

Mark Andrew Borden

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Education

2003 Ph.D. in Chemical Engineering, University of California, Davis
1999 B.S. in Chemical Engineering, University of Arizona, Tucson

Experience

2013 – present Associate Professor
Department of Mechanical Engineering, University of Colorado, Boulder

2012 – present Fellow
Materials Science and Engineering Program, University of Colorado, Boulder

2011 – present Affiliate Faculty
Bioengineering, University of Colorado, Denver

2010-2013 Assistant Professor
Department of Mechanical Engineering, University of Colorado, Boulder

2007-2010 Assistant Professor
Department of Chemical Engineering, Columbia University

2005-2007 Visiting Scientist
Department of Radiology, University of Arizona
Advisor: Robert Gillies, Ph.D.

2003-2007 Project Scientist
Department of Biomedical Engineering, UC Davis
Advisor: Katherine Ferrara, Ph.D.

1999-2003 Graduate Research Assistant
Department of Chemical Engineering, UC Davis
Advisor: Marjorie Longo, Ph.D.

1998-1999 Undergraduate Research Assistant
Department of Electrical Engineering, University of Washington
Advisor: Deirdre Meldrum, Ph.D.

1997-1998 Undergraduate Research Assistant
Department of Chemical Engineering, University of Arizona
Advisor: Roberto Guzman, Ph.D.

Honors & Awards

2002, 2003 Exxon Summer Graduate Research Fellowship

2004 Professors for the Future Fellowship

2006 Travel Award & Plenary Session, Society for Molecular Imaging

2008 James D. Watson Investigator Award

2010 NSF CAREER Award

2011 Nicholas Rome Faculty Fellow

2013 McLagan Family Faculty Fellow

2013 NAE Frontiers of Engineering Symposium

2014 Outstanding Research Award, Department of Mechanical Engineering, CU-Boulder

2014 Dean's Faculty Fellowship, CU-Boulder

Popular Press

2006 Wired Magazine, "Microbubbles Fantastic Voyage"

2007 The Economist, "Bubbling Under"

2009 Columbia University Engineering Magazine, "Treating Tumors in Children"

2012 University of Colorado Engineering Alumni Magazine, "Building a Better (Micro) Bubble"

2014 Nature Nanotechnology, News & Views, "Ultrasound imaging: Better contrast with vesicles"

I. Research Grants

Ongoing Research Grants

NSF DMR 1409972 (PI: Borden)
Synthetic Alveoli for Enhanced Oxygen Delivery
09/01/2014-08/31/2017

NIH (NIBIB) R21 EB018034 (MPI: Goodwin, Borden, Gutierrez-Hartmann)
Targeted Microbubbles for Noninvasive Measurement of Tumor VEGF Levels
09/2014-09/2016

NIH (NCI) R01 CA195051 (MPI: Borden, Dayton, Thamm)
Ultrasound Molecular Imaging to Assess Therapeutic Response
04/2015-02/2019

NIH (NHLBI) R21 HL129144 (MPI: Terry, Borden)
Oxygen Microbubble Peritoneal Ventilation Treatment for Acute Respiratory Distress Syndrome
07/2015-06/2017

ONR (Undersea Medicine) 11766740
Peritoneal Microbubble Oxygen Treatment for DCS
01/2015-12/2016

Completed Research Grants

NYSTAR James D. Watson Investigator Award C020028 (PI: Borden)
Design and Testing of Microbubbles for Medical Applications
01/01/2008-12/31/2009

Stewart Trust Award for Pilot Projects in Cancer Research (PI: Kandel)
Combined Ultrasound/Molecular Analysis of VEGF Blockade in Wilms Tumor
07/01/2008-06/30/2009

NIH R21 Award (NCI) CA139173 (MPI: Borden and Kandel)
Combined Ultrasound/Molecular Analysis of VEGF Blockade in Wilms Tumor
05/05/2009-04/30/2011

St. Baldrick's Foundation Award 139214 (PI: Yamashiro)
Novel microbubble-based gene delivery vehicles targeting solid tumors
07/01/2009-06/30/2010

NSF Major Research Instrumentation CBET 0933621 (PI: Somasundaran)
Raman microscope for probing nano-bio interfaces and complex systems
09/01/2009-08/31/2010

NIH R01 Award (NIBIB) EB009066 (MPI: Borden and Dayton)
Immune-Shielded, Ultrasound-Stimulated Contrast Agents for Ultrasound Molecular Imaging
09/30/2008-6/30/2012 (1-year NCE)

CU Innovative Seed Grant (PI, Murray)
Plasmonic microbubbles
07/01/2012-06/30/2014

NIH R21 Award (NIBIB) EB014382 (MPI: Hung and Borden)
Microbubble Infused Hydrogels for Cartilage Tissue Engineering
08/15/2011-07/31/2013 (1-year NCE)

NSF CBET 1133687 (PI: Borden)

Lanthanide-Lipids as MR Biosensors and Probes for Focused Ultrasound Surgery
09/01/2011-08/31/2014

CCTSI Co-Pilot Grant Program, Independent Investigator (PI, Gutierrez-Hartmann)
Silencing transcription factor ESE-1 in vivo with tumor targeted sonoporation to treat breast cancer
01/01/2013-06/30/2014

NSF CAREER Award (Biomedical Engineering) CBET 0952681 (PI: Borden)
Phase-Shift Microbubbles for Intravenous Oxygenation
03/01/2010-02/28/2015

NSF CMMI 1100335 (PI: Borden)
Mechanics and Thermodynamics of Highly Compressed Lipid Monolayers
06/01/2011-05/31/2015

NIH (NIBIB) R21 EB015040 (MPI: Sirsi, Kandel and Borden)
Quantitative Monitoring & Control of Tumor Vascular Permeability in vivo Using Microbubble Contrast Agents
07/01/2012-06/30/2014

II. Publications

[Google Scholar Profile](#)

Citations 3656 (updated 1/2016)
H-index 32 (updated 1/2016)

A. Peer-Reviewed Journal Articles

1. Gravano SM, Borden MA, von Werne T, Doerffler EM, Salazar G, Chen A, Kisak E, Zasadzinski JA, Patten TE, Longo ML*. (2002) "Poly(4-(aminomethyl)styrene)-b-polystyrene: synthesis and unilamellar vesicle formation." *Langmuir* 18(5): 1938-1941.
2. Borden MA, Longo ML*. (2002). "Dissolution behavior of lipid monolayer-coated, air-filled microbubbles: effect of hydrophobic chain length." *Langmuir*. 18(24): 9225-9233.
3. Borden MA, Longo ML*. (2004) "Oxygen permeability of fully condensed lipid monolayers." *Journal of Physical Chemistry B*. 108(19): 6009-6016.
4. Borden MA, Pu G, Runner GJ, Longo ML*. (2004) "Surface phase behavior and microstructure of lipid monolayer-coated microbubbles." *Colloids and Surfaces B: Biointerfaces*. 35: 209-223.
5. Zhao S, Borden MA, Bloch S, Kruse D, Ferrara KW, Dayton PA*. (2004). "Radiation force assisted targeting facilitates ultrasonic molecular imaging." *Molecular Imaging*. 13: 1-14.
6. Pu G, Longo ML*, Borden MA*. (2005). "Effect of microstructure on molecular oxygen permeation through condensed phospholipid monolayers." *Journal of the American Chemical Society*. 127: 6424-6425.
7. Borden MA*, Kruse D, Caskey C, Zhao S, Dayton PA, Ferrara KW. (2005). "Influence of lipid shell physicochemical properties on ultrasound-induced microbubble destruction." *IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control*, 52: 1992-2002.
8. Lum A, Borden MA, Dayton PA, Kruse DE, Simon SI, Ferrara KW*. (2006). "Ultrasound radiation force enables targeted deposition of model drug carriers loaded on microbubbles." *Journal of Controlled Release*, 111: 128-134.
9. Pu G, Borden MA, Longo ML*. (2006). "Collapse and shedding transitions in binary lipid monolayers coating microbubbles." *Langmuir*, 22: 2993-2999.
10. Borden MA*, Martinez GV, Ricker JV, Tsvetokova N, Longo ML, Gillies RJ, Dayton PA, Ferrara KW. (2006). "Lateral phase separation in lipid-coated microbubbles." *Langmuir*, 22: 4291-4297.
11. Borden MA*, Sarantos MR, Stieger SM, Simon SI, Ferrara KW, Dayton PA. (2006). "Ultrasound radiation force modulates ligand availability on ultrasound contrast agents." *Molecular Imaging*, 5(3):139-147.
12. Borden MA*, Little E, Gillies RJ, Ferrara KW. (2007). "DNA and polylysine adsorption and multilayer construction onto cationic lipid-coated microbubbles." *Langmuir*, 23:9401-9408.
13. Steiger S, Dayton PA, Borden MA, Caskey CF, Griffey S, Wisner E, Ferrara K*. (2007). "Imaging of angiogenesis using Cadence (TM) contrast pulse sequencing and targeted contrast agents." *Contrast Media and Molecular Imaging*, 3:9-18.
14. Ferrara KW*, Pollard R, Borden MA. (2007). "Ultrasound microbubble contrast agents: fundamentals and applications in gene and drug delivery." *Annual Review of Biomedical Engineering*, 9:415-447.

15. Borden MA*, Zhang H, Gillies RJ, Dayton PA, Ferrara KW. (2008). "A stimulus-responsive contrast agent for ultrasound molecular imaging." *Biomaterials*, 29:597-606.
16. Feshitan JA, Chen CC, Kwan JJ, Borden MA*. (2009). "Microbubble size isolation by differential centrifugation." *Journal of Colloid and Interface Science*, 329:316-324.
17. Borden MA*. (2009). "Nanostructural features on stable microbubbles." *Soft Matter*, 5:716-720.
18. Ferrara KW*, Borden MA, Zhang H. (2009). "Lipid-shelled vehicles: engineering for ultrasound molecular imaging and drug delivery." *Accounts of Chemical Research*, 42:881-892.
19. Longo ML*, Lozano MM, Borden MA. (2009). "Physical chemistry of experimental models for lipid shells of medical microbubbles." *Bubble Science, Engineering and Technology*. 1:18-30.
20. Sirsi S, Borden MA*. (2009). "Microbubble compositions, properties and biomedical applications." *Bubble Science, Engineering and Technology*. 1:3-17.
21. Sirsi S, Pae C, Oh DKT, Blomback H, Koubaa A, Papahadjopoulos-Sternberg B, Borden MA*. (2009). "Lung surfactant microbubbles." *Soft Matter*, 5:4835-4842.
22. Choi JJ, Feshitan JA, Baseri B, Wang S, Tung YS, Borden MA, Konofagou EE*. (2010). "Microbubble-size dependence of focused ultrasound-induced blood-brain barrier opening in mice *in vivo*." *IEEE Transactions on Biomedical Engineering*, 57:145-154.
23. Kwan JJ, Borden MA*. (2010). "Microbubble dissolution in a multigas environment." *Langmuir*. 26: 6542–6548.
24. Sirsi S, Feshitan J, Kwan J, Homma S, Borden MA*. (2010). "Effect of microbubble size on fundamental mode high frequency ultrasound imaging of mice." *Ultrasound in Medicine and Biology*. 6:935-948.
25. Epstein-Barash H, Orbey G, Polat BE, Ewoldt RH, Feshitan J, Langer R, Borden MA, Kohane DS*. (2010). "A microcomposite hydrogel for repeated on-demand ultrasound-triggered drug delivery." *Biomaterials*. 31:5208-5217.
26. Chen CC, Borden MA*. (2010). "Ligand conjugation to bimodal brush layers on microbubbles." *Langmuir*. 26:13183-13194.
27. Swanson EJ, Mohan V, Kheir J, Borden MA*. (2010). "Phospholipid stabilized microbubble foam for injectable oxygen delivery." *Langmuir*, 26:15726-15729.
28. Mullin L, Gessner R, Kwan J, Kaya M, Borden MA, Dayton PA*. (2011). "Effect of anesthesia carrier gas on *in vivo* circulation times of ultrasound microbubble contrast agents in rats." *Contrast Media and Molecular Imaging*, 6:126-131.
29. Chen CC, Borden MA*. (2011). "The role of poly(ethylene glycol) brush architecture in complement activation on targeted microbubble surfaces." *Biomaterials*, 32:6579-6587.
30. Tung YS, Vlachos F, Feshitan JA, Borden MA, Konofagou EE*. (2011). "The mechanism of interaction between focused ultrasound and microbubbles in blood-brain barrier opening in mice." *Journal of the Acoustical Society of America*, 130:3059–3067.
31. Swanson EJ, Borden MA*. "Injectable oxygen delivery based on protein-shelled microbubbles." (2011). *Nano LIFE*, 1:215-218.
32. Feshitan JA, Vlachos F, Sirsi SR, Konofagou EE, Borden MA*. (2012). "Theranostic Gd(III)-lipid microbubbles for MRI-guided focused ultrasound surgery." *Biomaterials*, 33:247-255.
33. Sirsi SR, Hernandez S, Zielinski L, Blomback H, Koubaa A, Synder M, Homma S, Kandel JJ, Yamashiro DJ, Borden MA*. (2012). "Polyplex-microbubble hybrids for ultrasound-guided plasmid DNA delivery to solid tumors." *Journal of Controlled Release*, 157:224–234. **COVER ARTICLE.**
34. Chen CC, Sirsi SR, Borden MA*. (2012). "Effect of surface architecture on *in vivo* ultrasound contrast persistence of targeted size-selected microbubbles." *Ultrasound in Medicine and Biology*, 38:492-503.
35. Flexman ML, Vlachos F, Kim HK, Sirsi S, Huang J, Hernandez SL, Johung TJ, Gander J, Reichstein A, Lampl BS, Wang A, Borden MA, Yamashiro DJ, Kandel JJ, Hielscher HJ*. (2012). "Monitoring Early Tumor Response to Drug Therapy with Diffuse Optical Tomography." *Journal of Biomedical Optics*, 17:016014.
36. Kwan JJ, Borden MA*. (2012). "Lipid monolayer mechanics during microbubble gas exchange." *Soft Matter*. 8:4756-4766.
37. Sirsi SR, Flexman M, Vlachos F, Huang J, Hernandez SL, Kim HK, Johung TJ, Gander J, Reichstein A, Lampl BS, Wang A, Hielscher AH, Yamashiro DJ, Kandel JJ, Borden MA*. (2012). "Contrast ultrasound allows identification of early responder tumor models to anti-angiogenic therapy." *Ultrasound in Medicine and Biology*. 38:1019–1029.
38. Kheir JN*, Scharp LA, Borden MA, Swanson EJ, Loxley A, Reese JH, Black K, Velazquez LA, Walsh BK, Mullen KE, Graham DA, Lawlor MW, Brugnara C, Bell DC, McGowan FX. (2012). "Oxygen Gas-Filled Microparticles Provide Intravenous Oxygen Delivery." *Science Translational Medicine*. 4:140ra88.
39. Thomas, Looney, Butler, McDicken, Anderson, Emmer, Vos, de Jong, Borden, Stride, Pelekasis, Sboros. (2012). "The "quasi-stable" lipid shelled microbubble in response to consecutive ultrasound pulses." *Applied Physics Letters*. Volume 101: article 071601.

40. Kwan JJ, Borden MA*. (2012). "Lipid monolayer collapse and microbubble stability." *Advances in Colloid & Interface Science*. 183–184:82–99.
41. Kwan JJ, Kaya M, Borden MA, Dayton PA*. (2012). "Theranostic oxygen delivery with ultrasound." *Theranostics*. 2(12):1174-1184.
42. Sirsi SR, Borden MA*. (2012). "Advances in ultrasound mediated gene therapy using microbubble contrast agents." *Theranostics*. 2(12):1208-1222. **COVER ARTICLE**.
43. Borden MA, Rege K. (2012). "Theranostic biocolloids: soft matter colloids for imaging and therapy." *Theranostics*. 2(12):1115-1116.
44. Lima*, Sirsi, Borden, Hung. (2012). "Microbubbles as biocompatible porogens for hydrogel scaffolds." *Acta Biomaterialia*. 8(12):4334–4341.
45. Feshitan, Boss, Borden*. (2012). "Magnetic resonance properties of Gd-microbubbles and their cavitation fragments." *Langmuir*. 28(43):15336–15343.
46. Borden*, Streeter, Sirsi, Dayton. (2013). "In vivo demonstration of cancer molecular imaging with ultrasound radiation force and buried-ligand microbubbles" *Molecular Imaging*. 12(0):1-8.
47. Garg, Thomas, Borden*. (2013). "The effect of lipid monolayer in-plane rigidity on in vivo microbubble circulation persistence." *Biomaterials*. 34(28):6862-70. **LEADING OPINION**.
48. Dove, Murray, Borden*. (2013). "Enhanced photoacoustic response with plasmonic nanoparticle-templated microbubbles." *Soft Matter*. 9(32):7743-7750.
49. Sirsi, Fung, Garg, Tianning, Mountford, Borden*. (2013). "Lung surfactant microbubbles increase lipophilic drug payload for ultrasound-targeted delivery." *Theranostics*. 3(6):409-419.
50. Feshitan, Legband, Borden*, Terry*. (2014). "Systemic oxygen delivery by peritoneal perfusion of oxygen microbubbles." *Biomaterials*, 35(9):2600-2606.
51. Satinover, Dove, Borden*. (2014). "Single-particle optical sizing of microbubbles." *Ultrasound in Medicine and Biology*, 40(1):138-47.
52. Sirsi SR, Borden MA*. (2014). "State-of-the-art materials for ultrasound-triggered drug delivery." *Advanced Drug Delivery Reviews*, 7:3-14. **COVER ARTICLE**.
53. Mountford, Sirsi, Borden*. (2014). "Condensation phase diagrams for lipid-coated perfluorobutane microbubbles". *Langmuir*, 30(21):6209-18
54. Dove, Borden*, Murray*. (2014). "Optically induced resonance of nanoparticle-loaded microbubbles." *Optics Express*, 39(13):3732-5.
55. Liu, Feshitan, Wei, Borden, Yuan*. (2014). "Ultrasound-modulated fluorescence based on fluorescent microbubbles." *Journal of Biomedical Optics*, 19(8):085005.
56. Borden MA*. (2014). "Microbubble dispersions of natural lung surfactant." *Current Opinion in Colloid and Interface Science*, 19(5):480-489.
57. Mountford, Sirsi, Borden*. (2014). "Condensation Phase Diagrams for Lipid-Coated Perfluorobutane Microbubbles." *Langmuir*, 30(21):6209–6218.
58. Dove, Mountford, Murray*, Borden*. (2014). "Engineering optically triggered droplets for photoacoustic imaging and therapy." *Biomedical Optics Express* 5(12):4417-4427.
59. Legband N, Feshitan JA, Borden MA, Terry B*. (2015). "Evaluation of Peritoneal Microbubble Oxygenation Therapy in a Rabbit Model of Hypoxemia." *IEEE Transactions on Biomedical Engineering*, 62(5):1376-1382.
60. Fix S, Borden MA, Dayton PA*. (2015). "Therapeutic gas delivery via microbubbles and liposomes." *Journal of Controlled Release*, 209:139-149.
61. Mountford, Thomas, Borden*. (2015). "Thermal Activation of Superheated Lipid-Coated Perfluorocarbon Drops" *Langmuir* 31(16):4627-4634.
62. McEwan, Owen, Stride, Fowley, Nesbitt, Cochrane, Coussios, Borden, Nomikou, McHale, Callan*. (2015). "Oxygen carrying microbubbles for enhanced sonodynamic therapy of hypoxic tumours" *Journal of Controlled Release* 203:51-56.
63. Liu, Feshitan, Wei, Borden, Yuan*. (2015). "Ultrasound-modulated fluorescence based on donor-acceptor-labeled microbubbles." *Journal of Biomedical Optics*. 20(3):036012-036012.
64. Mountford, Smith, Borden*. (2015). "Fluorocarbon Nanodrops as Acoustic Temperature Probes." *Langmuir* 31(39):10656-10663.
65. Song, Fan, Brlansky, Trudeau, Gutierrez-Hartmann, Calvisi, Borden*. (2015). "High Efficiency Molecular Delivery with Sequential Low-Energy Sonoporation Bursts." *Theranostics*. 5(12):1419.
66. McEwan, Kamila, Owen, Nesbitt, Callan, Borden, Nomikou, Hamoudi, Taylor, Stride, McHale, Callan*. (2016). "Combined sonodynamic and antimetabolite therapy for the improved treatment of pancreatic cancer using oxygen loaded microbubbles as a delivery vehicle." *Biomaterials*. 80:20-32.

B. Book Chapters, Peer-Reviewed

1. Borden MA & Dayton PA. (2008). "Ultrasound Contrast Agents" in Molecular Imaging in Oncology. Ed., Pomper M., Informa Healthcare, Inc.
2. Dayton PA & Borden MA. (2008). "Ultrasound Molecular Imaging" in Molecular Imaging in Oncology. Ed., Pomper M., Informa Healthcare, Inc.
3. Borden MA, Qin S, Ferrara KW. (2010). "Ultrasound Contrast Agents" in Molecular Imaging: Principles and Practice. Ed., Weissleder R., BC Dekkar, Inc.
4. Borden MA, Sirsi SR, Kwan JJ. (2011). "Microbubble Stability and Dynamics" in Encyclopedia for Surface and Colloid Science. Ed., Somasundaran P., Taylor and Francis, Inc.
5. Borden, Dove, Murray. (2016). "Plasmonic nanoparticles-coated microbubbles for theranostic applications" in Nanotheranostics for Personalized Medicine. World Scientific.
6. Borden. (2016). "Lipid-coated nanodrops and microbubbles" in Handbook of Ultrasonics and Sonochemistry. Springer.

C. Patents

1. "Microbubbles and methods for oxygen delivery." US 8,481,077 B2, July 2013.
2. "Systems and methods for opening a tissue." PCT/US2009/056565.
3. "Isolation of microbubbles of a selected size range from polydisperse microbubbles." PCT/US2009/056513.
4. "Systems, methods and devices for microbubbles." PCT/US2010/048887.
5. "Systems, methods, and devices for production of gas-filled microbubbles." PCT/US2010/046854.
6. "Methods, devices, and systems for on-demand, ultrasound-triggered drug delivery." PCT/US2010/060691.
7. "Systems, methods, and devices for plasmid gene transfection using polymer-modified microbubbles." PCT/US2011/49455
8. "Systems, methods, and devices for ultrasonic assessment of cancer and response to therapy." PCT/US2011/46830
9. "Medical imaging contrast devices, methods and system." PCT/US2011/46865
10. "Methods, devices and systems for preparing targeted microbubbles" PCT/US2011/034704
11. "Formulation and ultrasound studies of a new pro-bubble (phase-shift agent) for activation with low acoustic intensities" provisional patent 61/505,915.

III. Presentations

A. Invited Lectures at Conferences, Universities, Institutes and Companies

1. "Probing the gas permeability of the lipid monolayer shell of a microbubble ultrasound contrast agent." Dept. of Chemical & Environmental Engineering, University of Arizona, Tucson, AZ. 2005.
2. "Physicochemical properties of targeted microbubble shells." 11th European Ultrasound Contrast Symposium. Rotterdam, **Netherlands**. 2006.
3. "Ultrasound in molecular imaging." Molecular Imaging Workshop for the International Society for Magnetic Resonance in Medicine. Cancun, **Mexico**. 2007.
4. "Microbubbles for medical applications." Harvard Medical School and Boston Children's Hospital. Boston, MA. 2008.
5. "Ultrasound molecular imaging." Irving Cancer Research Center, Columbia University, New York, NY. 2008.
6. "Microbubbles in molecular imaging and targeted therapy." Dept. of Chemical Engineering, City College of New York, NY. 2008.
7. "Microbubbles in molecular imaging and targeted therapy." Dept. of Chemical Engineering, Brooklyn Polytechnic University, New York, NY. 2008.
8. "Lipid-coated microbubbles: fundamentals and biomedical applications." Fluid Dynamics Seminar, NJIT, Newark, NJ. 2008.
9. "Lipid-coated microbubbles: fundamentals and application to ultrasound molecular imaging and targeted drug delivery." Dept. of Chemical Engineering, Drexel University, Philadelphia, PA. 2008.
10. "Medical microbubbles." Riverside Research Institute, New York, NY. 2008.
11. "Microbubbles: an emerging vehicle for drug delivery." Dept. of Chemical Engineering, Arizona State University, Tempe, AZ. 2009.
12. "Lipid-coated microbubbles: fundamentals and applications." New England Complex Fluids Workshop, Yale University, New Haven, CT. 2009.
13. "Microbubble size affects intensity and duration of ultrasound contrast enhancement in mice." Contrast Media Research Conference, Copenhagen, **Denmark**. 2009.
14. "Acoustic imaging." Moffitt Cancer Center, Tampa, FL. 2010.

15. "Microbubble design for evaluating cancer chemotherapy." Dept. of Chemical Engineering, Brigham Young University, Provo, UT. 2010.
16. "Engineering microbubbles: ultrasound molecular imaging & targeted gene delivery." Seminar at Philips Research Facility, Briarcliff, NY. 2010.
17. "Design and testing of microbubbles for intravenous oxygenation." Symposium on Microbubbles & Microencapsulation for Drug Delivery, University College London, **United Kingdom**, April 2010.
18. "Design principles for medical microbubbles." Department of Chemical Engineering, University of Arizona, Tucson, AZ. 2010.
19. "The design of targeted microbubbles for ultrasound guidance of cancer treatment." Department of Chemical Engineering, Colorado School of Mines, Golden, CO. 2011.
20. "Contrast enhanced ultrasound for monitoring tumor response to therapy." Colorado Translational Research Imaging Center, Denver, CO. 2011.
21. "Microbubble coatings, fabrication and design." Artimino Conference on Advances in Ultrasound Technology, Florence, **Italy**. 2011.
22. "Sonoporation." 17th European Symposium on Ultrasound Contrast Imaging, Rotterdam, **Netherlands**, January 2012.
23. "Fundamentals and applications of lipid-coated microbubbles." Oxford University, Oxford, **United Kingdom**, January 2012.
24. "Design principles for medical microbubbles." Department of Mechanical and Aerospace Engineering, University of Colorado at Colorado Springs, March 2012.
25. "Design principles for medical microbubbles." Department of Physics and Astronomy, University of New Mexico, Department of Physics & Astronomy, Albuquerque, March 2012.
26. "Dilatational mechanical properties of lipid-coated microbubbles during gas exchange." Physics of Fluids, University of Twente, **Netherlands**, April 2012.
27. "Surface mechanics of medical microbubbles." Department of Mechanical Engineering, University of California Los Angeles, May 2012.
28. "Microbubbles in Medicine." Department of Biochemistry, University of Colorado, Denver, Roundtable Discussion, September 2012.
29. "Design principles for medical microbubbles." SciMath Colloquium, UNK, Kearney, NE, January 2013.
30. "Modulating molecular cohesive forces to synthesize ultrasound microbubbles." LEEDS Microbubble Symposium, Leeds, **United Kingdom**.
31. "Microbubble Engineering." Focused Ultrasound Foundation Symposium on Drug Delivery through the BBB, Bethesda, MD, September 2013.
32. "Molecular Engineering of Microbubble Shells." Department of Biomedical Engineering, Boston University, Boston, MA, August 2014.
33. "Molecular Engineering of Microbubble Shells." Department of Chemical Engineering, University of Arizona, Tucson, AZ, September 2014.
34. "Molecular Engineering of Microbubble Shells." Department of Mechanical Engineering, George Washington University, Washington, DC, October 2014.
35. "Ultrasound-Gated Molecular Imaging of Tumor Microenvironment." Department of Surgery, University of Chicago, Chicago, IL, March 2015.
36. "Peritoneal Microbubble Oxygenation Prolongs Survival in a Lung Injury Model." Department of Pediatrics, Anschutz Medical Campus, Denver, CO, June 2015.

B. Contributed Oral Presentations (presenter in bold)

37. **Borden**, Longo. (2002). "Dissolution behavior of lipid-coated, air-filled microbubbles: effect of lipid hydrophobic chain length." University of California System-Wide Biomedical Engineering Symposium, Santa Barbara, CA.
38. **Borden**, Longo. (2003). "Transport properties and surface microstructure of lipid monolayer-coated microbubbles." Materials Research Society, San Francisco, CA.
39. **Borden**, Longo. (2003). "Transport properties and surface microstructure of lipid monolayer-coated microbubbles." AIChE Annual Meeting, San Francisco, CA.
40. **Borden**, Longo. (2004). "Surface microstructure and transport properties of lipid/emulsifier monolayer-coated microbubbles." Materials Research Society, San Francisco, CA.
41. **Borden**, Ferrara. (2004). "Physicochemical properties of the microbubble lipid shell." IEEE Ultrasonics Symposium, Montreal, **Canada**.
42. **Borden**, Ferrara. (2005). "Phase Behavior and Transport Properties of the Lipid-Monolayer Shell of a Microbubble." ACS Fall Meeting, Washington, DC.
43. **Borden**, Ferrara. (2005). "Engineering the lipid microbubble shell for molecular imaging and targeted drug delivery." BMES Annual Meeting, Baltimore, MD.

44. **Borden**, Ferrara. (2005). "The electrode-bubble technique to measure the gas permeability of thin films." BMES Annual Meeting, Baltimore, MD.
45. **Borden**, Ferrara. (2006). "Ultrasound radiation force gated adhesion of targeted microbubbles." Society for Molecular Imaging Annual Meeting, Hawaii.
46. **Borden**, Ferrara. (2006). "Engineering the microbubble shell for molecular imaging and targeted drug delivery." SBE International Conference on Bioengineering and Nanotechnology, Santa Barbara, CA.
47. **Borden**, Dayton and Ferrara. (2007). "Focused adhesion and reduced immunogenicity using stimulus-responsive ultrasound contrast agents." IEEE Ultrasonics Symposium, New York, NY.
48. **Borden**, Dayton and Ferrara. (2007). "Stimulus-responsive ultrasound contrast agents for molecular imaging." AIChE Annual Meeting, Salt Lake City, UT.
49. **Borden** and Ferrara. (2007). "Compartmentalized and multilayered DNA loading onto lipid-coated microbubbles." AIChE Annual Meeting, Salt Lake City, UT.
50. **Choi**, Feshitan, Wang, Tung, Baseri, Borden Konofagou. (2008). "The dependence of the ultrasound-induced blood-brain barrier opening characteristics in vivo on microbubble size." Symposium for International Society of Therapeutic Ultrasound, Minneapolis, MN.
51. **Kheir**, Zurakowski, McGowan, Borden. (2008). "Novel oxygen-bearing nanoparticles provide dose-dependent oxygen delivery." Society of Critical Care Medicine, Hawaii.
52. **Borden**, Kheir, McGowan. (2008). "Designing microbubbles for intravenous oxygenation." ACS Colloids Symposium, Raleigh, NC.
53. **Borden**. (2008). "Lung surfactant microbubbles." AIChE Annual Meeting, Philadelphia, PA.
54. **Borden**, Kheir, McGowan. (2008). "Microbubbles for intravenous oxygenation." AIChE Annual Meeting, Philadelphia, PA.
55. **Borden**, Kandel, Yamashiro. (2008). "Facile size isolation and peptide conjugation to lipid-coated microbubbles: application to molecular imaging of renal tumor models." AIChE Annual Meeting, Philadelphia, PA.
56. Kaya, Streeter, Borden, Feshitan, Hetiarachchi, Lee, **Dayton**. (2009). "The role of microbubble size distribution in ultrasound imaging." 13th International Conference on Surface and Colloid Science, New York, NY.
57. **Sirsi**, Chen, Feshitan, Kwan, Fung, Borden. (2009). "Development of "bulky" lipid microbubbles for ultrasound triggered drug delivery." 13th International Conference on Surface and Colloid Science, New York, NY.
58. Sirsi, Feshitan, Homma, **Borden**. (2009). "High-frequency contrast ultrasound imaging of size-isolated microbubbles in mice." IEEE Ultrasonics Meeting, Rome, **Italy**.
59. **Sirsi**, Feshitan, Homma, Borden. (2009). "High-frequency in vivo ultrasound imaging of size-isolated microbubbles." World Molecular Imaging Congress, Montreal, **Canada**.
60. **Sirsi**, Chen, Feshitan, Kwan, Fung, Blomback, Borden. (2009). "Development of "Bulky" Lipid Microbubbles for Ultrasound Triggered Drug Delivery." AIChE Annual Meeting, Nashville, TN.
61. **Sirsi**, Blomback, Zielinski, Hernandez, Yamashiro, Kandel, Borden. (2009). "Utilizing novel microbubbles for efficient delivery of plasmid DNA to tumors." AIChE Annual Meeting, Nashville, TN.
62. **Sirsi**, Feshitan, Homma, Borden. (2009). "High-frequency in vivo ultrasound imaging of size-isolated microbubbles." AIChE Annual Meeting, Nashville, TN.
63. **Durney**, Sirsi, Nover, Ateshian, Konofagou, Maleke, Borden, Lima, and Hung. (2010). "Using microbubbles to modulate hydrogel scaffold properties for cartilage tissue engineering." Annual Meeting of the Orthopedic Research Society, New Orleans, LA.
64. **Sirsi**, Chen, Hernandez, Huang, Johung, Yamashiro, Kandel, Homma, Borden. (2010). "Comparing tumor response to VEGF blockade therapy using high frequency ultrasound imaging with size-selected microbubble contrast agents." BMES Annual Meeting, Austin, TX.
65. **Feshitan**, Sirsi, Kwan, Tung, Konofagou, Borden. (2010). "Engineering microbubbles for focused ultrasound therapy." AIChE Annual Meeting, Salt Lake City, UT.
66. **Kwan**, Borden. (2010). "Microbubble Dissolution in a multi-gas environment." AIChE Annual Meeting, Salt Lake City, UT.
67. **Chen**, Borden. (2010). "Ligand conjugation to bimodal PEG brush layers on microbubbles." AIChE Annual Meeting, Salt Lake City, UT.
68. **Sirsi**, Chen, Hernandez, Huang, Johung, Yamashiro, Kandel, Homma, Borden. (2010). "Comparing tumor response to VEGF blockade therapy using high frequency ultrasound imaging with size-selected microbubble contrast agents." IEEE Ultrasonics Symposium, San Diego, CA.
69. Kwan, **Borden**. (2010). "Microbubble shell break-up and collapse during gas exchange." IEEE Ultrasonics Symposium, San Diego, CA.
70. **Samiotaki**, Vlachos, Tung, Feshitan, Borden, Konofagou. (2011). "Pressure and microbubble size dependence study of focused ultrasound-induced blood-brain barrier's opening reversibility in vivo." Symposium for International Society of Therapeutic Ultrasound, New York, NY.

71. **Vlachos**, Tung, Feshitan, Borden, Konofagou. (2011). "Blood-brain barrier permeability dependence on acoustic and microbubble parameters." Symposium for International Society of Therapeutic Ultrasound, New York, NY.
72. **Tung**, Vlachos, Feshitan, Borden, Konofagou. (2011). "The bubble-dependent mechanism of FUS-induced blood-brain barrier opening in mice in vivo." Symposium for International Society of Therapeutic Ultrasound, New York, NY.
73. Swanson, Mohan, Kheir, **Borden**. (2011). "Lipid and protein carriers for injectable oxygen." ACS Colloids, Montreal, **Canada**.
74. **Borden**. (2011). "Ultrasound contrast agents and drug delivery vehicles." Preclinical Micro-ultrasound & Photoacoustic Imaging Symposium, Denver, CO.
75. **Borden**, Kwan. (2011). "Dynamics of lipid-coated microbubbles." ACS Fall Meeting, Denver, CO.
76. **Sirsi**, Hernandez, Zielinski, Blomback, Koubaa, Synder, Kandel, Yamashiro, Borden. (2011). "A novel polyplex-microbubble hybrid for improved ultrasound-mediated plasmid DNA delivery." BMES Annual Meeting, Hartford, CT.
77. **Feshitan**, Vlachos, Tung, Konofagou, Borden. (2011). "Gadolinium-bound microbubble shells for MRI biosensors." AIChE Annual Meeting, Minneapolis, MN.
78. **Kwan**, Borden. (2011). "Phospholipid encapsulation properties and effects on microbubble stability and dynamics." AIChE Annual Meeting, Minneapolis, MN.
79. **Borden**, Swanson, Song. (2011). "Synthetic Alveoli: biomimetic microbubbles for injectable oxygen delivery." ASME International Mechanical Engineering Congress and Exposition, Denver, CO.
80. **Borden**, Kwan. (2012). "Lipid Monolayer Studies on a Micro-Spherical Langmuir Trough." International Association of Colloid and Interface Scientists, Sendai, **Japan**.
81. **Sirsi**, Fung, Garg, Tianning, Mountford, Borden. (2012). "Development of "Bulky" Lipid Microbubbles for Improved Drug Loading and Enhanced Ultrasound Triggered Drug Delivery." BMES Annual Meeting, Atlanta, GA.
82. **Dove**, Murray, Borden. (2012). "Gold Nanoparticle Templated Microbubbles as Dual Mode Contrast Agents with Enhanced Photoacoustic Signals." ASME IMECE, Houston, TX. **Travel Award**.
83. **Kwan**, Borden. (2012). "Microbubble Response to Gas Exchange." Surfactants in Solution International Conference, Edmonton, Alberta, Canada.
84. **Dove**, Murray, Borden. (2013). "Gold Nanoparticle-Templated Microbubbles as Dual Mode Contrast Agents with Enhanced Photoacoustic Signals." ASME Global Congress on Nano Engineering for Medicine and Biology, Boston, MA.
85. **Song**, Sirsi, Trudeau, Gutierrez-Hartmann, Borden. (2013). "Microbubble-assisted sonoporation for in vitro delivery of siRNA to breast cancer cells." ASME Global Congress on Nano Engineering for Medicine and Biology, Boston, MA. **Outstanding Paper Award**.
86. **Dove**, Borden, Murray. (2013). "Plasmonic microbubbles as dual mode contrast agents with enhanced photoacoustic generation." 245th ACS National Meeting, New Orleans, LA.
87. **Borden**. (2013). "Design of lipid-coated microbubbles for oxygen delivery." 245th ACS National Meeting, New Orleans, LA.
88. Garg, Thomas, **Borden**. (2013). "Enhanced circulation persistence of microbubbles coated with longer chain lipids." 245th ACS National Meeting, New Orleans, LA.
89. **Feshitan**, Boss, Borden. (2013). "Magnetic resonance properties of Gd(III)-bound lipid-coated microbubbles and their cavitation fragments." 245th ACS National Meeting, New Orleans, LA.
90. **Sirsi**, Hernandez, Zeilinski, Blomback, Koubaa, Synder, Homma, Kandel, Yamshiro, Borden. (2013). "Polyplex-microbubble hybrids for ultrasound-guided plasmid DNA delivery to solid tumors." 245th ACS National Meeting, New Orleans, LA.
91. **Mountford**, Borden. (2013). "Thermodynamics of perfluorocarbon microbubble phase-change agents." 5th ACS National Meeting, New Orleans, LA. **CU Travel Award**.
92. **Dove**, Murray, Borden. (2013). "Characterization of optically induced microbubble oscillations." BMES annual meeting, Seattle, WA.
93. **Sirsi**, Kandel, Yamashiro, Borden. (2013). "Quantitative Control of Tumor Drug Uptake In Vivo using Microbubble Contrast Agents." BMES annual meeting, Seattle, WA.
94. **Song**, Sirsi, Trudeau, Gutierrez-Hartmann, Borden. (2014). "Microbubble-assisted sonoporation for *in vitro* delivery of siRNA to breast cancer cells." ASME NEMB, San Francisco, CA.
95. **Mountford**, Borden. (2014). "Condensation thermodynamics of microbubble-derived phase-shift theranostic agents." ASME NEMB, San Francisco, CA.
96. **Dove**, Borden, Murray. (2014). "Gold nanoparticle templated microbubbles for enhanced photoacoustic and ultrasound." SPIE Photonics West, San Francisco, CA.

97. **Borden**, Mountford. (2014). "Effect of Lipid Monolayer Composition on Fluorocarbon Microbubble Condensation." ACS Colloids Meeting, Philadelphia, PA.
98. **Borden**, Dove, Murray. (2014). "Gold nanoparticle coated microbubbles for enhanced photoacoustic imaging." ACS Colloids Meeting, Philadelphia, PA.
99. **Borden**, Song, Fan. (2014). "Microbubble Size, Acoustic Interactions and In Vitro Sonoporation Efficiency." ACS Colloids Meeting, Philadelphia, PA.
100. **Borden**, Feshitan, Legband, Terry. (2014). "Peritoneal Microbubble Oxygenation Prolongs Survival in a Lung Injury Model." ACS Colloids Meeting, Philadelphia, PA.
101. **Kelly**, Sirsi, Nover, Chen, Ditzel, Mountford, Etezazian, Ateshian, Borden, Hung. (2014). "Dynamic hydrostatic pressure-induced formation of micropores in mature tissue-engineered articular cartilage." BMES Annual Meeting, San Antonio, TX.
102. **Mountford**, Sirsi, Borden. (2014). "Condensation Properties of Perfluorobutane Microbubbles." IEEE Ultrasonics Meeting, Chicago, IL.
103. **Legband**, Buesing, Borden, Terry. (2015). "The Treatment of Acute Respiratory Distress Syndrome in Rats With a Peritoneal Dosing System." *Journal of Medical Devices* 9(2):020929.
104. **Buesing**, Legband, Goede, Borden, Terry. (2015). "Alternative to ECMO: Development of a novel peritoneal membrane oxygen delivery system." *SHOCK*. 43(6):67-68.
105. **Borden**, Mountford. (2015). "Design Rules for Acoustic Phase-Change Agents." ACS Colloids Meeting, Pittsburgh, PA.
106. **Song**, Fan, Brlansky, Trudeau, Gutierrez-Hartmann, Calvisi, Borden. (2015). "Efficient microbubble-assisted sonoporation for in vitro applications." ASME NEMB, Minneapolis, MN.
107. **Mountford**, Sirsi, Thomas, Borden. (2015). "Dynamic Phase Behavior of Theranostic Phase-Change Nanodrops." ASME NEMB, Minneapolis, MN.
108. **Borden**. (2015). "Microbubble Engineering." Nanomedicine Symposium, Anschutz Medical Center, Denver, CO.

C. Poster Conference Presentations (presenter in bold)

109. **Borden MA**, Longo ML. (2000). "Effect of lipid type and lipopolymer on the stability of air-filled microbubbles." American Institute of Chemical Engineers. Los Angeles, CA.
110. **Borden MA**, Longo ML. (2001). "Effect of lipid chain length on the dissolution behavior of lipid-stabilized microbubbles." The American Chemical Society, San Diego, CA.
111. **Borden**, Longo. (2001). "Effect of lipid chain length on the dissolution behavior of lipid-stabilized microbubbles." American Institute of Chemical Engineers, Reno, NV.
112. **Borden**, Longo. (2002). "Dissolution of lipid-coated microbubbles: effect of lipid chain length." Biophysical Society, Annual Meeting. San Francisco, CA.
113. **Borden**, Longo. (2003). "The physicochemical properties of therapeutic microbubbles." Sacramento Biotechnology Summit. Sacramento, CA.
114. **Borden**, Longo. (2003). "Transport properties and surface morphology of the microbubble lipid shell." Biophysical Society, Annual Meeting. San Antonio, TX.
115. **Borden**, Ferrara. (2004). "The physicochemical properties of therapeutic microbubbles." Sacramento Life Sciences Summit. Sacramento, CA.
116. **Borden**, Ferrara. (2004). "Surface architecture modulation in ultrasonic molecular imaging." Society for Molecular Imaging. St. Louis, MO.
117. **Borden**, Ferrara. (2004). "Surface architecture modulation in ultrasonic molecular imaging." 10th Annual Cancer Research Symposium, UC Davis Cancer Center. Sacramento, CA.
118. **Borden**, Ferrara, Gillies. (2006). "Radiation force-gated adhesion of ultrasound contrast agents." Sixth Arizona Biosciences Leadership Symposium, Sponsored by the Flinn Foundation. Phoenix, AZ.
119. **Borden**, Ferrara. (2006). "Ultrasound Imaging and Local Drug Delivery in Tumors." NIH Bioengineering Research Partnership (BRP) Grantees Meeting. Bethesda, MD.
120. **Borden**, Ferrara. "Engineering ultrasound contrast agents for molecular imaging and drug delivery." (2006). Gordon Research Conference on Drug Carriers in Medicine and Biology. Big Sky, MT.
121. **Feshitan**, Kwan, Borden. (2008). "Kinetically controlled design of microbubbles for targeted delivery and molecular imaging." Gordon Research Conference on Drug Carriers in Medicine and Biology, Big Sky, MT.
122. **Chen**, Borden. (2009). "Flow cytometric analysis of microbubble size distribution and surface interactions." 13th International Conference on Surface and Colloid Science, New York.
123. **Feshitan**, Chen, Borden. (2009). "Stability of size-selected microbubbles." 13th International Conference on Surface and Colloid Science, New York, June 2009.
124. **Kwan**, Chen, Borden. (2009). "A model for lipid-coated microbubble growth and dissolution in complex media." 13th International Conference on Surface and Colloid Science, New York.

125. **Sirsi**, Hernandez, Feshitan, Yamashiro, Kandel, Borden. (2009). "Utilizing microbubbles for efficient delivery of plasmid DNA to tumors." 13th International Conference on Surface and Colloid Science, New York.
126. **Feshitan**, Chen, Borden. (2009). "Stability of size-selected microbubbles." AIChE Annual Meeting, Nashville.
127. **Chen**, Borden. (2009). "Engineering microbubbles with the buried-ligand architecture for tumor targeting." AIChE Annual Meeting, Nashville.
128. **Kwan**, Borden. (2009). "Lipid coated microbubble multi-gas dissolution." AIChE Annual Meeting, Nashville.
129. **Swanson**, Borden. (2010). "Synthesis and stability of phospholipid monolayer-coated oxygen-filled microbubbles." Liposomes 2010, Vancouver, **Canada**.
130. **Sirsi**, Huang, Hernandez, Johung, Gandner, Reichstein, Lampl, Wang, Homma, Yamshiro, Kandel, Borden. (2011). "A comparison of tumor responses to BV therapy using high- frequency ultrasound imaging with size-selected microbubble contrast agents." World Molecular Imaging Congress, San Diego, CA.
131. **Borden**. (2011). "Lipid-coated microbubbles: fundamentals and biomedical applications." Butcher Symposium, Westminster, CO.
132. **Mountford**, Borden. (2012). "Microbubbles: a platform for studying the mechanics of biological monolayers." NSF CMMI annual meeting, Boston, MA.
133. **Mountford**, Sirsi, Baus, Kinzie, **Etezazian**, Lima, Hung, Borden. (2013). "Poly(lactic acid) microbubbles as stable porogens for tissue engineered scaffold." BMES annual meeting, Seattle, WA.
134. **Song**, Feshitan, **Fan**, Yang, Sirsi, Borden. (2013). "Improving sonoporative drug-delivery through the use of size-isolated microbubbles." BMES annual meeting, Seattle, WA.
135. **Borden**, Feshitan, Legband, Terry. (2014). "Peritoneal Microbubble Oxygenation: a new paradigm in extrapulmonary oxygen delivery." GRC Drug Carriers in Medicine and Biology, Waterville Valley, NH.
136. **Dove**, Borden, Murray. (2014). "Optically driven oscillations of nanoparticle-coated microbubbles." IEEE Ultrasonics Meeting, Chicago, IL.
137. **Song**, Fan, Trudeau, Gutierrez-Hartmann, Borden. (2014). "Improving sonoporative cellular drug-delivery with microbubble size." IEEE Ultrasonics Meeting, Chicago, IL.
138. **Dove**, Borden. (2014). "Estimation of microbubble resonance frequency from lipid intermolecular forces." IEEE Ultrasonics Meeting, Chicago, IL.
139. **Swift**, Terry, **Borden**. (2015). "Peritoneal microbubble oxygenation treatment of DCS." Office of Naval Research Undersea Medicine Program Review, Buffalo, NY.

IV. Teaching and Mentoring Activities

A. Courses Taught

Fall 07	CHEN E3110 Transport Phenomena I, 3 credit hours, 36 students co-taught with Chris Durning Student Evaluation: 4.2/6.0 (overall instructor), 4.0/6.0 (overall course)
Spring 08	CHEN E4030 Biocolloid Engineering Design, 3 credit hours, 18 students Student Evaluation: 5.2/6.0 (overall instructor), 5.3/6.0 (overall course) New Course
Fall 08	CHEN E4300 Chemical Engineering Control, 2 credit hours, 10 students Student Evaluation: 4.8/6.0 (overall instructor), 5.1/6.0 (overall course) New Course
Spring 09	CHEN E3810 Chemical Engineering Lab, 3 credit hours, 34 students co-taught with Scott Banta and Jordan Spencer Student Evaluation: 4.3/6.0 (overall instructor), 4.3/6.0 (overall course) CHEN E4030 Biocolloid Engineering Design, 3 credit hours, 9 students Student Evaluation: 5.7/6.0 (overall instructor), 5.7/6.0 (overall course)
Fall 09	CHEN E4300 Chemical Engineering Control, 2 credit hours, 29 students Student Evaluation: 4.9/6.0 (overall instructor), 4.6/6.0 (overall course)
Spring 10	CHEN E3810 Chemical Engineering Lab, 3 credit hours, 35 students co-taught with Jordan Spencer and Carmen Borden

Student Evaluation: 4.8/6.0 (overall instructor), 4.6/6.0 (overall course)

CHEN E4030 Biocolloid Engineering Design, 3 credit hours, 13 students
Student Evaluation: 5.7/6.0 (overall instructor), 5.9/6.0 (overall course)

Spring 11 MCEN 5040 Methods of Engineering Analysis 2, 3 credit hours, 37 students
Student Evaluation: 4.8/6.0 (overall instructor), 4.5/6.0 (overall course)

Fall 11 MCEN 4228/5228 Biocolloids and Biomembranes, 3 credit hours, 16 students
Student Evaluation: 5.2/6.0 (overall instructor), 4.9/6.0 (overall course)
New Course

Spring 12 MCEN 3022-1 Heat Transfer, 3 credit hours, 73 students
Student Evaluation: 5.1/6.0 (overall instructor), 4.8/6.0 (overall course)

Fall 12 MCEN 3022 Heat Transfer, 3 credit hours, 28 students
Student Evaluation: 5.0/6.0 (overall instructor), 4.8/6.0 (overall course)

MCEN 4228/5228 Biomedical Ultrasound, 3 credit hours, 18 students
Student Evaluation: 5.5/6.0 (overall instructor), 4.8/6.0 (overall course)
New Course

Spring 13 MCEN 4228/5228 Cells, Molecules and Tissues, 3 credit hours, 26 students
co-taught with Tom Perkins

Fall 13 MCEN 3022 Heat Transfer, 3 credit hours, 52 students

MCEN 4228/5228 Biocolloids and Biomembranes, 3 credit hours, 15 students

Spring 14 MCEN 3022 Heat Transfer, 3 credit hours, 183 students
Student Evaluation: 3.9/6.0 (overall instructor), 4.1/6.0 (overall course)

MCEN 4228/5228 Cells, Molecules and Tissues, 3 credit hours, 24 students
Co-taught with Tom Perkins
Student Evaluation: 4.3/6.0 (overall instructor), 4.7/6.0 (overall course)

Spring 15 MCEN 3022 Heat Transfer, 3 credit hours, 96 students

MCEN 4228/5228 Surface Forces in Biology, 3 credit hours, 24 students

Fall 15 MCEN 4228/5228 Biomedical Ultrasound, 3 credit hours, 29 students

Spring 16 MCEN 1024 Chemistry for Energy and Mat Sci, 3 credit hours, 95 students

MCEN 4228/5228 Surface Forces in Biology, 3 credit hours, 24 students

B. Guest Lectures

2004 Advanced Colloid and Surface Phenomena (ECH 254), UC Davis.
2005 Colloid and Surface Phenomena (ECH 170/254), UC Davis.
2008,9,10 Ultrasound in Diagnostic Imaging (BMEN 4410), Columbia University.
2008,9,10 Engineering Principles of Drug Delivery (CH 637), NYU-Polytechnic.
2015 Colloid and Interfaces (CHEN 5835), CU-Boulder

C. Teaching Workshops Attended

2004 *Students Do Participate in Discussions!* UC Davis.
2004 *Communicate Clearly in the Classroom.* UC Davis.
2005 *Outstanding Teaching Seminars.* UC Davis.
2005 *Teaching Workshop Certificate Series.* UC Davis.

- 2011 *Leadership Education for Advancement and Promotion (LEAP) Workshop*. CU-Boulder.
- 2011 FTEP: Classroom Learning Interview Process (CLIP) for MCEN 5040. CU-Boulder.
- 2011 FTEP: *Learning Goals and Formative Assessment*. CU-Boulder.
- 2012 FTEP: Classroom Learning Interview Process (CLIP) for MCEN 3022. CU-Boulder.
- 2012 FTEP: *Preparing a Teaching Statement*. CU-Boulder.
- 2012 CEAS Faculty Development Workshop: *"Making the Transition to Active learning: Selecting and Implementing Appropriate Active Learning Techniques in Engineering Courses."* CU-Boulder.
- 2012 Mechanical Engineering Department Teaching Workshop, CU-Boulder.

D. Mentoring Activities

Student Awards:

- 2009 Jing Jian, Semifinalist, Intel Science Competition
- 2011 Paul Mountford, Colorado Graduate Fellowship
- 2011 Kang-Ho Song, ME Student of the Month
- 2011 Paul Mountford, ME Outstanding Teaching Assistant Award
- 2011 Jacob Dove, ME Student of the Month
- 2011 Paul Mountford, NSF CMMI Student Travel Award
- 2012 Jacob Dove, Travel Grant, ASME IMECE
- 2013 Paul Mountford, SEAS Graduate Student Travel Award
- 2013 Kang-Ho Song, Outstanding Student Paper, ASME NEMB, Boston
- 2013 Paul Mountford, ME Student of the Month
- 2013 Paul Mountford, ME Outstanding Teaching Assistant Award
- 2014 Paul Mountford, IEEE Ultrasonics Student Travel Award
- 2014 Jake Dove, Poster Award, Colorado Photonics Industry Association

Postdoctoral Fellows:

- 2008-2014 Shashank Sirsi
- 2009-2010 Sameer Dalvi
- 2011-2012 James Kwan
- 2012-2013 Sumit Garg
- 2012-present Jameel Feshitan
- 2015-present Paul Mountford

Doctoral Students:

- 2007-2011 Cherry Chen (completed PhD)
- 2007-2011 James Kwan (completed PhD)
- 2007-2012 Jameel Feshitan (completed PhD)
- 2010-2015 Jake Dove (completed PhD)
- 2011-2015 Paul Mountford (completed PhD)
- 2010-2016 Kang-Ho Song (completed PhD)
- 2014-present Alec Thomas
- 2014-present Jordan Lum
- 2015-present Jesse Butterfield
- 2015-present Gazendra Shakya

Masters Students:

- 2007-2008 Zhobou Li, ChE
- 2007-2009 Shunxi Ji, ChE
- 2008-2009 Henning Blomback (Karolinska), ChE
- 2008-2010 Adel Koubaa (Karolinska), ChE
- 2009-2010 Lukasz Zielinski (Univ. London), ChE
- 2010-2011 Kryztopher Tung, ME
- 2011-2012 Christopher Doudna, ME
- 2011-2012 Scott Satinover, ME
- 2015-present Lauchlin Blue, MSE

Undergraduate Students:

- 2007-2008 Calvin Pae, ChE

2007-2008	David Kyung Tek Oh, ChE
2008-2009	Nicholas Chen, ChE
2008-2009	Chinpong Fung, ChE (Cornell)
2008-2009	Wayne Cheung, ChE
2008-2009	HeeSoo Kim, ChE
2009-2010	Jonathan Liu, ChE
2009-2010	Vickram Mohan, ChE
2009-2010	Melissa Moy, ChE
2009-2010	Tianning Mary Ye, ChE
2009-2010	Richard Ruizhi Li, ChE
2009-2010	Gizem Obrey, ChE
2009-2010	Nathan Lee, ChE
2009-2010	Hamzat Feshitan, Pharm
2010-2011	Milo Snyder, ChE
2011-2011	Lauren Gardenswartz, ME
2011-2012	Jocelyn Mulkey, ME
2011-2012	Carly Barnard, ME
2011-2012	Matthew Long, ME
2011-2013	Rena Yang, ME, (UROP awardee, DLA awardee)
2012-2012	Jesus Javier Rodales, ME (Ball Fellowship)
2012-2013	Alex Thomas, ChE
2012-2013	Ian Baus, ME
2012-2013	Emma Kinzie, ME
2011-2014	Shirin Etezazian, ME
2012-2014	Alexander Fan, ME
2013-2014	Alec Thomas, Environ Engr
2013-2014	Danim Jeong, ME
2013 spring	Daniel Kim, ME
2014 spring	Samantha Pettus, ME
2014 sum	Brett Jeffrey, ChBE
2014 sum	Samuel Berens, ChE, (Princeton)
2014 fall	Aaron Davidson, ME
2014 fall	Alexander Hinesley, ME
2014 fall	Charles Norwood, ME
2014 fall	Evan Mori, ME
2014 fall	Ivar Lycke, ME
2014 fall	Riley Pepia, ME
2014-2015	William Smith, ME
2014-2015	Andrew Gloor, ME
2015 spring	Elliot Toth, ME
2015 spring	Kyle Galbraith, ME
2015-present	David Pak, ME
2016-present	Justin Hopkins, ChE

High School Students:

2008	Andrew Pesco
2008	Jing Jian
2009	Monique Honeyghan (Harlem Childrens Society)
2009	Givi Basishvili (Harlem Childrens Society)
2009	Xavier Marrero (Harlem Childrens Society)
2013	Aniruddh Prakash
2015	Daniel Kim

V. Service Activities

PhD Committee Member

2007	Shaohua Lu, Earth and Environmental Engineering, Columbia University
2008	Chunguang Xi, Chemical Engineering, Columbia University
2008	Somil Mehta, Earth and Environmental Engineering, Columbia University

2008 Mark Schwartzman, Applied Physics and Applied Math, Columbia University
2009 James Choi, Biomedical Engineering, Columbia University
2011 Wendy Altman, Mechanical Engineering, University of Colorado
2011 Yao-Sheng Tung, Biomedical Engineering, Columbia University
2012 Xin Wang, Mechanical Engineering, University of Colorado
2012 Erik Gelderblom, Physics of Fluids, University of Twente
2013 Hengyi Ju, Mechanical Engineering, University of Colorado
2013 Ray Hsin-Jui Wu, Mechanical Engineering, University of Colorado
2014 Eric Kramer, Mechanical Engineering, University of Colorado
2014 Rajarshi Chattaraj, Mechanical Engineering, University of Colorado

Community Outreach Activities

2005 Organized university visit for Sacramento high school students to BME labs at UC Davis
2008-2009 Columbia University Double Discovery Center
2008-2010 Ascension Elementary School Science Fair
2009-2010 Mentor for Harlem Children's Society
2011 ASPIRE Summer Bridge Program, BOLD Center, CU-Boulder
2011 CO Advantage graduate preview weekend
2011-2012 Girls Explore Engineering Day
2012-present Discovery Learning Apprentice program

University Service

2011 College of Engineering Best Dissertation Award committee
2012 Provost's Research Review Board
2012 Biofrontiers Task Force
2014 Provost Research Review Committee

Departmental Service

2007-2010 Graduate Committee, Chemical Engineering, Columbia University
2007-2010 AIChE Student Chapter Advisor, Columbia University
2010 Faculty Search Committee, Chemical Engineering, Columbia University
2010-2013 Graduate Committee, Mechanical Engineering, CU-Boulder
2013 Faculty Search Committee, Mechanical Engineering, CU-Boulder
2013-present Personnel Committee, Mechanical Engineering, CU-Boulder

Professional Society Membership

1995 American Institute of Chemical Engineers
1999 American Chemical Society
2011 American Society of Mechanical Engineers
2003 Biomedical Engineering Society
2004 Institute of Electrical and Electronics Engineers
2004 Society for Molecular Imaging
2008 International Association of Colloid and Interface Scientists
2009 International Contrast Ultrasound Society

Professional Society Service

2008 Session Chair, Applications in the Life Sciences, ACS Colloids Symposium, Raleigh, NC.
2008 Judge, Undergraduate Poster Session, AIChE Annual Meeting, Philadelphia, PA.
2009 Symposium Organizer, Biocolloids for Imaging and Drug Delivery, IACIS/ACS Colloids, New York, NY
2009 Session Chair, Bioimaging and Diagnostics, AIChE Annual Meeting, Nashville, TN.
2009 Session Chair, Colloids Self Assembly, AIChE Annual Meeting, Nashville, TN.
2009 Judge, Undergraduate Poster Session, AIChE Annual Meeting, Nashville, TN.
2010 Session Chair, Molecular Imaging I, BMES Annual Meeting, Austin, TX.
2011 Session Chair, Biocolloids and Biological Interfaces, ACS Colloids Meeting, Montreal, **Canada**.
2011 Session Chair, Emulsions and Foams, AIChE Annual Meeting, Minneapolis, MN.
2011 Session Chair, Ultrasound Contrast Agents, Artimino Conference on Advances in Ultrasound Technology, Florence, **Italy**.

- 2011 Session Chair, Biomedical Imaging, Diagnostic, Monitoring and Therapeutic Methods II, ASME International Mechanical Engineering Congress and Expo, Denver, CO.
- 2011 Judge, Poster Session, Micro/Nano Technology Forum, ASME International Mechanical Engineering Congress and Expo, Denver, CO.
- 2012 Jury, Poster Session, 17th European Symposium on Ultrasound Contrast Imaging, Rotterdam, **Netherlands**.
- 2012 Session Chair, Supramolecular Organized Systems, IACIS, Sendai, **Japan**.
- 2013 Symposium Organizer, "Emulsions, Bubbles and Foams", ACS National Meeting, New Orleans, LA.
- 2013 Tutorial session, Emulsions, Bubbles and Foams, ACS National Meeting, New Orleans, LA.
- 2016 Symposium Organizer, "Emulsions, Bubbles and Foams", ACS Colloids Division Meeting, New York, NY.

Conference Abstract Reviewer

- 2009 World Molecular Imaging Congress
- 2009 Joint IACIS/ACS Colloids Meeting
- 2011 World Molecular Imaging Congress
- 2011 AIChE Meeting
- 2013 ACS Spring Meeting

Editorial Activities

- 2012-present Associate Editor, *Theranostics*
- 2016-present Associate Editor, *Journal of Membrane Biology*