Kenneth H. Sandhage

Reilly Professor of Materials Engineering
School of Materials Engineering
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RESEARCH INTERESTS/EXPERTISE

Advanced ceramics, metals, and composites; Shape-preserving chemical transformation of complex-shaped, 3-D materials; High-temperature materials chemistry (interactions between solids and reactive gases or liquids); Biologically-enabled processing of 3-D hierarchical micro/nanostructured materials; Chemical and structural modification of surfaces; Wet chemical/biochemical syntheses of conformal functional coatings; Applications: energy, medical, environmental, sensor, aerospace, and defense

EDUCATION

1981-86 *Massachusetts Institute of Technology, Cambridge, MA*
Ph.D. in Ceramics. Research on corrosion mechanisms of solid Al_2O_3 and $(Al,Cr)_2O_3$ in CaO-MgO-Al_2O_3-SiO_2 melts at 1450-1550°C. GPA = 4.9/5.0. Member of Sigma Xi.

1977-81 *Purdue University, W. Lafayette, IN*
B.S. in Metallurgical Engineering with Highest Distinction. GPA = 5.9/6.0. Honors: Armco Scholarship, 4 years in Purdue 500 (top 500 academic students), Member of Alpha Sigma Mu.

PROFESSIONAL EXPERIENCE

2015-present *Purdue University, West Lafayette, IN*
Reilly Professor of Materials Engineering in the School of Materials Engineering

2003-2015 *Georgia Institute of Technology, Atlanta, GA*
B. Mifflin Hood Professor (2005-2015), Professor (2003-2015) in the School of Materials Science and Engineering

1991-03 *The Ohio State University, Columbus, OH*
Professor (2000-2003), Associate Professor (1995-2000), Assistant Professor (1991-1995) in the Department of Materials Science and Engineering

1999 *Technische Universitat Hamburg-Harburg, Hamburg, Germany*
Visiting Scholar and Humboldt Fellow in the Advanced Ceramics Group of Prof. Nils Claussen

1988-91 *American Superconductor Corp., Watertown, MA*
Senior Scientist. Conducted R&D on the processing of superconducting oxide wires via deformation/oxidation of metals or deformation/annealing of oxides. Supervised joint research with Oak Ridge and Argonne National Laboratories.

1986-88 *Corning Glass Works, Painted Post, NY*
Senior Scientist. Conducted R&D on the processing of optical fibers for radiative environments (X rays, γ rays) and high bandwidth applications.

SELECTED HONORS AND AWARDS

- Seed for Success Award, Purdue University, 2020
- Seed for Success Award, Purdue University, 2019
- Outstanding Engineering Teacher, Purdue Exponent, 2019 (spring)
- Purdue Innovator Hall of Fame, 2018
- Seed for Success Award, Purdue University, 2016
- Outstanding Faculty Leadership Award for the Development of Graduate Research Assistants, Georgia Institute of Technology, 2014
- National Materials and Manufacturing Board of The National Academies, 2011-2013
- Member, National Materials Advisory Board of the National Academies, 2006-2010
- Chair of the Composites at Lake Louise Conference, Lake Louise, CA, 2009
- Fellow, The American Ceramic Society, 2002
- Lumley Research Award, College of Engineering, Ohio State University, 2002
- Research Accomplishment Award, College of Engineering, Ohio State Univ., 2001
- Alexander von Humboldt Fellowship, 1998
- Outstanding Materials Engineer Award, Purdue University, 1997
- Lumley Research Award, College of Engineering, Ohio State University, 1997
- Research Accomplishment Award, College of Engineering, Ohio State Univ., 1992
- Research Initiation Award, National Science Foundation, 1992
- Best Paper Awards:
  - 30th International Conference on Advanced Ceramics & Composites, 2nd Place Paper Award, The American Ceramic Society, 2006
  - Best Paper, Symposium K ("Biological and Bio-Inspired Materials and Devices"), Materials Research Society Spring Meeting, 2005
  - 29th International Conference on Advanced Ceramics & Composites, 1st Place Paper Award, The American Ceramic Society, 2005
  - Best Paper, 6th International Conference on the Processing & Fabrication of Advanced Materials, Singapore, 1997
  - Ross Coffin Purdy Award, The American Ceramic Society, 1996

REFEREED JOURNAL PUBLICATIONS

(Google Scholar: h index = 50; 9446 citations)

1. Q. Zhu, M. Pishahang, M. Caccia, C. Amy, C. C. Kelsall, A. D LaPotin, M. Bichnevicius, K. H. Sandhage, A. Henry, "Validation of the Porous Medium Approximation for Compact Heat Exchanger Analysis," ***Applied Energy***, *submitted*.

REFEREED JOURNAL PUBLICATIONS (continued)

2. A. S. Caldwell, G. Itskos, K. H. Sandhage, "Air-Stable, Earth-Abundant Molten Chlorides and Corrosion-Resistant Containment for Chemically-Robust, High-Temperature Thermal Energy Storage for Concentrated Solar Power," ***Mater. Today***, under modification (online at arXiv preprint arXiv:2010.12476)
3. T. D. Nguyen, M. Caccia, C. K. McCormack, G. Itskos, K. H. Sandhage, "Corrosion of Al_2O_3/Cr and Ti_2O_3/Cr Composites in Flowing Air and CO_2 at 750℃," ***Corros. Sci.***, *179*, 109115-1 to 109115-12 (2021).
4. J. Li, S. H. Hwang, G. Itskos, K. H. Sandhage, "Kinetic Mechanism of Conformal Magnesium Silicide (Mg_2Si) Film Formation via Reaction of Si Single Crystals with Mg Vapor," ***J. Mater. Sci.***, *55* (3) 1107-1116 (2020).
5. M. Caccia, M. Tabandeh-Khorshid, G. Itskos, A. R. Strayer, A. S. Caldwell, S. Pidaparti, S. Singnisai, A. D. Rohskopf, A. M. Schroeder, D. Jarrahbashi, T. Kang, S. Sahoo, N. R. Kadasala, A. Marquez-Rossy, M. H. Anderson, E. Lara-Curzio, D. Ranjan, A. Henry, K. H. Sandhage, "Ceramic/Metal Composites for Heat Exchangers in Concentrated Solar Power Plants," ***Nature***, *562* (7727) 406-409 (2018).
6. N. S. Semenikhin, N. R. Kadasala, R. J. Moon, J. W. Perry, K. H. Sandhage, "Singly Dispersed Gold Nanoshell-Bearing Cellulose Nanocrystals with Tailorable Plasmon Resonance," ***Langmuir***, *34* (15) 4427-4436 (2018).
7. Y. Zhang Ye Cai, S.H. Hwang, G. Wilk, F. DeAngelis, A. Henry*, K. H. Sandhage*, "Containment Materials for Liquid Tin at 1350°C as a Heat Transfer Fluid for High Temperature Concentrated Solar Power," ***Solar Energy***, *164*, 47-57 (2018).
8. A. S. Gordin, K. H. Sandhage, "*In situ* High-temperature X-ray Diffraction Analysis of Mg_2Si Film Formation Kinetics via Reaction of Mg Films with Si Single Crystal Substrates," ***Intermetallics***, *94*, 200-209 (2018).
9. M. Elashiry, M. M. Meghil, S. Kalathingal, A. Buchanan, R. Elrefai, S. Looney, M. Rajendran, M. Ochieng, N. Young, A. Elawady, R. M. Arce, K. H. Sandhage, C. W. Cutler, "Application of Radiopaque Micro-Particle Fillers for 3-D Imaging of Periodontal Pocket Analogues using Cone Beam CT," ***Dental Mater.***, *34* (4) 619-628 (2018).
10. M. Elashiry, M.M. Meghil, S. Kalathingal, A. Buchanan, M. Rajendran, R. Elrefai, M. Ochieng, A. Elawady, R. M. Arce, K. H. Sandhage, C. W. Cutler, "Development of Radiopaque, Biocompatible, Antimicrobial, Micro-Particle Fillers for Micro-CT Imaging of Simulated Periodontal Pockets," ***Dental Mater.***, *34* (4) 569-578 (2018).
11. A. Cheng, W. B. Goodwin, B. M. deGlee, R. A. Gittens, J. P. Vernon, S. L. Hyzy, Z. Schwartz, K. H. Sandhage*, B. D. Boyan*, "Surface Modification of Bulk Titanium Substrates for Biomedical Applications via Low-Temperature Microwave Hydrothermal Oxidation," ***J. Biomed. Mater. Res. A***, *106* (3) 782-796 (2018).

REFEREED JOURNAL PUBLICATIONS (continued)

12. C. Amy, D. Budenstein, M. Bagepalli, D. England, A. DeAngelis, G. Wilk, C. Jarrett, C. Kelsall, J. Hirschey, H. Wen, A. Chavan, B. Gilleland, C. Yuan, W. Chueh, K. H. Sandhage, Y. Kawajiri, A. Henry*, "Pumping Liquid Metal at High Temperatures Up to 1,673 K," ***Nature***, *550* (7675), 199-203 (2017).

13. W. B. Goodwin, D. Shin, D. Sabo, S. Hwang, Z. J. Zhang, J. C. Meredith,* K. H. Sandhage,* **"**Tunable Multimodal Adhesion of Three-Dimensional, Nanocrystalline $CoFe_2O_4$ Pollen Replicas," ***Bioinsp. Biomim.***, *12* (6) 066009-1 – 066009-13 (2017). (Featured Article)

14. Y. Fang, J. G. Hester, B. M. deGlee, C.-C. Tuan, P. D. Brooke, T. Le, C.P. Wong, M. M. Tentzeris*, K. H. Sandhage*, "A Novel, Facile, Layer-by-Layer Substrate Surface Modification for the Fabrication of All-Inkjet-Printed Flexible Electronic Devices on Kapton," ***J. Mater. Chem. C***, *4* (29) 7052-7060 (2016).

15. G. H. Waller, P. D. Brooke, B. H. Rainwater, S. Y. Lai, R. Hu, Y. Ding, F. M. Alamgir, K. H. Sandhage, M. L. Liu, "Structure and Surface Chemistry of Al_2O_3 Coated $LiMn_2O_4$ Nanostructured Electrodes with Improved Lifetime," ***J. Power Sources***, *306*, 162-170 (2016).

16. C. Jarrett, W. Chueh, C. Yuan, Y. Kawajiri, K. H. Sandhage, A. Henry, "Critical Limitations on the Efficiency of Two-Step Thermochemical Cycles," ***Solar Energy***, *123*, 57-73 (2016).

17. H. Lin, M. C. Allen, J. Wu, B. M. deGlee, D. Shin, Y. Cai, K. H. Sandhage, D. D. Deheyn, J. C. Meredith, "Bio-Enabled, Core/Shell Microparticles with Tailored Multimodal Adhesion and Optical Reflectivity," ***Chem. Mater.***, *27* (21) 7321-7330 (2015). ***(Front Cover)***

18. G. Begum, W. B. Goodwin, B. M. deGlee, K. H. Sandhage, Nils Kröger, "Compartmentalization of Enzymes for Cascade Reactions through Biomimetic Layer-by-Layer Mineralization," ***J. Mater. Chem. B****, 3*, 5232-5240 (2015).

19. B. Cocilovo, O. Herrera, S. Mehravar, Y. Fang, K. H. Sandhage, K. Kieu, R. A. Norwood, "Surface-Enhanced Two-Photon Excitation Fluorescence of Various Fluorophores Evaluated Using a Multiphoton Microscope," ***J. Lightwave Technol****., 33* (16) 3446-3452 (2015).

20. I. J. Gomez, W. B. Goodwin, D. Sabo, Z. J. Zhang, K. H. Sandhage*, J. C. Meredith*, "Three-Dimensional Magnetite Replicas of Pollen Particles with Tailorable and Predictable Multimodal Adhesion," ***J. Mater. Chem. C***, *3* (3) 632-643 (2015).

21. M. Lai, C. D. Hermann, R. Olivares-Navarrete, A. Cheng, R. A. Gittens, M. Walker, Y. Cai, K. Cai, K. H. Sandhage, Z. Schwartz, B. D. Boyan, "Role of $\alpha 2\beta 1$ Integrins in Mediating Cell Shape on Microtextured Titanium Surfaces," *J. Biomed. Mater. Res.,* ***J. Biomed. Mater. Res. A****, 103A* (2) 564-573 (2015).

22. Z. Xia, S. C. Davis, Ali A. Eftekhar, A. S. Gordin, Murtaza Askari, Qing Li, Farshid Ghasemi, K. H. Sandhage*, A. Adibi*, "Magnesiothermically Formed Porous Silicon Thin Films on Silicon-on-Insulator Optical Microresonators for High-Sensitivity Detection," ***Adv. Optical Mater.***, *2* (3) 235-239 (2014).

REFEREED JOURNAL PUBLICATIONS (continued)

23. K. Kieu, C. Li, Y. Fang, G. Cohoon, O.D. Herrera, M. Hildebrand, K. H. Sandhage, R. A. Norwood, "Structure-based Optical Filtering by the Silica Microshell of the Centric Marine Diatom *Coscinodiscus wailesii*," ***Optics Express**, 22* (13) 15992-15999 (2014).

24. M. B. Barta, J. H. Nadler, Z. Kang, B. K. Wagner, R. Rosson, Y. Cai, K. H. Sandhage, B. Kahn, "Composition Optimization of Scintillating Rare-Earth Nanocrystals in Oxide Glass-Ceramics for Radiation Spectroscopy," ***Appl. Optics***, *53* (16) D21-D28 (2014).

25. V. Singh, T. L. Bougher, A. Weathers, Y. Cai, K. Bi, M. T. Pettes, S. A. McMenamin, W. Lu, D. P. Resler, T. R. Gattuso, D. H. Altman, K. H. Sandhage, L. Shi, A. Henry, B. A. Cola, "High Thermal Conductivity of a Chain-Oriented Amorphous Polythiophene," ***Nature Nanotechnol.***, *9* (5) 384-390 (2014).

26. R. A. Gittens, R. Olivares-Navarrete, S. L. Hyzy, K. H. Sandhage, Z. Schwartz, B. D. Boyan, "Superposition of Nanostructures on Microrough Titanium-Aluminum-Vanadium Alloy Surfaces Results in an Altered Integrin Expression Profile," ***Connective Tissue Res.**, 55* (S1) 164-168 (2014).

27. B. S. Cook, Y. Fang, S. Kim, T. Le, W. B. Goodwin, K. H. Sandhage*, M. M. Tentzeris*, "Inkjet Catalyst Printing and Electroless Copper Deposition for Low-Cost Patterned Microwave Passive Devices on Paper," ***Electron. Mater. Lett.***, *9* [5] 669-676 (2013).

28. M. B. Dickerson, W. Lyon, W. E. Gruner, P. A. Mirau, M. L. Jespersen, Y. Fang, K. H. Sandhage, R. R. Naik, "Unlocking the Latent Antimicrobial Potential of Biomimetically Synthesized Inorganic Materials," ***Adv. Funct. Mater.***, *23* [34] 4236-4245 (2013).

29. R. A. Gittens, R. Olivares-Navarrete, A. Cheng, D. M. Anderson, T. McLachlan, I. Stephan, J. Geis-Gerstorfer, K. H. Sandhage, A. G. Fedorov, F. Rupp, B. D. Boyan, R. Tannenbaum, Z. Schwartz, "The Roles of Titanium Surface Micro/ Nanotopography and Wettability on the Differential Response of Human Osteoblast Lineage Cells," ***Acta Biomater.***, *9* (35) 6268-6277 (2013).

30. W. B. Goodwin, I. J. Gomez, Y. Fang, J. C. Meredith*, K. H. Sandhage*, "Conversion of Pollen Particles into Three-Dimensional Ceramic Replicas Tailored for Multimodal Adhesion," ***Chem. Mater.**, 25* (22) 4529-4536 (2013).

31. J. D. Berrigan, T. McLachlan, J. R. Deneault, Y. Cai, T.-S. Kang, M. F. Durstock, K. H. Sandhage, "Conversion of Porous Anodic Al_2O_3 into Freestanding, Uniformly-Aligned Multi-wall TiO_2 Nanotube Arrays for Electrode Applications," ***J. Mater. Chem. A***, *1* (1) 128-134 (2013).

32. A. Xing, J. Zhang, K. Chen, Z. Bao, Y. Mei, A. S. Gordin, K. H. Sandhage, "A Magnesiothermic Reaction Process for the Scalable Production of Mesoporous Silicon for Rechargeable Lithium Batteries," ***Chem. Commun.***, *49* (60) 6743-6745 (2013).

REFEREED JOURNAL PUBLICATIONS (continued)

33. S. C. Davis, V. C. Sheppard, G. Begum, Y. Cai, Y. Fang, J. D. Berrigan, N. Kröger*, K. H. Sandhage*, "Rapid Flow-through Biocatalysis with High Surface Area, Enzyme-loaded Carbon and Gold-bearing Diatom Frustule Replicas," ***Adv. Funct. Mater.***, *23* [36] 4611-4620 (2013).

34. Y. Kim, M. Kathaperumal, O. Smith, M.-J. Pan, Y. Cai, K. H. Sandhage, J. W. Perry, "High Energy Density Sol-Gel Thin Film based on Neat 2-Cyanoethyltrimethoxysilane," ***ACS Appl. Mater. Interf.***, *5* (5) 1544-1547 (2013).

35. Y. Fang, V. W. Chen, Y. Cai, J. D. Berrigan, S. R. Marder, J. W. Perry, K. H. Sandhage, "Biologically-enabled Syntheses of Freestanding Metallic Structures Possessing Subwavelength Pore Arrays for Extraordinary (Plasmon-Mediated) Infrared Transmission," ***Adv. Funct. Mater.***, *22* [12] 2550-2559 (2012). ***(Back Cover)***

36. K. Chen, Z. Bao, J. Shen, G. Wu, B. Zhou, K. H. Sandhage, "Freestanding Monolithic Silicon Aerogels," ***J. Mater. Chem.***, *22* [32] 16196-16200 (2012).

37. R. A. Gittens, R. Olivares-Navarrete, T. McLachlan, Y. Cai, S. L. Hyzy, J. M. Schneider, Z. Schwartz, K. H. Sandhage, B. D. Boyan, "Differential Responses of Osteoblast Lineage Cells to Nanotopographically-Modified, Microroughened Titanium-Aluminum-Vanadium Alloy Surfaces," ***Biomater.***, *33* (35) 8986-8994 (2012).

38. J. P. Vernon, N. Hobbs, A. Lethbridge, P. Vukusic, D. D. Deheyn, K. H. Sandhage, "3-D Photoluminescent Lanthanide-doped Barium Titanate Structures Synthesized by Coating and Shape-preserving Reaction of Complex-shaped Bioorganic Templates," ***J. Mater. Chem.***, *22* (21) 10435-10437 (2012). ***(Inside Front Cover)***

39. Y. Fang, J. D. Berrigan, Y. Cai, S. R. Marder, K. H. Sandhage, "Syntheses of Nanostructured Cu- and Ni-based Micro-assemblies with Selectable 3-D Hierarchical Biogenic Morphologies," ***J. Mater. Chem.***, *22* (4) 1305-1312 (2012). ***(Highlighted in Editors' Choice section of the Jan. 20, 2012 edition of Science)***

40. H. Cheun, C. Fuentes-Hernandez, J. Shim, Y. Fang, Y. Cai, H. Li, A. Sigdel, J. Meyer, J. Maibach, A. Dindar, Y. Zhou, J. Berry, J.-L. Bredas, A. Kahn, K. H. Sandhage, B. Kippelen, "Oriented Growth of Al_2O_3:ZnO Nanolaminates for Use as Electron-Selective Electrodes in Inverted Polymer Solar Cells," ***Adv. Funct. Mater.***, *22* [7] 1531-1538 (2012).

41. D. K. Hwang, C. Fuentes-Hernandez, J. D. Berrigan, Y. Fang, J. Kim, W. J. Potscavage, Jr., H. Cheun, K. H. Sandhage, B. Kippelen, "Solvent and Polymer Matrix Effects on TIPS-Pentacene/Polymer Blend Organic Field-Effect Transistors," ***J. Mater. Chem.***, *22*, 5531-5537 (2012).

42. D. W. Lipke, Y. Zhang, Y. Cai, K. H. Sandhage, "Intragranular Tungsten/Zirconium Carbide Nanocomposites via a Selective Liquid/Solid Displacement Reaction," ***J. Am. Ceram. Soc.***, *95* [9] 2769-2772 (2012).

REFEREED JOURNAL PUBLICATIONS (continued)

43. Z. Bao, M.-K. Song, S. Davis, Y. Cai, M. Liu, K. H. Sandhage, "Bio-enabled Syntheses of Hollow, High Surface Area, Micro/mesoporous Carbon Particles with Selectable 3-D Biogenic Morphologies for Tailored Catalysis, Filtration, or Adsorption," ***Energy Environ. Sci.***, *4* (10) 3980-3984 (2011).

44. J. D. Berrigan, T.-S. Kang, Y. Cai, J. R. Deneault, M. F. Durstock, K. H. Sandhage, "Protein-Enabled Layer-by-Layer Syntheses of Aligned, Porous-Wall, High-Aspect-Ratio TiO_2 Nanotube Arrays," ***Adv. Funct. Mater.***, *21*, 1693-1700 (2011). ***(Inside Front Cover)***

45. N. R. Haase, S. Shian, K. H. Sandhage, N. Kröger, "Biocatalytic Nanoscale Coatings Through Biomimetic Layer-by-Layer Mineralization," ***Adv. Funct. Mater.***, *21* (22) 4243-4251 (2011).

46. R. A. Gittens I., T. McLachlan, Y. Cai, S. Berner, R. Tannenbaum, Z. Schwartz, K. H. Sandhage, B. D. Boyan, "The Effects of Combined Micron-/Submicron-scale Surface Roughness and Nanoscale Features on Cell Proliferation and Differentiation," ***Biomater.***, *32*, 3395-3403 (2011).

47. H. Cheun, J. D. Berrigan, Y. Zhou, M. Fenoll, J. Shim, C. Fuentes-Hernandez, K. H. Sandhage, B. Kippelen, "Roles of Thermally-induced Vertical Phase Segregation and Crystallization on the Photovoltaic Performance of Bulk Heterojunction Inverted Polymer Solar Cells," ***Energy Environ. Sci.***, *4* (9) 3456-3460 (2011).

48. S. Kim, Y. Bastani, H. Lu, W. King, S. R. Marder, K. H. Sandhage, A. Gruverman, E. Riedo, N. Bassiri-Gharb, "Direct Patterning of Arbitrary-Shaped Ferroelectric Nanostructures on Platinized Silicon and Glass Substrates," ***Adv. Mater.***, *23* (33) 3786-3790 (2011).

49. J. P. Vernon, Y. Fang, Y. Cai, K. H. Sandhage, "Morphology-preserving Conversion of a 3D Bio-organic Template into a Nanocrystalline Multicomponent Oxide Compound," ***Angew. Chem. Intl. Ed.***, *49*, 7765-7768 (2010).

50. B. Hatton, L. Mishchenko, S. Davis, K. H. Sandhage, J. Aizenberg, "Assembly of Large Area, Highly Ordered, Crack Free Inverse Opal Films," ***Proc. Nat. Acad. Sci.***, *107* [23] 10354-10359 (2010).

51. H. Cheun, J. B. Kim, Y. H. Zhou, Y. Fang, A. Dindar, J. Shim, C. Fuentes-Hernandez, K. H. Sandhage, B. Kippelen, "Inverted Polymer Solar Cells with Amorphous Indium Zinc Oxide as the Electron-Collecting Electrode," ***Optics Express***, *18* [104] A506-A512 (2010).

52. N. Kröger, K. H. Sandhage, "From Diatom Biomolecules to Bio-inspired Syntheses of Silica- and Titania-based Materials," ***MRS Bull.***, *35* [2] 122-126 (2010).

53. K. H. Sandhage, "Materials 'Alchemy': Shape-preserving Chemical Transformation of Micro-to-Macroscopic 3-D Structures," ***JOM***, *62* [6] 32-43 (2010).

54. S. Shian, K. H. Sandhage, "Hexagonal and Cubic $TiOF_2$," ***J. Appl. Crystall.***, *43* [4] 757-761 (2010).

REFEREED JOURNAL PUBLICATIONS (continued)

55. D. W. Lipke, Y. Zhang, Y. Liu, B. C. Church, K. H. Sandhage, "Near Net Shape/Net Dimension ZrC/W-based Composites with Complex Geometries via Rapid Prototyping and Displacive Compensation of Porosity (DCP)," ***J. Euro. Ceram. Soc.***, *30*, 2265-2277 (2010).

56. Z. Bao, E. M. Ernst, S. Yoo, K. H. Sandhage, "Syntheses of Porous Self-Supporting Metal Nanoparticle Assemblies with 3-D Morphologies Inherited from Biosilica Templates (Diatom Frustules)," ***Adv. Mater.***, *21* [4] 474-478 (2009).

57. Y. Fang, Q. Wu, M. B. Dickerson, Y. Cai, S. Shian, J. D. Berrigan, N. Poulsen, N. Kröger, K. H. Sandhage, "Protein-Mediated Layer-by-Layer Syntheses of Freestanding Microscale Titania Structures with Biologically-assembled 3-D Morphologies," ***Chem. Mater.***, *21* [24] 5704-5710 (2009).

58. S. Shian, K. H. Sandhage, "A Gas-Tight, Cu Kα X-ray Transparent Reaction Chamber for High Temperature X-ray Diffraction Analyses of Halide Gas/Solid Reactions," ***Rev. Sci. Instr.***, *80*, 115108/1-115108/7 (2009).

59. G. Wang, Y. Fang, P. Kim, A. Hayek, M. R. Weatherspoon, J. W. Perry, K. H. Sandhage, S. R. Marder, S. C. Jones, "Layer-by-Layer Dendritic Growth of Hyperbranched Thin Films for Surface Sol-Gel Syntheses of Conformal, Functional, Nanocrystalline Oxide Coatings on Complex 3-D (Bio)Silica Templates," ***Adv. Funct. Mater.***, *19* [17] 2768-2776 (2009). ***(Frontispiece)***

60. Y. Liu, D. W. Lipke, Y. Zhang, K. H. Sandhage, "The Kinetics of Incongruent Reduction of Tungsten Carbide (WC) via Reaction with a Hafnium-Copper (Hf-Cu) Melt," ***Acta Mater.***, *57*, 3924-3931 (2009).

61. R. F. Shepherd, P. Panda, Z. Bao, K. H. Sandhage, J. A. Lewis, P. S. Doyle, "Stop-Flow Lithography of Colloidal, Glass, and Silicon Microcomponents," ***Adv. Mater.***, *20* [24] 4734-4739 (2008).

62. Y. Fang, N. Poulsen, M. B. Dickerson, Y. Cai, S. E. Jones, R. R. Naik, N. Kröger, K. H. Sandhage, "Identification of Peptides Capable of Inducing the Formation of Titania but not Silica via a Subtractive Bacteriophage Display Approach," ***J. Mater. Chem.***, *18*, 3871-3875 (2008).

63. A. D. Mann, R. R Naik, H. C. DeLong, K. H. Sandhage, "Biomimetic and Bio-Enabled Materials Science and Engineering: Introduction," ***J. Mater. Res.***, *23* [12] 3137-3139 (2008).

64. M. R. Weatherspoon, Y. Cai, M. Crne, M. Srinivasarao, K. H. Sandhage, "3-D Rutile Titania-based Structures with *Morpho* Butterfly Wing Scale Morphologies," ***Angew. Chemie Int. Ed.***, *47*, 7921-7923 (2008).

65. C. M. Carney, S. A. Akbar, Y. Cai, S. Yoo, K. H. Sandhage, "Reactive Conversion of Polycrystalline SnO_2 into Single Crystal SnO_2 Nanofiber Arrays at Low Oxygen Partial Pressure," ***J. Mater. Res.***, *23* [10] 2639-2644 (2008).

REFEREED JOURNAL PUBLICATIONS (continued)

66. M. B. Dickerson, S. E. Jones, Y. Cai, G. Ahmad, R. R. Naik, N. Kröger, K. H. Sandhage, "Identification and Design of Peptides for the Rapid, High Yield Formation of Nanoparticulate TiO_2 from Aqueous Solutions at Room Temperature," ***Chem. Mater.***, *20* [4] 1578-1584 (2008).

67. M. B. Dickerson, K. H. Sandhage, R. R. Naik, "The Protein and Peptide-Directed Syntheses of Inorganic Materials," ***Chem. Rev.***, *108* (11) 4935-4978 (2008).

68. G. Ahmad, M. B. Dickerson, Y. Cai, S. E. Jones, E. M. Ernst, M. S. Haluska, Y. Fang, J. Wang, G. Subramanyam, R. R. Naik, K. H. Sandhage, "Rapid Bio-Enabled Formation of Ferroelectric $BaTiO_3$ at Room Temperature from an Aqueous Salt Solution at Near Neutral pH," ***J. Am. Chem. Soc.***, *130* [1] 4-5 (2008).

69. M. R. Weatherspoon, M. B. Dickerson, G. Wang, Y. Cai, S. Shian, S. C. Jones, S. R. Marder, K. H. Sandhage, "Thin, Conformal, and Continuous SnO_2 Coatings on Hydroxyl-Amplified Biosilica (Diatom) Templates via Layer-by-Layer Alkoxide Deposition," ***Angew. Chem. Int. Ed.***, *46*, 5724-5727 (2007).

70. Y. Cai, M. B. Dickerson, M. S. Haluska, Z. Kang, C. J. Summers, K. H. Sandhage, "Manganese-doped Zinc Orthosilicate-bearing Phosphor Microparticles with Controlled 3-D Shapes Derived from Diatom Frustules," ***J. Am. Ceram. Soc.***, *90* [4] 1304-1308 (2007).

71. E. M. Ernst, B. C. Church, C. S. Gaddis, R. L. Snyder, K. H. Sandhage, "Enhanced Hydrothermal Conversion of Surfactant-modified Diatom Microshells into Barium Titanate Replicas," ***J. Mater. Res.***, *22* [5] 1121-1127 (2007).

72. S.-J. Lee, S. Shian, Ch.-H. Huang, K. H. Sandhage, "Rapid, Non-Photocatalytic Destruction of Organophosphorous Esters Induced by Nanostructured Titania-based Replicas of Diatom Microshells," ***J. Am. Ceram. Soc.***, *90* [5] 1632-1636 (2007).

73. Z. Bao, M. R. Weatherspoon, Y. Cai, S. Shian, P. D. Graham, S. M. Allan, G. Ahmad, M. B. Dickerson, B. C. Church, Z. Kang, C. J. Summers, H. W. Abernathy, III, M. Liu, K. H. Sandhage, "Shape-preserving Reduction of Silica Micro-Assemblies into Microporous Silicon Replicas," ***Nature***, *446* [3] 172-175 (2007).

74. U. Kusari, Z. Bao, Y. Cai, G. Ahmad, K. H. Sandhage, L. G. Sneddon, "Formation of Nanostructured, Nanocrystalline Boron Nitride Microparticles with Diatom-Derived 3-D Shapes," ***Chem. Comm.***, [11] 1177-1179 (2007).

75. N. Kroger, M. B. Dickerson, G. Ahmad, Y. Cai, M. S. Haluska, K. H. Sandhage, N. Poulsen, V. C. Sheppard, "Bio-enabled Synthesis of Rutile (TiO_2) at Ambient Temperature and Neutral pH," ***Angew. Chem. Int. Ed.***, *45*, 7239-7243 (2006).

76. H. R. Luckarift, M. B. Dickerson, K. H. Sandhage, J. C. Spain, "Rapid, Room-Temperature Synthesis of Anti-bacterial Bio-nano-composites of Lysozyme with Amorphous Silica or Titania," ***Small***, *2* [5] 640-643 (2006). ***(Cover Article)***

REFEREED JOURNAL PUBLICATIONS (continued)

77. E. Koep, C. Jin, M. S. Haluska, R. Das, R. Narayan, K. H. Sandhage, R. L. Snyder, M. Liu, "Microstructure and Electrochemical Properties of Cathode Materials for SOFCs Prepared via Pulsed Laser Deposition," ***J. Power Sources***, *161* [1] 250-255 (2006).

78. S. Yoo, H. Rick, K. H. Sandhage, S. A. Dregia, S. A. Akbar, "Kinetic Mechanism of TiO_2 Nanocarving via Reaction with Hydrogen Gas," ***J. Mater. Res.***, *21* [7] 1822-1829 (2006).

79. M. R. Weatherspoon, M. S. Haluska, Y. Cai, J. S. King, C. J. Summers, R. L. Snyder, K. H. Sandhage, "Phosphor Microparticles of Controlled 3-D Shape from Phytoplankton," ***J. Electrochem. Soc.***, *153* [2] H34-H37 (2006).

80. A. W. Schill, C. S. Gaddis, W. Qian, M. A. El-Sayed Y. Cai, V. T. Milam, K. H. Sandhage, "Ultrafast Electronic Relaxation and Charge Carrier Localization in CdS/CdSe/CdS Quantum Dot Heterostructures," ***Nano Lett.***, *6* [9] 1940-1949 (2006).

81. G. Ahmad, M. B. Dickerson, B. C. Church, Y. Cai, S. E. Jones, R. R. Naik, J. S. King, C. J. Summers, N. Kroger, K. H. Sandhage, "Rapid, Room-Temperature Formation of Crystalline Calcium Molybdate Phosphor Microparticles via Peptide-Induced Precipitation," ***Adv. Mater.***, *18*, 1759-1763 (2006).

82. S. Shian, Y. Cai, M. R. Weatherspoon, S. M. Allan, K. H. Sandhage, "Three-Dimensional Assemblies of Zirconia Nanocrystals via Shape-preserving Reactive Conversion of Diatom Microshells," ***J. Am. Ceram. Soc.***, *89* [2] 694-698 (2006).

83. M. S. Haluska, I. Dragomir, K. H. Sandhage, R. L. Snyder, "X-ray Diffraction Analyses of 3-D MgO-based Replicas of Diatom Microshells Synthesized by a Low-Temperature Gas/Solid Displacement Reaction," ***Powder Diff.***, *20* [4] 306-310 (2005).

84. Y. Cai, K. H. Sandhage, "Zn_2SiO_4-coated Microparticles with Biologically-controlled 3-D Shapes," ***Phys. Stat. Sol. (a)***, *202* [10] R105-R107 (2005). ***(Cover Article)***

85. M. S. Haluska, R. L. Snyder, K. H. Sandhage, S. T. Misture, "A Closed, Heated Reaction Chamber Design for Dynamic High-Temperature X-ray Diffraction Analyses of Gas/Solid Displacement Reactions," ***Rev. Sci. Instr.***, *76*, 126101-1 - 126101-4 (2005).

86. K. H. Sandhage, R. L. Snyder, G. Ahmad, S. M. Allan, Y. Cai, M. B. Dickerson, C. S. Gaddis, M. S. Haluska, S. Shian, M. R. Weatherspoon, R. A. Rapp, R. R. Unocic, F. M. Zalar, Y. Zhang, M. Hildebrand, B. P. Palenik, "Merging Biological Self-assembly with Synthetic Chemical Tailoring: The Potential for 3-D Genetically-Engineered Micro/nanodevices (3-D GEMS)," ***Int. J. Appl. Ceram. Technol.***, *2* [4] 317-326 (2005).

87. J. Zhao, C. S. Gaddis, Y. Cai, K. H. Sandhage, "Free-standing Microscale Structures of Zirconia Nanocrystals with Biologically Replicable 3-D Shapes," ***J. Mater. Res.***, *20* [2] 282-287 (2005).

REFEREED JOURNAL PUBLICATIONS (continued)

88. M. R. Weatherspoon, S. M. Allan, E. Hunt, Y. Cai, K. H. Sandhage, "Sol-Gel Synthesis on Self-Replicating Single-Cell Scaffolds: Applying Complex Chemistries to Nature's 3-D Nanostructured Templates," ***Chem. Comm.***, [5] 651-653 (2005).
89. M. B. Dickerson, R. R. Naik, P. M. Sarosi, G. Agarwal, M. O. Stone, K. H. Sandhage, "Ceramic Nanoparticle Assemblies with Tailored Shapes and Tailored Chemistries via Biosculpting and Shape-preserving Inorganic Conversion," ***J. Nanosci. Nanotech.***, *5* [1] 63-67 (2005).
90. Y. Cai, S. M. Allan, F. M. Zalar, K. H. Sandhage, "Three-dimensional Magnesia-based Nanocrystal Assemblies via Low-Temperature Magnesiothermic Reaction of Diatom Microshells," ***J. Am. Ceram. Soc.***, *88* [7] 2005-2010 (2005).
91. S. Yoo, S. A. Akbar, K. H. Sandhage, "Oriented Single Crystal Titania Nanofibers via Nanocarving with Hydrogen-bearing Gas," ***Adv. Mater.***, *16* [3] 260-264 (2004).
92. C. S. Gaddis, K. H. Sandhage, "Freestanding Microscale 3-D Polymeric Structures with Biologically-derived Shapes and Nanoscale Features," ***J. Mater. Res.***, *19* [9] 2541-2545 (2004).
93. R. R. Unocic, F. M. Zalar, P. M. Sarosi, Y. Cai, K. H. Sandhage, "Anatase Assemblies from Algae: Coupling Biological Self-assembly of 3-D Nanoparticle Structures with Synthetic Reaction Chemistry," ***Chem. Comm.***, [7] 795-796 (2004).
94. M. B. Dickerson, R. R. Naik, M. O. Stone, Y. Cai, K. H. Sandhage, "Identification of Peptides that Promote the Rapid Precipitation of Germania Nanoparticle Networks via Use of a Peptide Display Library," ***Chem. Comm.***, *15*, 1776-1777 (2004).
95. M. B. Dickerson, P. J. Wurm, J. R. Schorr, W. P. Hoffman, E. Hunt, K. H. Sandhage, "Near Net-Shaped, Ultra-High Melting, Recession-Resistant Rocket Nozzles Liners via the Displacive Compensation of Porosity (DCP) Method," ***J. Mater. Sci.***, *39* (19) 6005-6015 (2004).
96. S. Yoo, S. A. Akbar, K. H. Sandhage, "Nanocarving of Titania (TiO_2): A Novel Approach for Fabricating a Chemical Sensing Platform," ***Ceram. Int.***, *30* [7] 1121-1126 (2004).
97. Z. Grzesik, M. B. Dickerson, K. H. Sandhage, "The Incongruent Reduction of Tungsten Carbide by a Zirconium-Copper Melt," ***J. Mater. Res.***, *18* [9] 2135-2140 (2003).
98. N. A. Travitzky, P. Kumar, K. H. Sandhage, R. Janssen, N. Claussen, "In Situ Synthesis of Al_2O_3 Reinforced Ni-based Composites," ***Adv. Eng. Mater.***, *5* [4] 256-259 (2003).
99. N. Travitzky, P. Kumar, K. H. Sandhage, R. Janssen, and N. Claussen, "Rapid Syntheses of Al_2O_3 Reinforced Fe-Cr-Ni Composites," ***Mater. Sci. Eng. A***, *A344*, 245-252 (2003).

REFEREED JOURNAL PUBLICATIONS (continued)

100. K. H. Sandhage, M. B. Dickerson, P. M. Huseman, M. A. Caranna, J. D. Clifton, T. A. Bull, T. J. Heibel, W. R. Overton, M. E. A. Schoenwaelder, "Novel, Bioclastic Route to Self-Assembled, 3D, Chemically Tailored Meso/Nanostructures: Shape-Preserving Reactive Conversion of Biosilica (Diatom) Microshells," ***Adv. Mater.***, *14* [6] 429-433 (2002).

101. M. B. Dickerson, R. L. Snyder, and K. H. Sandhage, "Dense, Near Net-Shaped, Carbide/Refractory Metal Composites at Modest Temperatures by the Displacive Compensation of Porosity (DCP) Method," ***J. Am. Ceram. Soc.***, *85* [3] 730-732 (2002).

102. R. Citak, M. Turker, K. H. Sandhage, "Effect of Mechanical Alloying Duration on the Microstructure in Composites Produced Via Oxidation of Ba-Al Powders," ***Turkish J. Eng. Environmental Sci.***, *25* [3] 205-210 (2001).

103. M. B. Dickerson, K. H. Sandhage, "Low-Temperature Reaction Casting of Dense, Near Net-Shaped Carbide/Refractory Metal Composites with Tailored Phase Contents," ***Latin Am. J. Metall. Mater.***, *21* [1] 18-24 (2001).

104. P. Kumar, N. A. Travitsky, P. Beyer, K. H. Sandhage, R. Janssen, N. Claussen, "Reactive Casting of Ceramic Composites (R-3C)," ***Scripta Mater.***, *44* [5] 751-757 (2001).

105. S. Vilayannur, K. H. Sandhage, "Selective Internal Oxidation of the Noble-Metal-Rich Intermetallic Compound, $BaAg_5$," ***Oxid. Met.***, *55* [1,2] 87-103 (2001).

106. P. I. Gouma, M. J. Mills, K. H. Sandhage, "The Fabrication of Free-Standing Titania-based Gas Sensors by the Oxidation of Metallic Titanium Foils," ***J. Am. Ceram. Soc.***, *83* [4] 1007-1009 (2000).

107. T. J. Detrie, K. H. Sandhage, "The Fabrication of $Bi_2Sr_2Ca_1Cu_2O_{8\pm x}$/Ag Super-conducting Tapes by the Oxidation and Post-Oxidation (Partial Melt) Annealing of Malleable, Metal-Bearing Precursors," ***J. Mater. Res.***, *15* [2] 306-316 (2000).

108. E. Saw, K. H. Sandhage, P. K. Gallagher, A. S. Litsky, "Near Net-Shaped Calcium Hydroxyapatite by the Oxidation of Machinable, Ca-bearing Precursors (the Volume Identical Metal Oxidation, or VIMOX, Process)," ***J. Am. Ceram. Soc.***, *83* [4] 998-1000 (2000).

109. E. Saw, K. H. Sandhage, P. K. Gallagher, A. S. Litsky, "The Fabrication of Near Net-Shaped Hydroxyapatite Ceramics by the Oxidation of Solid, Metal-bearing Precursors," ***Mater. & Manuf. Proc.***, *15* [1] 29-46 (2000).

110. K. H. Sandhage, S. M. Allameh, P. Kumar, H. J. Schmutzler, D. Viers, X.-D. Zhang, "Near Net-Shaped, Alkaline-Earth-bearing Ceramics for Electronic and Refractory Applications via the Oxidation of Solid, Metal-bearing Precursors (the VIMOX Process)," ***Mater. & Manuf. Proc.***, *15* [1] 1-28 (2000).

111. S. Vilayannur, K. H. Sandhage, S. Dregia, "Selective External Oxidation of the Intermetallic Compound, $BaAg_5$," ***J. Electrochem. Soc.***, *147* [7] 2805-2813 (2000).

REFEREED JOURNAL PUBLICATIONS (continued)

112. S. M. Allameh, K. H. Sandhage, "Fabrication of (Ba,Pb)TiO_3-based Tapes with Positive Temperature Coefficients of Resistivity by the Oxidation of Malleable, Metal-bearing Precursors (the Volume Identical Metal Oxidation Process)," ***J. Mater. Res***., *14* [11] 4319-4328 (1999).

113. P. Kumar, K. H. Sandhage, "The Displacive Compensation of Porosity (DCP) Method for Fabricating Dense, Shaped, High-Ceramic-Bearing Bodies at Modest Temperatures," ***J. Mater. Sci.***, *34* [23] 5757-5769 (1999).

114. P. Kumar, S. A. Dregia, K. H. Sandhage, "Epitaxial Growth of Magnesia and Spinel on Sapphire during Incongruent Reduction in Molten Magnesium," ***J. Mater. Res***., *14* [8] 3312-3318 (1999).

115. K. A. Rogers, P. Kumar, R. Citak, K. H. Sandhage, "The Fabrication of Dense, Shaped Ceramic/Metal Composites at ≤1000°C by the Displacive Compensation of Porosity Method," ***J. Am. Ceram. Soc***., *82* [3] 757-60 (1999).

116. R. Citak, K. A. Rogers, K. H. Sandhage, "Low Temperature Synthesis of $BaAl_2O_4$/Al Composites by the Oxidation of Solid Metal-Bearing Precursors," ***J. Am. Ceram. Soc***., *82* [1] 237-40 (1999).

117. D. H. Viers, K. H. Sandhage, "Near Net-Shaped (Ba,Sr)$Al_2Si_2O_8$ Bodies by the Oxidation of Machinable Metal-bearing Precursors," ***J. Am. Ceram. Soc.***, *82* [1] 249-52 (1999).

118. P. Kumar, K. H. Sandhage, "The Fabrication of Near Net-Shaped Spinel Bodies by the Oxidative Transformation of Mg/Al_2O_3 Precursors," ***J. Mater. Res.***, *13* [12] 3423-3435 (1998).

119. S. M. Allameh, K. H. Sandhage, "The Oxidative Transformation of Solid, Barium-Metal-Bearing Precursors into Monolithic Celsian with a Retention of Shape, Dimensions, and Relative Density," ***J. Mater. Res.***, *13* [5] 1271-1285 (1998).

120. R. B. Rogenski, K. H. Sandhage, A. L. Vasiliev, E. P. Kvam, "The Effect of Excess Neodymia on the Grain Growth of the Solid-Solution Superconductor, $Nd_{1+x}Ba_{2-x}Cu_3O_y$," ***J. Mater. Res***., *13* [10] 2819-2832 (1998).

121. X. D. Zhang, K. H. Sandhage, H. L. Fraser, "Synthesis of $BaAl_2Si_2O_8$ from Solid Ba-Al-Al_2O_3-SiO_2 Precursors: III. $BaAl_2Si_2O_8$ Structure after Annealing at ≤ 650°C and 1650°C," ***J. Mater. Res***., *13* [11] 3122-3134 (1998).

122. X-D. Zhang, K. H. Sandhage, H. L. Fraser, "Synthesis of $BaAl_2Si_2O_8$ from Solid Ba-Al-Al_2O_3-SiO_2 Precursors: II. TEM Analyses of Phase Evolution," ***J. Am. Ceram. Soc.***, *81* [11] 2983-97 (1998).

123. S. M. Allameh, K. H. Sandhage, "Synthesis of $BaAl_2Si_2O_8$ from Solid Ba-Al-Al_2O_3-SiO_2 Precursors: I. XRD and SEM/EDX Analyses of Phase Evolution," ***J. Am. Ceram. Soc***., *80* [12] 3109-26 (1997).

124. G. A. Ward, K. H. Sandhage, "Synthesis of Barium Hexaferrite by the Oxidation of a Metallic Ba-Fe Precursor," ***J. Am. Ceram. Soc.***, *80* [6] 1508-16 (1997).

REFEREED JOURNAL PUBLICATIONS (continued)

125. J. J. Gannon, Jr., K. H. Sandhage, "Solid-State, High-Oxygen-Fugacity Processing of BSCCO-2212 Superconductors," ***IEEE Trans. Appl. Supercond.***, *7* [2] 1533-36 (1997).

126. K. H. Sandhage, H. J. Schmutzler, R. Wheeler, H. L. Fraser, "Mullite Joining by the Oxidation of Malleable, Alkaline-Earth-Metal-Bearing Bonding Agents," ***J. Am. Ceram. Soc.***, *79* [7] 1839-1850 (1996).

127. H. J. Schmutzler, K. H. Sandhage, J. C. Nava, "The Fabrication of Dense, Shaped Barium Cerate by the Oxidation of Solid Metal-Bearing Precursors," ***J. Am. Ceram. Soc.***, *79* [6] 1575-1584 (1996).

128. S. M. Allameh, K. H. Sandhage, "Effect of High-Temperature, High-Oxygen-Fugacity Annealing on the Stability of the $(Bi,Pb)_2Sr_2Ca_2Cu_3O_{10\pm\delta}$ -type Compound," ***J. Am. Ceram. Soc.***, *78* [9] 2513-2520 (1995).

129. D. H. Chmielewski, K. H. Sandhage, "Stability of $Bi_2Sr_2Ca_1Cu_2O_{8\pm\delta}$ Thick Films at Elevated Oxygen Pressures and Temperatures," ***J. Am. Ceram.Soc.***, *78* [9], 2504-2512 (1995)

130. H. J. Schmutzler, K. H. Sandhage, "Transformation of Ba-Al-Si Precursors to Celsian (monoclinic $BaO{\cdot}Al_2O_3{\cdot}2SiO_2$) by High-Temperature Oxidation," ***Metall. Trans. B.***, *26B*, 135-148 (1995).

131. H. J. Schmutzler, M. M. Antony, K. H. Sandhage, "A Novel Reaction Path to $BaTiO_3$ by the Oxidation of a Solid Metallic Precursor," ***J. Am. Ceram. Soc.***, *77* [3] 721-729 (1994) ***(Purdy Award, The American Ceramic Society)***

132. M. M. Antony, K. H. Sandhage, "Barium Titanate/Noble Metal Laminates Prepared by the Oxidation of Metallic Precursors," ***J. Mater. Res.***, *8* [11] 2968-2977 (1993).

133. K. H. Sandhage, "The Preparation of Superconducting $YBa_2Cu_3O_{7-y}$/Ag Micro-laminates by an Oscillating Oxidation Scheme," ***J. Electrochem. Soc.***, *139*, 1661-1671 (1992).

134. J. S. Luo, N. Merchant, V. A. Maroni, D. M. Gruen, B. S. Tani, K. H. Sandhage, C. A. Craven, "Growth of C-Axis-Oriented Films of $YbBa_2Cu_3O_{7-y}$ on Single Crystal and Polycrystalline MgO Substrates by Oxidation of a Liquid Alloy Precursor," ***Physica C***, *192*, 356-361 (1992).

135. N. Merchant, J. S. Luo, V. A. Maroni, D. M. Gruen, B. S. Tani, S. Sinha, K. H. Sandhage, C. A. Craven, "Epitaxial Growth of $YbBa_2Cu_3O_{7-\delta}$ Films on (100)-Oriented MgO and $SrTiO_3$ Substrates by Oxidation of a Liquid Alloy Precursor," ***J. Mater. Res.***, *7*, 2680-2688 (1992).

136. J.S. Luo, N. Merchant, V. A. Maroni, D.M. Gruen, B. S. Tani, W. L. Carter, G. N. Riley, Jr., K. H. Sandhage, "Thermostability and Decomposition of the $(Bi,Pb)_2Sr_2Ca_2Cu_3O_{10}$ Phase in Silver-Clad Tapes," ***J. Appl. Phys.***, *72*, 2385-2389 (1992).

REFEREED JOURNAL PUBLICATIONS (continued)

137. K. H. Sandhage, W. L. Carter, L. J. Masur, C. Joshi, H. Hsu, G. J. Yurek, "Synthesis of a Ba-Pb-Bi-O/Ag Superconducting Composite by the Oxidation of a Ba-Pb-Bi-Ag Metallic Precursor," ***Physica C***, *177*, 95-100 (1991).

138. K. H. Sandhage, G. J. Yurek, "Indirect Dissolution of $(Al,Cr)_2O_3$ in CaO-MgO-Al_2O_3-SiO_2 Melts," ***J. Am. Ceram. Soc.***, *74* [8], 1941-1954 (1991).

139. K. H. Sandhage, G. N. Riley, Jr., W. L. Carter, "The Oxide-Powder-in-Tube Method for Producing High Jc BSCCO Superconductors," ***JOM***, *43* [3], 21-25 (1991).

140. K. H. Sandhage, G. J. Yurek, "Direct and Indirect Dissolution of Sapphire in CaO-MgO-Al_2O_3-SiO_2 Melts: Dissolution Kinetics," ***J. Am. Ceram. Soc.***, *73* [12], 3633-42 (1990).

141. K. H. Sandhage, G. J. Yurek, "Indirect Dissolution of Sapphire into Calcia-Magnesia-Alumina-Silica Melts: Electron Microprobe Analysis of the Dissolution Process," ***J. Am. Ceram. Soc.***, *73* [12] 3643-3649 (1990).

142. K. H. Sandhage, G. J. Yurek, "Indirect Dissolution of Sapphire into Silicate Melts," ***J. Am. Ceram. Soc.***, *71* [6] 478-489 (1988).

143. H. Hsu, L. Masur, C. Joshi, K. H. Sandhage, W. Carter, G. J. Yurek, "Formation of Metal/Superconducting Oxide Composites by Oxidation of Melt-Spun Metallic Precursors," ***IEEE Trans. Magn.***, *25* [2] 2134-7 (1989).

BOOK CHAPTERS

144. K. H. Sandhage, S. M. Allan, M. B. Dickerson, E. M. Ernst, C. S. Gaddis, S. Shian, M. R. Weatherspoon, G. Ahmad, Y. Cai, M. S. Haluska, R. L. Snyder, R. R. Unocic, and F. M. Zalar, "Inorganic Preforms of Biological Origin: Shape-Preserving Reactive Conversion of Biosilica Microshells (Diatoms)," pp. 235-253 in *Handbook of Biomineralization*, Eds. E. Bauerlein, P. Behrens, Vol. 2, Wiley-VCH, Weinheim, Germany, 2007.

145. K. H. Sandhage, N. Claussen, "Reaction Casting of Ceramic/Metal and Ceramic/Intermetallic Composites," pp. 423-436 in *Handbook of Advanced Ceramics: Materials Science, Processing, and Their Applications*, Ed. S. Somiya, Elsevier Science Publishers, New York, NY, 2003.

146. K. H. Sandhage, N. Claussen, "Near Net-Shape, Oxidation-Formed Ceramics and Ceramic/Metal Composites," pp. 8035-8040 in *The Encyclopedia of Materials Science and Technology*, Eds. K. H .J. Buschow, R. W. Cahn, M. C. Flemings, B. Ilschner, E. J. Kramer, S. Mahajan, Volume 9, Elsevier Science Publishers, New York, NY, 2001.

147. K. H. Sandhage, P. K. Gallagher, "Thermal Stability of Tl-Ba-Ca-Cu-O High-Tc Superconductors," in *Tl-Based High Temperature Superconductors*, pp. 387-406, Edited by Allen M. Hermann, J. V. Yakhmi, Marcel Dekker, New York, 1994.

BOOK CHAPTERS (continued)

148. J. S. Luo, D. Michel, D, J.-P. Chevalier, N. Merchant, V. A. Maroni, D. M. Gruen, K. H. Sandhage, C. A. Craven, "Synthesis of High-Temperature Superconductors by Oxidation of a Precursor Alloy," in Advances in High-Tc Superconductors, *Materials Science Forum*, Vol. 137-139, pp. 523-546, Eds. J. J. Pouch, S. A. Alterovitz, R. R. Romanofsky, A. F. Hepp (TransTech Publications).

PROCEEDINGS

149. T. Le, T. Trang, V. Lakafosis, M. Tentzeris, Z. Lin, Y. Fang, K. Sandhage, C. P. Wong, "Graphene Enhanced Wireless Sensors," *IEEE Sensors Proc.*, 777-780 (2012).

150. Z. Xia, M. Askari, S. C. Davis, K. H. Sandhage, A. Adibi, "Highly Sensitive SOI Optical Sensors with Porous Si," *Conf. Integrated Photonics Research, Silicon, Nanophotonics* (IPRSN), Optical Society of America, Colorado Springs, CO, June 17, 2012.

151. L. Mishchenko, B. D. Hatton, I. B. Burgess, S. Davis, K. H. Sandhage, J. Aizenberg, "Colloidal Co-Assembly Route to Large-Area, High-Quality Photonic Crystals," pp. 79460K-1 - 79460K-8 In Photonic and Phononic Properties of Engineered Nanostructures, *SPIE Proc.*, Vol. 7946, Ed. A. Adibi, S.-Y. Lin, A. Scherer, The International Society for Optical Engineering, Bellingham, WA, 2011.

152. Z. Xia, A. A. Eftekhar, S. C. Davis, K. Sandhage, A. Adibi, "Novel Porous Silicon Integrated Optical Devices for Sensing Applications," pp. 545-546, *Proc. IEEE Photonics Conf.*, Arlington, VA, Oct. 9-13, 2011.

153. B. D. Hatton, L. Mishchenko, R. Norwood, S. Davis, K. H. Sandhage, J. Aizenberg, "An Evaporative Co-assembly Method for Highly-Ordered Inverse Opal Films," pp. 72050F In Symposium on MOEMS-MEMS: Micro-, Nanofabrication, *SPIE Proc.*, Vol. 7205, International Society for Optical Engineering, Bellingham, WA, 2009.

154. V. W. Chen, Y. N. Fang, Y. D. Zhang, K. J. Perry, K. H. Sandhage, J. W. Perry, "Conformal Coating of Tailored Photonic Crystals Fabricated Using Multiphoton Lithography," pp. 197-198 in *Prof. Conf. Lasers and Electro-Optics and Quantum Electronics and Laser Science* (CLEO/QELS), Baltimore, MD, Vols. 1-5, IEEE, New York, NY, 2009.

155. Y. Cai, M. R. Weatherspoon, E. Ernst, M. S. Haluska, R. L. Snyder, K. H. Sandhage, "3-D Microparticles of $BaTiO_3$ and Zn_2SiO_4 via the Chemical (Sol-Gel, Acetate Precursor, or Hydrothermal) Conversion of Biologically (Diatom) Templates," *Ceram. Eng. Sci. Proc.*, **27** [8] 49-56 (2007). ***2nd Place Paper Award, 30th Intl. Conf. Advanced Ceramics & Composites, The American Ceramic Society, Cocoa Beach, FL.***

156. D. J. Hansford, K. H. Sandhage, "Novel Polymer-Ceramics Composites for Conformable RF Applications," pp. 1574-1577 in *Proc. IEEE International Symp. Antennas and Propagation*, Honolulu, HI, June 9, 2007, IEEE, New York, NY.

PROCEEDINGS (continued)

157. U. Kusari, Z. Bao, Y. Cai, G. Ahmad, K. H. Sandhage, L. G. Sneddon, "Template Routes to Non-Oxide Ceramic Nano- and Micro-Structures," *Nanomanufacturing*, Ed. F. Stellaci, J. W. Perry, G. S. Herman, R. N. Das (Mater. Res. Soc. Symp. Proc. 921E, Warrendale, PA), 0921-T04-10, 2006.

158. K. H. Sandhage, S. Shian, C. S. Gaddis, M. R. Weatherspoon, Y. Cai, S. Yoo, M. S. Haluska, R. L. Snyder, Y. Liu, M. Liu, N. Ferrell, D. J. Hansford, M. Hildebrand, B. Palenik, "Biologically Enabled Syntheses of Nanostructured 3-D Sensor Materials: The Potential for 3-D Genetically Engineered Microdevices (3-D GEMs)," *J. Rare Metal Mater. Eng.*, **35** (3) 13-14, 2006.

159. M. R. Weatherspoon, S. M. Allan, C. S. Gaddis, Y. Cai, M. S. Haluska, R. L. Snyder, K. H. Sandhage, "Perovskite Particles from Phytoplankton," in *Biological and Bio-Inspired Materials and Devices,* edited by K. H. Sandhage, S. Yang, T. Douglas, A.R. Parker, and E. DiMasi (Mater. Res. Soc. Symp. Proc. **873E**, Warrendale, PA , 2005). ***Best Paper, Symposium K ("Biological and Bio-Inspired Materials and Devices"), MRS Spring Meeting, 2005.***

160. M. B. Dickerson, Y. Cai, K. H. Sandhage, R. R. Naik, M. O. Stone, "Sequence Specific Morphological Control Over the Formation of Germanium Oxide During Peptide Mediated Synthesis," *Ceram. Eng. Sci. Proc.*, **26** [6] 25-32 (2005).

161. S. M. Allan, M. R. Weatherspoon, P. D. Graham, Y. Cai, M. S. Haluska, R. L. Snyder, K. H. Sandhage, "Shape-preserving Chemical Conversion of Self-assembled 3-D Bioclastic Micro/nanostructures via Low-temperature Displacement Reactions," *Ceram. Eng. Sci. Proc.*, **26** [3] 289-296 (2005). ***1st Place Paper Award, 29th Intl. Conf. Advanced Ceramics & Composites, The American Ceramic Society, Cocoa Beach, FL.***

162. J. Nash, M. B. Dickerson, K. Pathak, K. H. Sandhage, R. L. Snyder, U. Balachandran, B. Ma, R. Blaugher, R. Bhattacharya, "Novel, Closed Heating Chambers for Rapid, In-Situ, HTXRD Analyses of Gas/Solid and Liquid/Solid Reactions," pp. 44-52 in *Processing and Fabrication of Advanced Materials XI*, Vol. 2, Eds. T. S. Srivatsan, R. A. Varin, ASM International, Materials Park, OH, 2003.

163. M. B. Dickerson, R. L. Snyder, K. H. Sandhage, "The Fabrication of Dense, W-Rich, W/ZrC Composites by the PRIMA-DCP Process at 1300°C," pp. 403-412 in *Processing and Fabrication of Advanced Materials XI*, Vol. 2, Eds. T. S. Srivatsan, R. A. Varin, ASM International, Materials Park, OH, 2003.

164. F. M. Zalar, M. B. Dickerson, K. H. Sandhage, "Self-Assembled, 3-D Nanoparticle Structures with Tailored Chemistries via the BaSIC Process," pp. 415-422 in *Processing and Fabrication of Advanced Materials XI*, Vol. 2, Eds. T. S. Srivatsan, R. A. Varin, ASM International, Materials Park, OH, 2003.

165. P. J. Wurm, M. J. Mills, K. H. Sandhage, "Lightweight, Creep-Resistant, $Fe_{0.6}Al_{0.4}$/MgO Composites Fabricated at 1000°C by the Displacive Compensation of Porosity," pp. 272-282 in *Processing and Fabrication of Advanced Materials XI*, Vol. 2, Eds. T. S. Srivatsan, R. A. Varin, ASM International, Materials Park, OH, 2003.

PROCEEDINGS (continued)

166. K. H. Sandhage, M. B. Dickerson, P. M. Huseman, F. M. Zalar, M. R. Rondon, E. C. Sandhage, "A Novel Hybrid Route to Chemically-Tailored, Three-Dimensional Oxide Nanostructures: The BaSIC (Bioclastic and Shape-Preserving Inorganic Conversion) Process," *Progress Nanotechnol.*, pp. 255-266, The American Ceramic Society, Westerville, OH (2002).

167. M. B. Dickerson, Z. Grzesik, K. H. Sandhage, "New Generation of Composite Materials Fabricated by PRIMA-DCP Method," pp. 560-565 in *Proc. 7th Polish Corrosion Conf.*, Ed. E. Smieszek, Wydawnictwo Czasopism i Ksiazek Techicznych, Krakow, Poland, 2002.

168. Z. Grzesik, M. B. Dickerson, K. H. Sandhage, "The Heterogeneous Reaction of WC with Zr in Liquid Zr_2Cu," pp. 575-578 in *Proc. 7th Polish Corrosion Conf.*, Ed. E. Smieszek, Wydawnictwo Czasopism i Ksiazek Techicznych, Krakow, Poland, 2002.

169. M. Dickerson, K. Pathak, K. H. Sandhage, R. L. Snyder, "Applications of 2-D Multiwire Detectors in X-ray Analysis," *Adv. X-ray Anal.*, **45**, 338-344 (2002).

170. K. H. Sandhage, M. B. Dickerson, P. M. Huseman, F. M. Zalar, M. R. Rondon, E. C. Sandhage, "A Novel Hybrid Route to Chemically-Tailored, Three-Dimensional Oxide Nanostructures: The BaSIC (Bioclastic and Shape-Preserving Inorganic Conversion) Process," *Ceram. Eng. Sci. Proc.*, **23** [4] 653-664 (2002).

171. P. J. Wurm, P. Kumar, K. D. Ralston, M. J. Mills, K. H. Sandhage, "Fabrication of Lightweight Oxide/Intermetallic Composites at 1000°C by the DCP Method," pp. 93-101 in Innovative Processing and Synthesis of Ceramics, Glasses, and Composites V, *Ceram. Trans.*, Vol. 129, Ed. J. P. Singh, N. P. Bansal, A. Bandyopadhyay, L. Klein, The American Ceramic Society, Westerville, OH, 2002**.**

172. M. B. Dickerson, R. L. Snyder, K. H. Sandhage, "Rapid, Low-Temperature Fabrication of Very-High-Melting ZrC/W-bearing Composites by the PRIMA-DCP Process," pp. 155-160 in *Powder Materials: Current Research and Industrial Practices*, Ed. F. D. S. Marquis, N. N. Thadhani, E. V. Barrera, TMS, Warrendale, PA, 2001.

173. P. J. Wurm, P. Kumar, K. D. Ralston, M. J. Mills, K. H. Sandhage, "Fabrication of Dense, Lightweight, Oxide-Rich, Oxide/Aluminide Composites at 1000°C by the Displacive Compensation of Porosity (DCP) Process," pp. 129-139 in *Powder Materials: Current Research and Industrial Practices*, Ed. F. D. S. Marquis, N. N. Thadhani, E. V. Barrera, TMS, Warrendale, PA, 2001.

174. M. B. Dickerson, R. L. Snyder, K. H. Sandhage, "Low-Temperature Fabrication of Dense, Near Net-Shaped Tungsten/Zirconium Carbide Composites with Tailored Phase Contents by the PRIMA-DCP Process," *Ceram. Eng. Sci. Proc.*, **22** [4], 97-107 (2001).

175. A. S. Litsky, K. H. Sandhage, E. Saw, S. Briggs, P. K. Gallagher, "Near Net-Shape Fabrication of Hydroxyapatite and HA-Alloy Composites," pp. 101-112 in *Key Engineering Mater*., Vol. 198-199, Trans. Tech. Publications, Switzerland, 2001.

PROCEEDINGS (continued)

176. A. Jain, K. H. Sandhage, "The Fabrication of Near Net-Shaped, Refractory $MgCr_2O_4$-based Ceramics via the Volume Identical Metal Oxidation (VIMOX) Process," pp. 15-23 in Innovative Processing and Synthesis of Ceramics, Glasses, and Composites IV, *Ceram. Trans.*, Vol. 115, Ed. N. P. Bansal, J. P. Singh, The American Ceramic Society, Westerville, OH, 2000.

177. M. B. Dickerson, R. R. Unocic, K. T. Guerra, M. J. Timberlake, K. H. Sandhage, "The Fabrication of Dense Carbide/Refractory Metal Composites of Near Net Shape at Modest Temperatures by the PRIMA-DCP Process," pp. 25-31 in Innovative Processing and Synthesis of Ceramics, Glasses, and Composites IV, *Ceram. Trans.*, Vol. 115, Ed. N. P. Bansal, J. P. Singh, The American Ceramic Society, Westerville, OH, 2000.

178. R. Citak, M. Turker, K. H. Sandhage, "Effect of Mechanical Alloying Duration on Phase Transformation in Oxidation of Ba-Al Powders"," pp. 441-447 in *Proc. Second National Powder Metallurgy Conf. with International Participation*, Ankara, Turkey, Sept. 15-17, 1999, Turkish Powder Metallurgy Association, Ankara, Turkey, 2000.

179. K. A. Rogers, P. Kumar, R. Citak, K. H. Sandhage, "The Displacive Compensation of Porosity (DCP) Method for Fabricating Dense Oxide/Metal Composites at Modest Temperatures with Small dimensional Changes," pp. 141-152 in Innovative Processing and Synthesis of Ceramics, Glasses, and Composites II, *Ceram. Trans.*, Vol. 94, Ed. N. P. Bansal, J. P. Singh, The American Ceramic Society, Westerville, OH, 1999.

180. P. Kumar, K. H. Sandhage, "Near Net-Shaped Magnesium Aluminate Spinel by the Oxidation of Solid, Magnesium-bearing Precursors," pp. 129-140 *Ceram. Trans.*, Vol. 94, Ed. Narattam P. Bansal, J. P. Singh, The American Ceramic Society, Westerville, OH, 1999.

181. K. A. Rogers, K. H. Sandhage, "The Effect of Transient Liquid Phase Additions on the α to β-Silicon Nitride Transformation in Celsian-Silicon Nitride Composites," *Ceram. Eng. Sci. Proc.*, **19** [3], 113-120 (1998).

182. K. A. Rogers, R. Citak, P. Kumar, K. H. Sandhage, "Syntheses of Alkaline Earth Aluminate/Zirconia Composites from Metal-Bearing Precursors," *Ceram. Eng. Sci. Proc.*, **19** [4], 507-514 (1998).

183. T. J. Detrie, K. H. Sandhage, "$Bi_2Sr_2Ca_1Cu_2O_8$ (Bi-2212) From Metal-Bearing Precursors," pp. 93-104 in Impact of Recent Advances in the Synthesis and Processing of Ceramic Superconductors, Ed. W. Wong-Ng, U. Ballachandran, A.S. Bhalla, *Ceram. Trans.*, Vol. 85, American Ceramic Society, Westerville, OH, 1998.

184. K. H. Sandhage, S. M. Allameh, X.-D. Zhang, D. Viers, P. Kumar, H. L. Fraser, "Fabrication of Near Net-Shaped Alkaline-Earth-Bearing Ceramics by the Oxidation of Solid, Metal-Bearing Precursors," pp. 763-774 in *Proc. Intl. Conf. Proc. Fabrn. Adv. Mater. 6*, Vol. 1, Edited by K. A. Khor, T. S. Srivatsan, J. J. Moore, Nov. 24-26, 1997, Singapore. ***Best Paper, 6th Intl. Conf. Processing & Fabrication Adv. Mater., Singapore, 1997.***

PROCEEDINGS (continued)

185. E. Saw, K. H. Sandhage, P. K. Gallagher, A. S. Litsky, “Near Net-Shaped Hydroxyapatite Ceramics by the Oxidation of Solid, Metal-Bearing Precursors,” pp. 1703-1714 in *Proc. Intl. Conf. Proc. Fabrn. Adv. Mater. 6*, Vol. 2, Edited by K. A. Khor, T. S. Srivatsan, J. J. Moore, Nov. 24-26, 1997, Singapore.

186. K. H. Sandhage, “The Fabrication of Alkaline-Earth-Bearing Ceramics by the Oxidation of Solid, Metal-Bearing Precursors,” pp. 103-126 in Innovative Processing and Synthesis of Ceramics, Glasses, and Composites, *Ceram. Trans.*, Vol. 85, Eds. N. P. Bansal, K. V. Logan, J. P. Singh, The American Ceramic Society, Westerville, OH, 1998.

187. E. Saw, K. H. Sandhage, P. K. Gallagher, A. S. Litsky, “Synthesis of Hydroxyapatite by the Oxidation of Solid, Metal-Bearing Precursors,” pg. 328 in *Trans. Fifth World Biomaterials Congress*, Univ. Toronto Press, Toronto, Canada, 1996.

188. S. M. Allameh, K. H. Sandhage, H. L. Fraser, "Synthesis of Near Net-Shaped, Celsian-Bearing Ceramics by the Oxidation of Solid, Metal-Bearing Precursors (SMP)," pp. 867-879 in *Proc. Intl. Conf. Proc. Fabrn. Adv. Mater. IV*, Ed. T. S. Srivatsan, J. J. Moore, TMS, Warrendale, PA, 1996.

189. J. Ringnalda, R. Wheeler, H. Schmutzler, M. Breslin, K. H. Sandhage, H. L. Fraser, “Scanning and Transmission Electron Microscopy on Composite Materials Prepared by SMP and In-Situ Displacive Reactions,” pp. 571-574 in *Proc. Electron Microscopy and Analysis Conf.*, Birmingham, England, Sept. 12-15, 1995, Ed. D. Cherns, Institute of Physics Conference Series, Vol. 147, 1995.

190. K. H. Sandhage, S. M. Allameh, H. L. Fraser, “A Novel Solid Metal-Bearing Precursor (SMP) Route to Near Net-Shaped Alkaline-Earth Aluminosilicates,” pp. 499-506 in Fourth Euro-Ceramics: Basic Science - Developments in Processing of Advanced Ceramics - I, Vol. 1, *Proc. Fourth Euro. Ceram. Soc. Conf.*, Oct. 2-6, 1995, Riccione, Italy, Ed. C. Galassi, Gruppo Editoriale Faenza Editrice, Faenza, Italy, 1995.

191. K. H. Sandhage, H. J. Schmutzler, R. Wheeler, H. L. Fraser, “TEM Analyses of an All-Ceramic BaO-Al_2O_3-SiO_2 Bond Between Mullite Plates Produced with a Novel Solid Metallic Bonding Agent,” pp. 67-74 in Fourth Euro-Ceramics: Coatings and Joinings, Vol. 9, *Proc. Fourth Euro. Ceram. Soc. Conf.*, Oct. 2-6, 1995, Riccione, Italy, Ed. B. S. Tranchina, A. Bellosi, Gruppo Editoriale Faenza Editrice, Faenza, Italy, 1995.

192. K. H. Sandhage, S. M. Allameh, D. H. Chmielewski, J. J. Gannon, Jr., “Elevated Oxygen Pressure Processing of the $Bi_2Sr_2Ca_1Cu_2O_8$-type and $(Bi,Pb)_2Sr_2Ca_2Cu_3O_{10}$-type Superconductors, pp. 211-218 in Fourth Euro-Ceramics: High Tc Superconductors - Part I, Vol. 6, *Proc. Fourth Euro. Ceram. Soc. Conf.*, Oct. 2-6, 1995, Riccione, Italy, Ed. A. Barone, D. Fiorani, A. Tampieri, Gruppo Editoriale Faenza Editrice, Faenza, Italy, 1995.

PROCEEDINGS (continued)

193. H. J. Schmutzler, K. H. Sandhage, "Formation of Shaped Celsian ($BaO{\cdot}Al_2O_3{\cdot}2SiO_2$) Bodies by the Oxidation of Solid Metallic Precursors," pp. 113-124 in *Proc. Fabrn. Adv. Mater. High Temp. Appl. III*, Ed. V. A. Ravi, T. S. Srivatsan, J. J. Moore, TMS, Warrendale, PA, 1994.

194. H. J. Schmutzler, K. H. Sandhage, "Formation of High-Temperature Structural Ceramics and Ceramic-Matrix Composites by the Oxidation of Solid Metal-Bearing Precursors," *Ceram. Eng. Sci. Proc.*, **15** [4], 95-103 (1994).

195. K. H. Sandhage, M. M. Antony, H. J. Schmutzler, "Synthesis of Ferroelectric Ceramics by the Oxidation of Metallic Precursors," pp. 49-59 in Dielectric Ceramics: Processing, Properties, and Applications, *Ceram. Trans.*, Vol. 32, The American Ceramic Society, Westerville, OH, 1993.

196. J. S. Luo, N. Merchant, V. A. Maroni, D. M. Gruen, B. S. Tani, K. H. Sandhage, C. A. Craven, "Synthesis of C-Axis Oriented $YBa_2Cu_3O_{7-\square}$ Films on Single and Polycrystalline Substrates by Oxidation of Liquid Alloys," pp. 195-200 in Synthesis and Processing of Ceramics: Scientific Issues, *Mater. Res. Soc. Symp. Proc.*, Vol. 249, Eds. W. E. Rhine, T. M. Shaw, R. J. Gottschall, Y. Chen, Materials Research Society, Pittsburgh, PA, 1992.

197. G. N. Riley, Jr., W. L. Carter, K. H. Sandhage, "Solid Solution in the 3-Layer Phase in Ag-Sheathed (Pb)BSCCO Superconductors," pp. 216-219 in *Proc. International Workshop on Superconductivity*, June 23-26, 1992, Honolulu HA, International Superconductivity Technology Center/MRS, Pittsburgh, PA, 1992.

198. J. S. Luo, N. Merchant, V. A. Maroni, D. M. Gruen, B. S. Tani, W. L. Carter, G. N. Riley, Jr., K. H. Sandhage, "A Study of Parameters that Influence Growth and Stability of the $(Bi,Pb)_2Sr_2Ca_2Cu_3O_{10}$ Phase," pp. 233-238 in Layered Superconductors: Fabrication, Properties and Applications, *Mater. Res. Soc. Symp. Proc.*, Vol. 275, Eds. D. T. Shaw, C. C. Tsuei, T. R. Schneider, Y. Shiohara, Materials Research Society, Pittsburgh, PA, 1992.

199. K. H. Sandhage, L. J. Masur, G. D. Smith, J. M. Poole, M. G. McKimpson, "The Metallic Precursor Approach to Long Lengths of $YBa_2Cu_3O_x$ Superconducting Wire," pp. 347-362 in *Proc. Symp. High Temp. Superconducting Compounds III: Processing and Microstructure-Property Relationships*, Ed. S. H. Whang, A. DasGupta, E. Collings, TMS, Warrendale, PA, 1991.

200. K. H. Sandhage, P. L. Bocko, B. H. W. S. DeJong, "A Two-Defect Model for Radiation-Induced Attenuation in Multimode Fiber," pp. 110-119 in Fiber Optics Reliability: Benign and Adverse Environments II, *SPIE Proc.*, Vol. 992, Ed. D. K. Paul, R. A. Greenwell, S. G. Wadekar, The International Society for Optical Engineering, Bellingham, WA, 1988.

GRANTED PATENTS

1. R. A. Gittens Ibacache, J. P. Vernon, K. H. Sandhage, B. D. Boyan, “Surface Modification of Implant Devices,” *U.S. Patent No. 9,889,229,* Feb. 13, 2018.
2. C. Cutler, K. H. Sandhage, “Bio-compatible Radiopaque Dental Fillers for Imaging,” *U.S. Patent No. 9,814,791*, Nov. 14, 2017.
3. D. W. Lipke, K. H. Sandhage, “Shaped Metal-Containing Components and Reaction Based Methods for Manufacturing the Same,” *U.S. Patent No. 9,272,923*, March 1, 2016
4. K. H. Sandhage, Z. Bao, “Methods of Fabricating Nanoscale-to-Microscale Structures,” *U.S. Patent No. 7,615,206*, Nov. 10, 2009.
5. K. H. Sandhage, “Shaped Microcomponents via Reactive Conversion of Synthetic Microtemplates,” *U.S. Patent No. 7,393,517*, July 1, 2008.
6. S. A. Akbar, S. Yoo, K. H. Sandhage, “Method of Forming Nanostructures on Ceramics,” *U.S. Patent No. 7,303,723*, Dec. 4, 2007.
7. K. H. Sandhage, “Shaped Microcomponents via Reactive Conversion of Biologically-derived Microtemplates,” *U.S. Patent No. 7,204,971*, April 17, 2007.
8. K. H. Sandhage, “Shaped Microcomponents via Reactive Conversion of Biologically-derived Microtemplates,” *U.S. Patent No. 7,067,104*, June 27, 2006.
9. K. H. Sandhage, P. Kumar, “Method for Fabricating Shaped Monolithic Ceramics and Ceramic Composites through Displacive Compensation of Porosity, and Ceramics and Composites made Thereby,” *U.S. Patent No. 6,833,337*, Dec. 21, 2004.
10. M. J. Mills, K. H. Sandhage, P.-I. Gouma, “Free-Standing Fluid Sensors, Filters, and Catalyst Devices, and Methods Involving Same,” *U.S. Patent No. 6,689,322*, Feb. 10, 2004.
11. M. J. Mills, K. H. Sandhage, P.-I. Gouma, “Free-Standing Fluid Sensors, Filters, and Catalyst Devices, and Methods Involving Same,” *U.S. Patent No. 6,682,700*, Jan. 27, 2004.
12. K. H. Sandhage, R. L. Snyder, “Electrolysis Apparatus and Methods Using Urania in Electrodes, and Methods of Producing Reduced Substances, from Oxidized Substances, Including the Electrowinning of Aluminum,” *U.S. Patent No. 6,616,826*, Sept. 9, 2003.
13. K. H. Sandhage, R. R. Unocic, M. B. Dickerson, M. Timberlake, K. Guerra, “Method for Fabricating High-Melting, Wear-Resistant Ceramics and Ceramic Composites at Low Temperatures, *U.S. Patent No. 6,598,656*, July 29, 2003.
14. K. H. Sandhage, P. Kumar, “Method for Fabricating Shaped Monolithic Ceramics and Ceramic Composites through Displacive Compensation of Porosity, and Ceramics and Composites made Thereby,” *U.S. Patent No. 6,407,022*, June 18, 2002.
15. K. H. Sandhage, “Method for Oxygenating Oxide Superconductive Materials,” *U.S. Patent No. 6,284,713*, Sept. 4, 2001.

GRANTED PATENTS (continued)

16. N. Claussen, K. H. Sandhage, P. Kumar, R. Janssen, P. Beyer, F. Wagner, N. Travitsky, "Die Casting of Refractory Metal-Ceramic Composite Materials," *European Patent No. 1,252,349*, German Patent No. 10,047,384, Aug. 9, 2001.
17. E. R. Podtburg, K. H. Sandhage, A. Otto, L. J. Masur, C. A. Craven, J. D. Schreiber, "Oxide Superconductor Precursors," *U.S. Patent No. 6,219,901*, April 24, 2001.
18. K. H. Sandhage, "Method for Oxygenating Oxide Superconductive Materials," *U.S. Patent No. 6,153,561*, Nov. 28, 2000.
19. K. H. Sandhage, R. L. Snyder, "Electrodes, Electrolysis Apparatus and Methods Using Uranium-bearing Ceramic Electrodes, and Methods of Producing a Metal from a Metal Compound Dissolved in a Molten Salt, Including Electrowinning of Aluminum," *U.S. Patent No. 6,146,513*, Nov. 14, 2000.
20. A. Otto, L. J. Masur, E. R. Podtburg, K. H. Sandhage, "High Pressure Oxidation of Precursor Alloys," *U.S. Patent No. 6,066,599*, May 23, 2000.
21. E. R. Podtburg, K. H. Sandhage, A. Otto, L. J. Masur, C. A. Craven, J. D. Schreiber, "Composite Metal Preforms for Oxidation to Manufacture High-Temperature Superconductors," *U. S. Patent No. 5,851,957*, Dec. 22, 1998.
22. J. Gilliland, A. Morrow, K. H. Sandhage, "Radiation Resistant Optical Waveguide Fiber," *U. S. Patent No. 5,681,365*, Oct. 28, 1997.
23. J. Gilliland, A. Morrow, K. H. Sandhage, "Radiation Resistant Optical Waveguide Fiber," *U. S. Patent No. 5,509,101*, April 16, 1996.
24. A. Otto, L. Masur, E. Potdburg, K. H. Sandhage, "High Pressure Oxidation of Precursor Alloys," *U. S. Patent No. 5,472,527*, Dec. 5, 1995.
25. K. H. Sandhage, "Processes for Fabricating Structural Ceramic Bodies and Structural Ceramic-Bearing Composite Bodies," *U. S. Patent No. 5,447,291*, Sept. 5, 1995.
26. K. H. Sandhage, "Electroceramics and Process for Making the Same," *U. S. Patent No. 5,318,725*, June 7, 1994.
27. K. H. Sandhage, "A Process for Making Ceramic/Metal and Ceramic/Ceramic Laminates by the Oxidation of a Metal Precursor," *U. S. Patent No. 5,259,885*, Nov. 9, 1993.
28. D. R. Powers, K. H. Sandhage, M. J. Stalker, "Method for Making a Preform Doped with a Metal Oxide," *U. S. Patent No. 5,203,897*, Apr. 20, 1993.
29. G. D. Smith, G. McKimpson, L. J. Masur, K. H. Sandhage, "Process for Forming Superconductor Precursor," *U. S. Patent No. 5,034,373*, July, 23, 1991.