

RICHARD E. EITEL

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ACADEMIC APPOINTMENTS

- Assistant Professor, University of Kentucky:** Lexington KY July 2006-current
Department of Chemical and Materials Engineering
- ASEE/ONR Summer Faculty:** Naval Research Lab, Washington, D.C. May-Aug 2009
Center for Biomolecular Science and Engineering (CBMSE)
- Guest Scientist,** National Institute of Materials Science, Tsukuba, Japan. November 2009
Ceramics Division, Guest Lecturer

EDUCATION

- Postdoc, Materials Research Institute** Jan 2004–June 2006
The Pennsylvania State University: University Park, PA
- Ph.D. Materials Science and Engineering** Dec 2003
The Pennsylvania State University: University Park, PA
- B.S. Ceramic Engineering** Dec 1998
New York State College of Ceramics at Alfred University: Alfred, NY

INTERDISCIPLINARY/SYNERGISTIC RESEARCH ACTIVITIES:

- Center for Clinical and Translational Science, University of Kentucky, Sept 2011-Aug 2012
“Cell Based Endothelium Activation Capacity (EAC) Sensor for the Diagnosis and Monitoring of Sepsis, Severe Sepsis, and Septic Shock,” PI: Pilot Scale Clinical Trial
Mentor: A. Bernard (UK Medical Center)
- Advanced Photon Source (APS), Argonne National Lab, Aug 2011
“In-situ Synchrotron Diffraction of High Performance Lead Free Piezoceramics,” User Facility Grant,
PI: Jacob Jones (UFL), Collaborators: T. Goknur (UFL)
- Center for Nanophase Materials Science (CNMS) ORNL, Oak Ridge, TN June, 2011
“ssPFM Study of the Nanoscale Domain Dynamics in Lead Free BaFeO₃-BaTiO₃ Piezoceramics” PI: User Facility Grant
Collaborators: S. Kalinin, S. Jesse, A. Kumar (ORNL)
- ASEE/ONR Summer Research Faculty: Naval Research Lab, Washington, D.C. May-Aug 2009
“On-Chip Processing of Magnetic Beads Using Permanent Magnets”
Host: F. Ligler (NRL), Collaborators: P. Howell, J. Kim (NRL)
- Materials Research Institute: University Park, PA Aug 2004–Dec 2005
“Microfluidic Microsystems for Zebrafish Embryo Manipulation”
PI’s: M. Pishko (CME, PSU), K. Cheng (Pathology, PSU College of Medicine), and M.K. Lanagan (Eng. Science, PSU),
- Center for Optical Technologies (COT), Penn State/Lehigh University Aug 2003–June 2006
“Active Fiber Alignment in Optoelectronic Packages,” Co-PI: Pilot Grant
PI’s: C. Randall (PSU), K. Uchino (PSU), R. Pearson (Lehigh), J. Shakespeare (Lehigh).

Life Sciences Greenhouse of Central Pennsylvania,
“Microsystems for Cell Manipulation,”

Aug 2003 – July 2004

PI’s: C.A. Randall, M. Lanagan, with Fraunhofer Institute for Biomedical Technology,

Undergraduate Coop Student, Alcoa Inc, Alcoa Center, PA

Jan-Aug 1997

Project: “Alternative Glass Frit for HTCC Electronic Packaging Substrates”

Supervisor: Dr. J. Dynys (Alcoa)

AWARDS

NIMS of Japan: **Invited Guest Scientist**, National Institute of Materials Science, Tsukuba, November, 2009.

ASEE/ONR: **Summer Faculty Fellowship**, U.S. Naval Research Laboratory: Center for Biomolecular Science and Engineering, May-August, 2009.

The Penn State Research Foundation: **Inventors Incentive**: K. Uchino, C.A. Randall, J. Agraz, R.E. Eitel, and S.H. Park, “Piezoelectric Ultrasonic Motor for 2-Dimensional Positioning,” 2009.

R&D Magazine: **R&D 100 Award**, K.Uchino, C.A. Randall, R.E. Eitel and S.H. Park, “Integrated Fiber Alignment Package (IFAP),” 2007.

Materials Research Institute: Student Research Award Winner, **Best Ph.D. Thesis**: “Novel Piezoelectric Ceramics: Development of High Temperature, High Performance Piezoelectric on the Basis of Structure,” 2004.

The Penn State Research Foundation: **Inventors Incentive**: R.E. Eitel, T.R. Shrout, C.A. Randall, and S.E. Park, “Perovskite Materials for High Temperature and High Performance Actuators and Transducers”, 2004.

National Science Foundation: **GK12 Fellowship**: Graduate Automotive Technology Education (GATE), Graduate Teaching Fellows in K-12 Education, 2002.

International Microelectronics and Packaging Society: **Educational Foundation Grant Fellowship**: “Novel Piezoelectrics for High Performance Actuators and Sensors: High Strain and High T_C Morphotropic Phase Boundary Systems,” 2000.

Materials Research Laboratory: **“Frontiers in Materials”** Poster Competition: “Novel Piezoelectric Systems: Phase Stability and Property Predictions on the Basis of Tolerance Factor,” 1999.

PROFESSIONAL POSITIONS

Guest Associate Editor: Special Issue of the *International Journal of Applied Ceramic Technology* for the 2011 IMAPS/ACerS Ceramic Interconnect and Ceramic Microsystems Technology Conference, 2011.

Educational Committee: IEEE: Ultrasonics, Ferroelectrics, and Frequency Control Division, 2006.

CONFERENCE AND SYMPOSIA ORGANIZATIONAL ACTIVITIES

General Chair: 9th Annual IMAPS/ACerS: Ceramic Interconnect and Ceramic Microsystems Technology Conference, USA 2013.

General Chair: 8th Annual IMAPS/ACerS: Ceramic Interconnect and Ceramic Microsystems Technology Conference, Germany, 2012.

Publications Chair: 7th Annual IMAPS/ACerS: Ceramic Interconnect and Ceramic Microsystems Technology Conference, San Diego, CA, 2011.

Session Organizer: “Piezoelectric Application Including MEMS,” 6th Annual IMAPS/ACerS: Ceramic Interconnect and Ceramic Microsystems Technology Conference, Tokyo, Japan, 2010.

Session Chair: “Electronic Ceramics,” 26th International Japan-Korea Seminar on Ceramics, Tsukuba, Japan, 2009.

Student Paper Award Committee: 5th Annual IMAPS/ACerS: Ceramic Interconnect and Ceramic Microsystems Technology Conference, Denver, CO, 2009.

Session Chair: “Ceramic Actuators in Microsystems (Piezoelectrics Materials and Devices),” 5th Annual IMAPS/ACERS: Ceramic Interconnect and Ceramic Microsystems Technology Conference, Denver, CO, 2009.

Session Organizer: “Biomedical Devices and Applications,” 5th Annual IMAPS/ACerS: Ceramic Interconnect and Ceramic Microsystems Technology Conference, Denver, CO, 2009.

Session Organizer: “Biomedical Devices and Applications,” 4th Annual IMAPS/ACerS: Ceramic Interconnect and Ceramic Microsystems Technology Conference, Munich, Germany, 2008.

Session Chair: “International Symposium on Applications of Ferroelectrics,” Nara, Japan, 2007.

Session Organizer: “Multilayer Actuators,” 3rd Annual IMAPS/ACerS: Ceramic Interconnect and Ceramic Microsystems Technology Conference, Denver, CO, 2007.

Session Chair: “International Symposium on Applications of Ferroelectrics,” Sunset Park, NC, 2006.

Session Chair: “International Center for Actuators and Transducers: 44th International Smart Actuator Symposium,” University Park, PA, 2005.

PROFESSIONAL MEMBERSHIPS

Materials Research Society (MRS), Institute of Electrical and Electronics Engineers (IEEE), International Microelectronics and Packaging Society (IMAPS), American Ceramics Society (ACerS), American Institute of Chemical Engineering

SCIENTIFIC PEER REVIEW

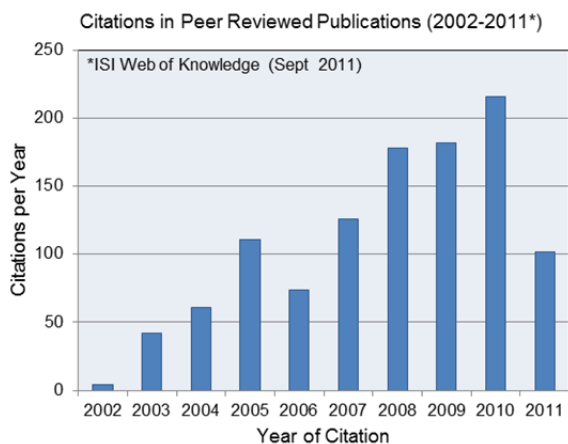
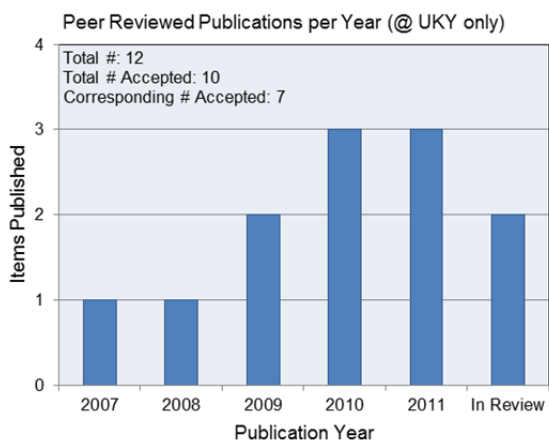
Guest Associate Editor: Special Issue of the *International Journal of Applied Ceramic Technology* for the 2011 IMAPS/ACerS Ceramic Interconnect and Ceramic Microsystems Technology Conference, 2011.

Regular Scientific Peer review for: *Advanced Materials* (7), *Applied Physics Letters* (11), *Chem Phys Chem* (2), *Electroceramics* (6), *International Journal of Applied Ceramic Technology* (5), *IEEE: Transactions* (6), *Journal of Applied Physics* (5), *Journal of Materials Research* (3), *Journal of Materials Science* (1), *Journal of Physics: Condensed Matter* (2), *Journal of the American Ceramic Society* (13), *Lab On A Chip* (1), *Materials Letters* (10), *Thin Solid Films* (5), *Physical Review B*, *Physica Status Solidi* (3), *Ultrasonics* (1)

NSF Panel Reviews: 2009

CONTRIBUTING EDITOR CREDITS

- Contributing Editor: T.A. Skidmore, T.P. Comyn, and S.J Milne, "Dielectric and Piezoelectric Properties in the System: $(1-x)[(\text{Na}_{0.5}\text{K}_{0.5}\text{NbO}_3)_{0.93}-(\text{LiTaO}_3)_{0.07}]_x[\text{BiScO}_3]$," *Journal of the American Ceramic Society*, 93[3] pp624-6 (2010).
- Contributing Editor: S. Zhang, X. Dong, Y. Chen, F. Cao, Y. Zhang, G. Wang, N. Sama, and D. Remiens, "Growth and Electric Properties of MPB $\text{BiScO}_3\text{-PbTiO}_3$ Thin Films on $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ -Coated Silicon Substrates," *Journal of the American Ceramic Society*, 93[6] pp1583-5 (2010).



REFEREED PUBLICATIONS (*H-INDEX*: 18, **GRADUATE ADVISEE.*, # *CORRESPONDING*)

- W. Zhang*, and R.E. Eitel#, "A Package Level Multilayer Ceramic Piezoelectric Micropump for Integrated Microfluidic Systems," *Lab On A Chip*, submitted (2011).
- W. Zhang*, and R. E. Eitel#, "Sintering Behavior, Properties, and Applications of Co-Fired Piezoelectric/Low Temperature Co-Fired Ceramic (PZT-SKN/LTCC) Multilayer Ceramics," *International Journal of Applied Ceramic Technology*, submitted, (2011).
- W. Zhang*, and R. E. Eitel#, "Low Temperature Sintering and Properties of 0.98PZT-0.02SKN Ceramics with LiBiO_2 and CuO Addition," *Journal of the American Ceramic Society*, published online, (2011). <http://onlinelibrary.wiley.com/doi/10.1111/j.1551-2916.2011.04504.x/abstract>
- S. O. Leontsev*, and R.E. Eitel#, "Origin and Magnitude of the Large Piezoelectric Response in the Lead-free $(1-x)\text{BiFeO}_3\text{-xBaTiO}_3$ Solid Solution," *Journal of Materials*

Research, 26[1] pp9-17 (2011).

<http://journals.cambridge.org/action/displayAbstract?aid=7975003>

5. W. Zhang*, and R. E. Eitel[#], "Biostability of LTCC Materials for Microfluidic and Biomedical Devices," *International Journal of Applied Ceramic Technology*, published online, (2010).
<http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7402.2010.02581.x/abstract>
6. *Topical Review*: S. O. Leontsev*, and R.E. Eitel[#], "Progress in engineering high strain lead-free piezoelectric ceramics," *Science and Technology of Advanced Materials*, 11 044302 (2010). <http://iopscience.iop.org/1468-6996/11/4/044302>
7. S.W. Gotmare*, S. O. Leontsev*, and R.E. Eitel[#], "Thermal degradation and aging of high temperature piezoelectric ceramics" *Journal of the American Ceramic Society*, 93 [7] pp1965-9, (2010). <http://www3.interscience.wiley.com/journal/123314953/abstract>
8. Seung-Ho Park, Amanda Baker, Richard E. Eitel, Clive A. Randall, and Kenji Uchino[#], "Active optical fiber alignment with a piezoelectric ultrasonic motor integrated into Low Temperature Cofired Ceramics (LTCC)" *Journal of Intelligent Material Systems and Structures*, 21, pp569-79, (2010). <http://jim.sagepub.com/cgi/content/abstract/21/4/469>
9. S. O. Leontsev*, and R. E. Eitel[#], "Dielectric and Piezoelectric properties in Mn-Modified (1-x)BiFeO₃-xBaTiO₃ Ceramics," *Journal of the American Ceramic Society*, 92 [12] pp2957-61, (2009). <http://www3.interscience.wiley.com/journal/122604759/abstract>
10. N. S. Satarkar, W. Zhang*, R. E. Eitel, J. Z. Hilt[#], "Magnetic Hydrogel Nanocomposites as Remote Controlled Microfluidic Valves," *Lab on a Chip*, 9, pp 1773-9, (2009).
<http://www.rsc.org/publishing/journals/LC/article.asp?doi=b822694f#>
11. S. H. Park, J. Agraz, S. Tuncdemir, R. E. Eitel, A. L. Baker, C. A. Randall[#], K. Uchino[#], "Delta-shape Piezoelectric Ultrasonic Motor for 2-dimensional Positioning," *Japanese Journal of Applied Physics*, 47 [1] pp313-8, (2008). <http://jjap.ipap.jp/link?JJAP/47/313/>
12. R. E. Eitel[#], C. A. Randall, "Octahedral Tilt-Suppression of Ferroelectric Domain Wall Dynamics and the Associated Piezoelectric Activity in Pb(Zr,Ti)O₃," *Physical Review B*, 75 [9] 094106 (2007). <http://prb.aps.org/abstract/PRB/v75/i9/e094106>
13. R. E. Eitel, T. R. Shrout & C. A. Randall[#], "Nonlinear Contributions to the Dielectric Permittivity and Converse Piezoelectric Coefficient in Piezoelectric Ceramics," *Journal of Applied Physics*, 99 [12], 124110 (2006). http://jap.aip.org/japiau/v99/i12/p124110_s1
14. C. A. Randall[#], R. E. Eitel, T. R. Shrout & A. Kelnberger, "High Strain Piezoelectric Multilayer Actuators - A Materials Science and Engineering Challenge," *Journal of Electroceramics*, 14 [3] 177-91 (2005).
<http://www.springerlink.com/content/n6l5537253465271/>
15. L. Baker, M. Lanagan, C. A. Randall[#], E. Semouchkina, G. Semouchkin, - K. Z. Rajab, R. E. Eitel, R. Mittra, S. Rhee, P. Geggier, C. Duschl, G. Fuhr, "Integration concepts for the fabrication of LTCC structures," *International Journal of Applied Ceramic Technology* 2 [6], p514-520, (2005). <http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7402.2005.02052.x/abstract>

16. S. J. Zhang[#], E. F. Alberta, R. E. Eitel, C. A. Randall, & T. R. Shrout, "Elastic, piezoelectric, and dielectric characterization of modified BiScO₃-PbTiO₃ ceramics," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, 52 [11] 2131-2139, (2005). http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1561684
17. S. J. Zhang[#], R. E. Eitel, C. A. Randall, T. R. Shrout, & E. F. Alberta "Manganese-modified BiScO₃-PbTiO₃ piezoelectric ceramic for high-temperature shear mode sensor," *Applied Physics Letters*, 86, 262904 (2005). http://apl.aip.org/resource/1/applab/v86/i26/p262904_s1
18. C. J. Stringer, R. E. Eitel, T. R. Shrout, C. A. Randall[#], I. M. Reaney, "Phase Transition and Chemical Order in the Ferroelectric Perovskite (1-x)Bi(Mg_{3/4}W_{1/4})O₃-xPbTiO₃ Solid Solution System," *Journal of Applied Physics*, 97 [2] 024101 (2005). http://jap.aip.org/resource/1/japiau/v97/i2/p024101_s1
19. R. E. Eitel, S. J. Zhang, T. R. Shrout, C. A. Randall[#] & I. Levin, "Phase Diagram of the Perovskite System (1-x)BiScO₃-xPbTiO₃," *Journal of Applied Physics*, 96 [5] 2828-31 (2004). http://jap.aip.org/resource/1/japiau/v96/i5/p2828_s1
20. R. E. Eitel, T. R. Shrout & C. A. Randall[#], "Tailoring Properties and Performance of (1-x)BiScO₃-xPbTiO₃ Based Piezoceramics by Lanthanum Substitution," *Japanese Journal of Applied Physics*, 43 [12] 8146-50 (2004). <http://jjap.jsap.jp/link?JJAP/43/8146/>
21. T.-H. Song, R. E. Eitel, T. R. Shrout & C. A. Randall[#], "Dielectric and Piezoelectric Properties in the BiScO₃-PbTiO₃-PbO*SnO₂ Ternary System," *Japanese Journal of Applied Physics*, 43 [8A] 5392-7 (2004). <http://jjap.jsap.jp/link?JJAP/43/5392/>
22. C. A. Randall[#], R. E. Eitel, B. Jones, T. R. Shrout, D. I. Woodward & I. M. Reaney, "Investigation of a High T_C Piezoelectric System: (1-x)Bi(Mg_{1/2}Ti_{1/2})O₃-xPbTiO₃," *Journal of Applied Physics*, 94 [7] 3633-9 (2004). http://jap.aip.org/resource/1/japiau/v94/i7/p3633_s1
23. T.-H. Song, R. E. Eitel, T. R. Shrout[#], C. A. Randall, & W. Hackenberger, "Piezoelectric Properties in the Perovskite BiScO₃-PbTiO₃-(Ba,Sr)TiO₃ Ternary System," *Japanese Journal of Applied Physics*, 42 5181-4 (2003). <http://jjap.jsap.jp/link?JJAP/42/5181/>
24. D. I. Woodward, I. M. Reaney[#], R. E. Eitel & C. A. Randall, "Crystal and Domain Structure of the BiFeO₃-PbTiO₃ Solid Solution," *Journal of Applied Physics*, 94 [5] 3313-8 (2003). http://jap.aip.org/resource/1/japiau/v94/i5/p3313_s1
25. C. A. Randall[#], R. E. Eitel, T. R. Shrout, D. I. Woodward & I. M. Reaney, "Transmission Electron Microscopy Investigation of the High Temperature BiScO₃-PbTiO₃ Piezoelectric Ceramic System," *Journal of Applied Physics*, 93 [11] 9271-4 (2003). http://jap.aip.org/resource/1/japiau/v93/i11/p9271_s1
26. V. Porokhonsky, S. Kamba[#], A. Pashkin, M. Savinov, J. Petzelt, R. E. Eitel & C. A. Randall, "Broadband Dielectric Spectroscopy of (1-x)BiScO₃-xPbTiO₃ Piezoelectrics," *Applied Physics Letters*, 83 [8] 1605-7 (2003). http://apl.aip.org/resource/1/applab/v83/i8/p1605_s1
27. J. Cheng, R. E. Eitel, N. Li & L. E. Cross[#], "Structural and Electrical Properties of (1-x)Bi(Ga_{1/4}Sc_{3/4})O₃-xPbTiO₃ Piezoelectric Ceramics," *Journal of Applied Physics*, 94 [1] 605-9 (2003). http://jap.aip.org/resource/1/japiau/v94/i1/p605_s1

28. J. Cheng, R. E. Eitel & L. E. Cross[#], "Lanthanum-Modified (1-x)(Bi_{0.8}La_{0.2})(Ga_{0.05}Fe_{0.95})O₃-xPbTiO₃ Crystalline Solutions: Novel Morphotropic Phase-Boundary Lead-Reduced Piezoelectrics," *Journal of the American Ceramic Society*, 86 [12] 2111-5 (2003). <http://onlinelibrary.wiley.com/doi/10.1111/j.1151-2916.2003.tb03617.x/abstract>
29. S. J. Zhang[#], L. Lebrun, S. Rhee, R. E. Eitel, C. A. Randall & T. R. Shrout, "Crystal Growth and Characterization of New High Curie Temperature (1-x)BiScO₃-xPbTiO₃ Single Crystals," *Journal of Crystal Growth*, 236 [1-3] 210-6 (2002). [http://dx.doi.org/10.1016/S0022-0248\(01\)02093-0](http://dx.doi.org/10.1016/S0022-0248(01)02093-0)
30. R. E. Eitel, C. A. Randall[#], T. R. Shrout & S.-E. Park, "Preparation and Characterization of High Temperature Perovskite Ferroelectrics in the Solid-Solution (1-x)BiScO₃-xPbTiO₃," *Japanese Journal of Applied Physics*, 41 [4A] 2099-104 (2002). <http://jjap.ipap.jp/link?JJAP/41/2099>
31. R. E. Eitel, C. A. Randall[#], T. R. Shrout, P. W. Rehrig, W. Hackenberger & S.-E. Park, "New High Temperature Morphotropic Phase Boundary Piezoelectrics Based on Bi(Me)O₃-PbTiO₃ Ceramics," *Japanese Journal of Applied Physics*, 40 [10] 5999-6002 (2001). <http://jjap.ipap.jp/link?JJAP/40/5999>

BOOK CHAPTERS

1. C. A. Randall, R. E. Eitel, C. Stringer, T. H. Song, S. J. Zhang & T. R. Shrout, "High Performance, High Temperature Perovskite Piezoelectric Ceramics"; in *Piezoelectric Single Crystals*, Edited and Published by S. Trolier-McKinstry, University Park, PA (2004).
2. T. R. Shrout, R. E. Eitel, & C. A. Randall, "High Performance, High Temperature Perovskite Piezoelectric Ceramics"; in *Piezoelectric Materials in Devices*, Edited by N. Setter, EPFL Swiss Federal Institute of Technology, Lausanne, Switzerland, (2002).

PATENTS

1. W. Zhang,* and R.E. Eitel, Package Level Multilayer Piezoelectric Micropump for lab on a Chip, 2011 *Disclosure Filed*.
2. P.B. Howell, and R.E. Eitel, Rotationally Actuated Magnetic Bead Trap and Mixer, 2010 *Provisional patent filed*.
3. S.O. Leontsev,* and R.E. Eitel, Lead Free Piezoelectric Ceramic Materials with High Piezoelectric Strain Coefficient and High Depolarization Temperature. 2009 disclosure filed, 2010 *Provisional Patent filed*.
4. R.E. Eitel, K.W. Anderson, T. Dziubla, J. Poag,* W. Zhang,* Endothelium/Epithelium on Chip (EOC) Cell Culture Platform. *Disclosure filed*.
5. J.Z. Hilt, N. Satarkar, W. Zhang,* R. Eitel. Methods for Preparation and Application of Nanocomposites in Microfluidic Devices. *Provisional Patent filed*.
6. US Patent, 7,501,743 B2: "Piezoelectric Ultrasonic Motor for 2-Dimensional Positioning," K. Uchino, C.A. Randall, J. Agraz, R.E. Eitel, and S.H. Park, (Mar 10, 2009).

7. US Patent 6,685,849: "Perovskite Materials for High Temperature and High Performance Actuators and Transducers," R. E. Eitel, S.-E. Park, C. A. Randall & T. R. Shrout, (February 3 2004).

INVITED PRESENTATIONS AND SEMINARS: (PRESENTING, *GRADUATE ADVISEE)

1. R.E. Eitel, "The Materials Science and Applications of Smart Electronic Ceramics," Department of Chemical and Materials Engineering, University of Kentucky, Lexington, KY, 2011.
2. R.E. Eitel, "Smart Ceramic Materials and Devices," Department of Chemical Engineering, Vanderbilt University, Nashville, TN, 2011.
3. S.O. Leontsev*, and R.E. Eitel, "Structural Origins of the Piezoelectric Strain Response in BiFeO₃-BaTiO₃ Piezoelectric Ceramics," Center for Advanced Materials, University of Kentucky, July 14, 2010.
4. R.E. Eitel, "High Curie Temperature Lead-Free Piezoceramics," Tokyo Institute of Technology, Tokyo, Japan, Nov 27, 2009.
5. R.E. Eitel, "Smart Electroceramic Materials and Devices," Tokyo University of Science, Chiba, Japan, Nov 26, 2009.
6. R.E. Eitel, "High Curie Temperature Lead-Free Piezoceramics," 26th International Japan-Korea Seminar on Ceramics, Tsukuba, Japan, Nov 23-25, 2009.
7. R.E. Eitel, "LTCC Based Microfluidic Structures for the Controlled Synthesis of Antioxidant Polymers," Annual Symposium of the Indiana IMAPS Chapter, 2009.
8. R.E. Eitel, "Microfluidic Applications of Low Temperature Cofired Ceramics," Naval Research Laboratory: Center for BioMedical Science and Engineering, Washington, D.C., December 23, 2008.
9. R.E. Eitel, "Rayleigh Law Response in Ferroelectric Ceramics: Quantifying Domain Wall Dynamics and Structural Relationships," 16th International Symposium on Applications of Ferroelectrics, Nara, Japan, 2007.
10. R. E. Eitel, "Smart Electroceramic Materials and Devices," National Taiwan University, Taipei, Taiwan, 2007.
11. R.E.Eitel, "Current Challenges in High Temperature, High Performance Piezoelectric Ceramics," Department of Chemical and Materials Engineering, University of Kentucky, Lexington, KY 2005.

**PRESENTATIONS WITH PROCEEDINGS OR EXTENDED ABSTRACT:
(PRESENTING, *GRADUATE ADVISEE)**

1. W. Zhang*, and R.E. Eitel, "Sintering Behavior of Cofired LTCC/PZT-SKN Multilayer Ceramics for Microfluidic and Lab on Chip Applications, *Proceedings of the IMAPS/ACerS 7th CICMT Conference*, San Diego, CA, 2011.
2. R.E. Eitel, and S.O. Leontsev, "High Curie Temperature Lead-Free Piezoceramics," *Proceedings of the 26th International Japan-Korea Seminar on Ceramics*, Tsukuba, Japan, November 23-25, 2009.

3. S.O. Leontsev*, and R.E. Eitel, "Large Piezoelectric Strain Coefficient in a High Curie Temperature Lead-Free Piezoelectric Ceramic," *Proceedings of the 14th US-Japan Seminar on Dielectric and Piezoelectric Materials*, Welches, OR, 2009.
4. R.E. Eitel, W. Zhang*, Nitin Satarkar, and J. Zach Hilt, "Remote Controlled Valves for Flow Control in LTCC-Based Microfluidic Devices," *Proceedings of the 5th IMAPS/ACERS Conference on Ceramic Interconnect and Ceramic Microsystems Technologies*, Denver, CO, 2009.
5. W. Zhang*, P. Wattamwar, K. Cummins, and T. Dziubla, and R.E. Eitel, "LTCC Based Microfluidic Structures for the Controlled Synthesis of Antioxidant Polymers," *Proceedings of IMAPS 2008: The 41st International Symposium on Microelectronics*, Providence, RI, 2008.
6. R.E. Eitel, and W. Zhang*, "Biostability of LTCC Materials for Microfluidics and Biomedical Devices," *Proceedings of the 4th Conference on Ceramic Interconnect and Ceramic Microsystems Technologies*, Munich, Germany, 2008.
7. D. Besser, G. Swan G, T. Dziubla T, & R.E. Eitel, "Building Continuous Loop Learning Communities: An Engineering Outreach Case Study," *2008 ASEE Proceedings of the Southeast Section Conference*. Memphis, TN, 2008.
8. R. E. Eitel, W Zhang, and J. Lumpp, "Microfluidic LTCC Devices for Cellular Biology," *Proceedings of the IMAPS/ACERS International Conference on Ceramic Interconnect and Ceramic Microsystems Technologies*, Denver, CO, 2007.
9. R. E. Eitel, A. L. Baker, J. Agraz, M. Lanagan, K. Uchino and C. A. Randall, "On-Board Fiber Alignment in LTCC Optoelectronic Packages" *Proceedings of the IMAPS/ACerS 1st International Conference on Ceramic Interconnect and Ceramic Microsystems Technologies*, Baltimore, MD, 2005.
10. C. A. Randall, G. Yang, E. Dickey, R. E. Eitel, T. R. Shrout, M. T. Lanagan, D. Kwon, E. Semouchkina, G. Semouchkin, S. Rhee and A. L. Baker, Keynote Lecture: "Present and Future Challenges in Multilayer Ceramic Devices," *Proceedings of the IMAPS/ACerS 1st International Conference on Ceramic Interconnect and Ceramic Microsystems Technologies*, Baltimore, MD, 2005.
11. T. R. Shrout, S. J. Zhang, R. E. Eitel, C. Stringer, and C. A. Randall, "High Performance, High Temperature Perovskite Piezoelectrics," *Proceedings of the 37th International Symposium on Microelectronics*, Long Beach, CA, 2004.
12. J. Cheng, R. E. Eitel, N. Li & L. E. Cross, "Structural Evolution, Dielectric and Piezoelectric Properties of Modified BiFeO₃-PbTiO₃ Piezoelectrics," *Ceramic Transactions*, 150(Ceramic Materials and Multilayer Electronic Devices pp. 221-8) 2004.
13. J. Cheng, R. Eitel, N. Li and L. E. Cross, "Fabrication and Characterization of Bi(Ga,Sc)O₃-PbTiO₃: Novel High Curie Temperature Piezoelectrics," *Proceedings of 27th Annual Conference on Composites, Advanced Ceramics, Materials, and Structures*, V24, Aug, 2003.
14. R.E. Eitel and S.M. Pilgrim, "X-Ray Phase Transition Analysis of Cryogenic Perovskite Ceramics," *Proceedings of the 1998 Workshop on PMN*, Alfred NY, 19 October 1998.

PRESENTATIONS: (PRESENTING, *GRADUATE ADVISEE, %UNDERGRADUATE ADVISEE)

1. W. Zhang*, and R. E. Eitel, "Development and Optimization of Integrated Piezoelectric PZT/LTCC Micropumps," to be presented at Materials Science & Technology 2011, Columbus, OH 2011.
2. J.L. Fischer*, A.L. Shearer%, J.M. Shapiro, C.A. Trinkle, R.E. Eitel, K.W. Anderson, "Influence of CD151 Expression and Endothelial Cell Phenotype on Selectivity of Cancer Cell Adhesion to Endothelial Monolayers," to be presented at 2011 AIChE Annual Meeting, Minneapolis, MN, 2011.
3. D. Cochran, P. Wattamwar, R. Eitel, K. Anderson, and T. Dziubla, "Targeting of Antioxidant Polymer Nanoparticles Inhibition of Metal Nanoparticle Toxicity," to be presented at 2011 AIChE Annual Meeting, Minneapolis, MN, 2011.
4. W. Zhang*, and R.E. Eitel, "Package-level Multilayered Piezoelectric Micropumps for Lab-on-Chip," 2010 AIChE Annual Meeting, Salt Lake City, UT, 2010.
5. W. Mercke*, R.E. Eitel, T. Dziubla, and K. Anderson, "Real Time Monitoring of Endothelial Cell Permeability Using Trans-Endothelial Electrical Resistance," 2010 AIChE Annual Meeting, Salt Lake City, UT, 2010.
6. W. Zhang*, and R.E. Eitel, "Integrated LTCC Package-level Multilayered Piezoelectric Micropumps for Lab-on-Chip," IMAPS/ACerS 6th CICMT Conference, Chiba, Japan, 2010.
7. N.S. Satarkar, W. Zhang*, S. Meenach, C. Barton, R.E. Eitel, K.W. Anderson, J.Z. Hilt. "Radiofrequency Actuation of Hydrogel Nanocomposites," 2009 MRS Fall Meeting, Boston, MA, 2009.
8. R.E. Eitel, "Field Dependant Contributions to the Piezoelectric Response Piezoelectric Ceramic Materials," Fall Workshop for the Center for Advanced Materials, Lexington, KY, 2009.
9. J. Poag*, R. Eitel, K. Anderson, and T. Dziubla, "Endothelial Cell Culture in a Ceramic Microfluidic Device," AIChE Annual meeting, Nashville, TN, 2009.
10. S.O. Leontsev*, and R.E. Eitel, "Large Piezoelectric Strain Coefficient in a High Curie Temperature Lead-Free Piezoelectric Ceramic," 14th US-Japan Seminar on Dielectric and Piezoelectric Materials, Welches, OR, 2009.
11. R.E. Eitel, W. Zhang*, Nitin Starkar, and J. Zach Hilt, "Remote Controlled Valves for Flow Control in LTCC-Based Microfluidic Devices," 5th IMAPS/ACERS Conference on Ceramic Interconnect and Ceramic Microsystems Technologies, Denver, CO, 2009.
12. W. Zhang*, P. Wattamwar, K. Cummins%, and T. Dziubla, and R.E. Eitel, "LTCC Based Microfluidic Structures for the Controlled Synthesis of Antioxidant Polymers," IMAPS 2008: The 41st International Symposium on Microelectronics," Providence, RI, 2008.
13. N.S. Satarkar, W. Zhang*, R. Eitel, **J.Z. Hilt**. Application of Magnetic Hydrogel Nanocomposites as Remote Controlled Microfluidic Valves, *2008 American Institute of Chemical Engineers Annual Meeting*, Philadelphia, PA, 2008.

14. R.E. Eitel, and W. Zhang*, "Biostability of LTCC Materials for Microfluidics and Biomedical Devices," 4th Conference on Ceramic Interconnect and Ceramic Microsystems Technologies, Munich, Germany, 2008.
15. D. Besser, G. Swan G, T. Dziubla T, & R.E. Eitel, "Building Continuous Loop Learning Communities: An Engineering Outreach Case Study," 2008 ASEE Proceedings of the Southeast Section Conference. Memphis, TN; 2008.
16. R. E. Eitel, "Crystal Symmetry and Structural Dependence of the Non-Linear Voltage Response in Ferroelectrics," 2007 International Conference on Electroceramics, Arusha, Tanzania, 2007.
17. P. Rottman[%], L. Boyer, M. Spencer, R.E. Eitel, and J. Nychka, "Materials Analysis of Historic Mortars: Drayton Hall," American Ceramics Society, Student Speaking Competition, Materials Science & Technology, Indianapolis, IN, 2011.
18. R. E. Eitel, W Zhang*, and J. Lump, "Microfluidic LTCC Devices for Cellular Biology," IMAPS/ACERS International Conference on Ceramic Interconnect and Ceramic Microsystems Technologies, Denver, CO, 2007.
19. R. E. Eitel, C. A. Randall, T. R. Shrout, C. J. Stringer, S. J. Zhang, S. Choi and I.M. Reaney "Designing High Performance Piezoelectric Ceramics: The Role of Crystallographic Symmetry and Domain Wall Contributions", 15th International Symposium on Applications of Ferroelectrics, Sunset Park, NC, 2006.
20. R. E. Eitel, C. A. Randall, and A. L. Baker, "Multifunctional Materials Integration and Devices in LTCC," Materials Science and Technology 2006, Cincinnati, OH 2006.
21. R. E. Eitel, T. R. Shrout, and C. A. Randall, "Rayleigh Law Approach to Quantifying the Nonlinearity of the Dielectric Permittivity and Converse Piezoelectric Coefficient in Piezoelectric Ceramics" 2006 U.S. Navy Workshop on Acoustic Transduction Materials and Devices, State College, PA, 2006.
22. R. E. Eitel, A. L. Baker, J. Agraz, M. Lanagan, K. Uchino and C. A. Randall, "On-Board Fiber Alignment in LTCC Optoelectronic Packages" IMAPS/ACerS 1st International Conference on Ceramic Interconnect and Ceramic Microsystems Technologies, Baltimore, MD, 2005.
23. C. A. Randall, G. Yang, E. Dickey, R. E. Eitel, T. R. Shrout, M. T. Lanagan, D. Kwon, E. Semouchkina, G. Semouchkin, S. Rhee and A. L. Baker, Keynote Lecture: "Present and Future Challenges in Multilayer Ceramic Devices," IMAPS/ACerS 1st International Conference on Ceramic Interconnect and Ceramic Microsystems Technologies, Baltimore, MD, 2005.
24. R. E. Eitel, A. L. Baker, J. Agraz, M. K. Lanagan, K. Uchino and C. A. Randall, "On-Board Piezoelectric Alignment for Optoelectronic Packaging," 2005 Spring Meeting, International Center for Actuators and Transducers, State College, PA, 2005.
25. R. E. Eitel, A. L. Baker, K. Uchino, and C. A. Randall, Poster: "Novel Integrated LTCC-Piezoelectric Alignment Structures for Optoelectronics," Center for Optical Technologies Open House, Bethlehem, PA, 2004 (also Fall Meeting Center for Dielectric Studies, State College, PA, 2005).

26. R. E. Eitel, C. J. Stringer, S. M. Choi, B. Jones, S. J. Zhang, T. R. Shrout, Clive A. Randall, "New Ferroelectric Ceramic Materials for High Performance and High Temperature Applications," 2004 U.S. Navy Workshop on Acoustic Transduction Materials and Devices, State College, PA, 2004.
27. R.E. Eitel, T. R. Shrout, and C. A. Randall, "Nonlinear Contributions to the Dielectric and Piezoelectric Properties of Ferroelectric Ceramics", 106th Annual Meeting of the American Ceramic Society, Indianapolis, IN 2004.
28. T. R. Shrout, S. J. Zhang, R. E. Eitel, C. Stringer, and C. A. Randall, "High Performance, High Temperature Perovskite Piezoelectrics," 37th International Symposium on Microelectronics, Long Beach, CA, 2004.
29. R. E. Eitel, T. R. Shrout, and C. A. Randall, "Designing Perovskite MPB Materials with High Piezoelectric Activity," Meeting of the European Ceramics Society, Istanbul, Turkey, 2003.
30. J. Cheng, R. Eitel, N. Li and L. E. Cross, "Fabrication and Characterization of Bi(Ga,Sc)O₃-PbTiO₃: Novel High Curie Temperature Piezoelectrics," 27th Annual Conference on Composites, Advanced Ceramics, Materials, and Structures, 2003.
31. R. E. Eitel, C. J. Stringer, C. A. Randall, and T. R. Shrout, "Structure and Tailoring of New Piezoelectric Compositions based on BiMeO₃-xPbTiO₃," 105th Annual Meeting of the American Ceramic Society, Nashville, TN, 2003.
32. R. E. Eitel, T.H. Song, S. J. Zhang, C. Stringer, B. Jones, I. Reaney, S. Misture, C. A. Randall, and T. R. Shrout, "New Ferroelectric Systems for High Temperature Piezoelectric and Relaxor Materials," Spring Meeting of the Center for Dielectric Studies, University Park, PA, 2003.
33. R. E. Eitel, T. R. Shrout, and C. A. Randall, "Beyond PZT: Development of New High Performance Piezoelectric Compositions," Penn State University Graduate Seminar Series, University Park, PA, 2003.
34. T. R. Shrout, R. E. Eitel, C. A. Randall, E. Alberta, and P. W. Rehrig, "New high temperature morphotropic phase boundary piezoelectric ceramics," IEEE International Symposium on Applications of Ferroelectrics, 13th, Nara, Japan, 2002.
35. R. E. Eitel, T.R. Shrout, and C. A. Randall, "New (1-x)BiScO₃ – xPbTiO₃ Morphotropic Phase Boundary Perovskites having High Curie Temperature and High Piezoelectric Coefficients," 104th Annual Meeting of the American Ceramic Society, St. Louis, MO, 2002.
36. R. E. Eitel, T.R. Shrout, and C. A. Randall, Poster: "Investigation of Piezoelectric Properties of (1-x)BiScO₃ – xPbTiO₃ with High T_C," 2002 U.S. Navy Workshop on Acoustic Transduction Materials and Devices, Baltimore, MD, 2002 (Also Fall Meeting of the Pennsylvania Ceramics Association, University Park, PA, 2002).
37. R. E. Eitel, C. A. Randall, T.R. Shrout, P.W. Rehrig, W. Hackenberger, and S-E. Park, "Development of Novel High Temperature High Performance Piezoelectrics on the Basis of Structure," International Meeting on Ferroelectrics: IMF10, Madrid, Spain, 2001.

38. C. A. Randall, R. E. Eitel, J. P. Nino, T. R. Shrout, H-J. Youn, and M. Lanagan, "Keynote Lecture: Novel Bi-Compounds and Solid Solutions for Electroceramics Applications," Ferroelectrics UK 2001, Sheffield, England, 2001.
39. R. E. Eitel, T. R. Shrout, C. A. Randall, P. Rehrig, W. Hackenberger Poster: "Novel Piezoelectric Systems: Development of High Temperature, High Performance Piezoelectrics on the Basis of Structure," 2001 U.S. Navy Workshop on Acoustic Transduction Materials and Devices, Baltimore, MD, 2001.
40. R. E. Eitel, S. E. Park, and C. A. Randall, Poster: "Novel Piezoelectric Systems: High Performance Materials for High Temperature Applications," Pennsylvania Chapter of IMAPS Fall Lunch, University Park, PA 2000.
41. R. E. Eitel, S. E. Park, and C. A. Randall, "Novel Piezoelectric Systems: Phase Stability and Property Predictions on the Basis of Structure," 102nd Annual Meeting of the American Ceramic Society, St. Louis, MO, 2000.
42. R.E. Eitel and Steven M. Pilgrim, Poster: "X-Ray Phase Transition Analysis of Cryogenic Perovskite Ceramics," 1999 U.S. Navy Workshop on Acoustic Transduction Materials and Devices, State College PA, 1999.
43. R.E. Eitel and S.M. Pilgrim, "The Use of In-Situ X-Ray Diffraction for the Characterization of Several Relaxor Ferroelectrics," 101st Annual Meeting of the American Ceramic Society, Indianapolis IN, 1999.
44. R.E. Eitel and S.M. Pilgrim, "X-Ray Phase Transition Analysis of Cryogenic Perovskite Ceramics," Proceedings of the 1998 Workshop on PMN, Alfred NY, 1998.
45. S. M. Pilgrim, C. B. DiAntonio, and R. E. Eitel, "Smart Electrostrictive Materials For Cryogenic Use: Compositions and Phase Transitions," The 56th Annual Pittsburgh Diffraction Conference, Pittsburgh, PA, 1998.

POSTER PRESENTATIONS: (PRESENTING, *GRAD/%UNDERGRAD ADVISEE, LAST 5 YEARS ONLY)

1. J.Luo, and R.E. Eitel, "An LTCC Clark-type oxygen sensor," to be presented at Materials Science & Technology 2011, Columbus, OH, 2011. (poster only)
2. J.L. Fischer*, A.L. Shearer%, J.M. Shapiro, M.A. Moss, R.E. Eitel, K.W. Anderson, "Cancer Cell Adhesion Studies for Understanding the Metastatic Cascade," Markey Cancer Center Day 2011, Lexington, KY, 2011. (poster only)
3. D. Cochran, P. Wattamwar, R. Eitel, K. Anderson, and T. Dziubla, "Endothelial Targeting of Antioxidant Polymer Nanoparticles for the Suppression of Vascular Oxidative Stress," Society for Biomaterials 2011 Annual Meeting, Orlando, FL, 2011. (poster only)
4. W. Zhang*, and R.E. Eitel, "Integration of Thick Film PZT Devices with Commercial LTCC Electronic Packaging Materials and Processing," Annual KYEPSCOR conference, Lexington, KY, 2010. (poster only)
5. J Poag*, K. Anderson, R.E. Eitel, and T Dziubla, "Endothelial Cell Culture in a Ceramic Microfluidic Device" Annual KYEPSCOR conference, Lexington, KY, 2010. (poster)

6. W. Zhang*, and R.E. Eitel, "Integration of Thick Film PZT Devices with Commercial LTCC Electronic Packaging Materials and Processing," 2006 U.S. Navy Workshop on Acoustic Transduction Materials and Devices, State College, PA, 2010. (poster) *Runner-up student paper competition*
7. S.O. Leontsev*, and R.E. Eitel, "TEM Investigation of Mn-modified (1-x)BiFeO₃-xBaTiO₃ Piezoelectric Ceramics" 2010 U.S. Navy Workshop on Acoustic Transduction Materials and Devices, State College, PA, 2010. (poster only)
8. L. Wolverton, J. Tarter, R.E. Eitel, M. Weissenburger, and C. Dowden, "Thermal Properties of Alumina Cathode Heater Potting Materials," International Vacuum Electronics Conference, Monterey, CA, 2010.
9. W. Zhang*, and R.E. Eitel, "Package-level Multilayered Piezoelectric Micropumps for Lab-on-Chip," 2009 MRS Fall Meeting, Boston, MA, 2009. (poster only)
10. J. Poag*, R. Eitel, K. Anderson, and T. Dzuibla, "Endothelial Cell Culture in a Ceramic Microfluidic Device," Biomaterials Day, Lexington, KY, 2009. (poster only) - *1st place in poster competition*
11. J. Poag*, R. Eitel, K. Anderson, and T. Dzuibla, "Endothelial Cell Culture in a Ceramic Microfluidic Device," University of Kentucky CMEGSA Poster Session, Lexington, KY, 2009. (poster only) - *Graduate choice award*
12. N.S. Satarkar, W. Zhang*, R. Eitel, J.Z. Hilt. Magnetic Hydrogel Nanocomposites for Remote Controlled Drug Delivery, Society For Biomaterials 2009 Annual Meeting and Exposition: Giving LIFE to a world of materials, San Antonio, TX, 2009. (poster only) *poster award*
13. S. W. Gotmare*, and R.E. Eitel, "Thermal Degradation and Aging of High Temperature Piezoelectric ceramics" MRS 2008: Fall Meeting, Boston, MA, 2008. (poster only)
14. W. Zhang*, and R.E. Eitel, "Active Component Fabrication for Low Temperature Co-fired Ceramics (LTCC) Microfluidic Devices", MRS 2008: Fall Meeting, Boston, MA, 2008. (poster only)
15. S. Leontsev*, and R. E. Eitel, "Phase Transition Behavior and Piezoelectricity in Bulk (1-x)BiFeO₃-xBaTiO₃", MRS 2008: Fall Meeting, Boston, MA, 2008. (poster only)