kayani, P.T. White, S.W. Sofie, Z. Gary Yang, D. McCready, S. Visco, C. Jacobson, H. Kurokawa, "Deposition and evaluation of protective PVD coatings on ferritic stainless steel SOFC interconnects," J. Electrochem. Soc., 153 [10], ppA1886-A1893 (2006)

14. F. Dogan, S. W. Sofie, W. C. Hicks, M. Strasik, A. C. Day, and K. E. McCrary, "Neodymium Oxide Doped Melt Textured YBa2Cu3O7-x Single Crystals," IEEE T. Appl. Supercon., 13 [2], 3076-3078 (2003)

15. F. Dogan and S.W. Sofie, "Microstructural Control of Complex-Shaped Ceramics Processed by Freeze Casting." Ceram.Forum Int./Ber.DKG. 79 [5], pp E35-E38 (2002)

16. S.W. Sofie and F. Dogan, "Effect of Carbon on the Microstructure and Superconducting Properties of YBa2Cu3O7-x Melt Textured Crystals," Supercond. Sci. & Technol., 15, pp1-6 (2002)

17. S.W. Sofie and F. Dogan, "Freeze Casting of Aqueous Alumina Slurries with Glycerol," J. Am. Ceram. Soc, 84 [7], pp 1459-1464 (2001)

18. S.W. Sofie and F. Dogan, "Ceramic Shape Forming by Freeze Drying of Aqueous and Non-aqueous Slurries," Ceramic Transactions (USA), 108, pp 235-243 (2000)

19. S.W. Sofie and F.Dogan, "Shape Forming of Aqueous Alumina Slurries by Freeze-Drying," Ceramic Transactions (USA), 115, pp 227-235 (2000)

Conference Presentations

1. "Increased Thermal Stability of Infiltrated Nickel Anode Catalysts on YSZ Scaffolds by Chemical Anchoring Techniques," Materials Science and Technology 2008 Conference and Exhibition, Pittsburg, PA, 2008

2. "High Performance Interleaved Electrolyte Supported Solid Oxide Fuel Cell," Materials Science and Technology 2008 Conference and Exhibition, Pittsburg, PA, 2008

3. "Noble Metal Free Metallic Braze Sealant for SOFC Application," FuelCell2008 Sixth International Fuel Cell Science, Engineering and Technology Conference June 16-18, 2008, Denver, Colorado, USA

4. "Hydrogen sulfide induced nickel depletion of SOFC anodes," FuelCell2008 Sixth International Fuel Cell Science, Engineering and Technology Conference June 16-18, 2008, Denver, Colorado, USA

5. "Metallic Braze Sealant for SOFC Application," 32nd International Cocoa Beach Conference & Exposition on Advanced Ceramics and Composites, Daytona Beach, FL, 2008

6. "Flow & Diffusion Characteristics of Freeze Cast Substrates with Aligned Columnar Pores," 32nd International Cocoa Beach Conference & Exposition on Advanced Ceramics and Composites, Daytona Beach, FL, 2008

7. "Growth and Characterization of Long Range Ordered Pore Structures via Freeze-Tape Casting," Materials Science and Technology 2007 Conference and Exhibition, Detroit, MI, 2007

8. "Robust Copper Braze for Hermetic Sealing of Solid Oxide Fuel Cells," Materials Science and Technology 2007 Conference and Exhibition, Detroit, MI, 2007

9. "Development of a Novel High Performance Electrolyte Supported Solid Oxide Fuel Cell," Materials Science and Technology 2007 Conference and Exhibition, Detroit, MI, 2007

10. "Copper Based Braze for Robust Sealing of Planar Solid Oxide Fuel Cells," 31st International Cocoa Beach Conference & Exposition on Advanced Ceramics and Composites, Daytona Beach, FL, 2007

11. "Controlled Thermal Expansion Anode Compositions with Improved Strength for use in Anode Supported SOFC's," 31st International Cocoa Beach Conference & Exposition on Advanced Ceramics and Composites, Daytona Beach, FL, 2007

12. "MSU HiTEC Research Activities," Montana Energy Symposium, Bozeman, MT, 2006

13. "Progress in High Power SOFC's for Aerospace Applications," 29th International Conference on Advanced Ceramics & Composites, Cocoa Beach, FL, 2005

14. "SOFC Electrode Structures Fabricated with Functionally Graded and Aligned Porosity," 29th International Conference on Advanced Ceramics & Composites, Cocoa Beach, FL,2005

15. "Novel Tape Casting Techniques for the Fabrication of Graded and Aligned Porous Membranes," 29th International Conference on Advanced Ceramics & Composites, Cocoa Beach, FL, 2005

16. "Progress in High Power Density SOFC's for Aerospace Applications," 2004 Fuel Cell Seminar; Technology, Markets, and Commercialization, San Antonio, TX, 2004

17. "Anisotropic Y2BaCuO5 Particle Segregation in Growth Sectors of YBa2Cu3O7-x Melt Textured Single Crystals," 104th Annual Meeting & Exposition of The American Ceramic Society, St. Louis, MI, 2002

18. "Micro-Slip Casting of PZT Transducers for Enhanced Catheter Drug Delivery," The 104th Annual Meeting & Exposition of The American Ceramic Society, St. Louis, MI, 2002

19. "The effect of carbon rich precursors on the solidification and properties of Y-Ba-Cu-O crystals," 3rd International Workshop on Processing and Applications of Superconducting (RE)BCO Large Grain Materials, University of Washington, Seattle, WA, 2001

20. "Enhanced flux pinning in Nd doped Y-Ba-Cu-O superconductors," 3rd International Workshop on Processing and Applications of Superconducting (RE)BCO Large Grain Materials, University of Washington, Seattle, WA, 2001

21. "Freeze Casting of Aqueous Alumina Slurries with Glycerol," 102nd Annual Meeting &Exposition of The American Ceramic Society, St. Louis, MI, 2000

22. "Dry Pressing of Large PLZT Thick Plates for Ultrasonic Transducer Fabrication," 52nd Pacific Coast Regional & Basic Science Division Meeting of The American Ceramic Society, Bellevue, WA, 2000

23. "Ceramic Shape Forming by Freeze Drying of Aqueous and Non-aqueous Slurries," 101st Annual Meeting & Exposition of The American Ceramic Society, Indianapolis, IN, 1999

Professional Affiliations

•Member of the American Ceramics Society
•Member of the American Society of Mechanical Engineers
•Member of the National Institute of Ceramic Engineers

Honors and Awards

•Nominated for Presidents Excellence in Teaching Award, 2009

•Voted ME Outstanding Professor, 2008
•Special Recognition Award by the NASA Glenn Safety Office with appreciation for an "Exceptional Act of Courage" during a laboratory fire rescue of a co-worker, 2004
•Nominated for the UW College of Engineering Outstanding Teaching Assistant, 2001 & 2002
•Awarded teaching assistant of the year for the UW Ceramic Engineering Class, 1998

Mentoring, Outreach, Other Activities:
Mentored students in the laboratory through the NSF Research Experience for Undergraduates (REU) program, Montana Apprenticeship Program (MAP) for Native American undergraduates, and Undergraduate Scholars Program (USP). Involved in Native American high school outreach programs, women in engineering laboratory tours and demonstrations, senior capstone project advising. Participating as an Advisory Board Member for the Teaching Engineering Application in Math & Science (TEAMS) program for Montana Grades 6 through 8 (G6-8) teachers. Currently mentoring 3 undergraduates, 3 MS, 1 PhD, and 1 post-doc in the laboratory under sponsored research programs.