

Russell S. Witte

Assistant Professor
Radiology
Optical Sciences
Biomedical Engineering

1609 N. Warren Ave.
Bldg 211, Rm 124
Tucson, AZ 85724
Office: (520) 626-0346
rwitte@radiology.arizona.edu
<http://www.u.arizona.edu/~rwitte/>

DEGREES AND EDUCATION

2002 - 2007	Postdoctoral Training	University of Michigan
May 2002	PhD, Bioengineering	Arizona State University
Dec 2000	MSE, Bioengineering	Arizona State University
Aug 1993	BS, Physics (<i>Cum Laude</i>)	University of Arizona

RESEARCH HIGHLIGHTS

INTERESTS:

- Novel contrast mechanisms for ultrasound imaging (photoacoustics, current flow, elasticity)
- Smart contrast agents for molecular imaging and therapy (Cancer, Cardiac, Neural)
- Functional brain imaging of electrical signals (noninvasive and invasive techniques)
- Human skeletal muscle dynamics at fiber bundle/millisecond scale using ultrasound
- Implantable bioMEMs for long-term neural recording, stimulation and drug delivery
- Neural coding, brain plasticity and behavior

APPLICATIONS:

- Cancer imaging and therapy
- Electrical mapping of biopotentials (cardiac arrhythmia, epilepsy)
- Novel paradigms to diagnose and treat neurological disorders (e.g, Parkinsons')
- Muscular disease, sports injury, rehabilitation, fatigue and aging

RESEARCH POSITIONS

2007- Present	Assistant Professor (Department of Radiology, Univ. of Arizona) Assistant Professor (College of Optical Sciences, Univ. of Arizona) Assistant Professor (Department of Biomedical Engineering, Univ. of Arizona)
2005 - 2007	Senior Research Fellow (Biomed. Ultrasonics Lab, Univ. of Michigan, Ann Arbor MI)
2002 - 2005	Post Doctoral Fellow (Biomed. Ultrasonics Lab, Univ. of Michigan, Ann Arbor MI) <u>Advisor:</u> Matthew O'Donnell, PhD, Professor and Chair of Biomedical Engineering
1996- 2002	Graduate Research Associate (Neural Computation Lab, Arizona St Univ, Tempe AZ) <u>Advisor:</u> Daryl R Kipke, PhD, Associate Professor of Bioengineering
1994	Research Assistant (Nuclear Medicine, University Medical Center, Tucson AZ) <u>Advisor:</u> Walter Williams PhD, MD, Professor of Radiology
1993	Research Assistant (Centre René Huguenin, Cancer Hospital, Saint Cloud, France) <u>Advisors:</u> Francois Lokiec PhD, Professor of Pharmacokinetics and Alain Pecking MD, Professor of Nuclear Medicine
1989-93	Research Assistant (Lymphology Laboratory, Univ Medical Center, Tucson AZ) <u>Advisor:</u> Dennis Way, Director of Lymphology Laboratory, Department of Surgery
1989-90	Honors Program Undergraduate Research Fellow (Univ of Arizona, Tucson AZ) <u>Advisor:</u> William Bickel PhD, Professor of Physics

AWARDS AND HONORS**Russell S. Witte**

- Mentored Senior Capstone Design Team--Won "Most Innovative" Project (2009-2010)
- Mentored Senior Capstone Student Leon Garcia—Won "Fish Out of Water" award (2010)
- Special Appreciation, College of Optical Sciences as Colloquium Speaker (Sept 2010)
- Sole nominee by the UA for Keck Young Scholars Award (2009)
- United States Department of Labor Recognition Award (2008)
- Louis J. Kettel Faculty Mentor Award (2008)
- Travel Award, IEEE-EMBS Neural Engineering Conference (2007)
- NIH Post-Doctoral Training Grant in Tissue Engineering and Rehabilitation (2004-2006)
- Recognition for "Outstanding Paper" in Current Opinion in Neurobiology (2005)
- Arizona Regents Scholarship (2000)
- First Place ASU Biomedical Engineering Poster Competition (1998, 2000)
- Vesto Melvin Slipper Scholarship in Physics (1992)
- Voted "Most Imaginative" Undergraduate Research Project, University of Arizona (1990)
- Nugent Scholarship (1988-1991)
- Arts and Sciences Dean's List (1989-1993)

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

- Member, GIDP Applied Mathematics
- Member, GIDP Biomedical Engineering
- Member, GIDP Neuroscience
- Member, Sarver Institute
- Member, Arizona Cancer Center
- Member IEEE, SPIE, BMES
- Member Society for Neuroscience
- Member American Physiologic Society
- Sponsored Member AAAS/Science Program for Excellence in Science
- Chaired Electrical Imaging Session for BMES
- Reviewer for
 - Nature (family of journals)
 - IEEE Transactions on Biomedical Engineering
 - IEEE Trans on Neural Systems and Rehabilitation Engineering
 - IEEE Trans on UFFC
 - Brain Research (family of journals)
 - Journal of Lymphology, Radiology, Optic Letters
 - NIH Study Section (NIBIB) Mail in Reviewer
 - IEEE EMBS Conference Papers ...
 - Reviewer Journal of Biomedical Optics
 - Reviewer Lytmos, North Carolina Multidisciplinary Research Grants
 - Journal of Physics in Biology and Medicine
 - Optic Letters

TEACHING

Responsibility	Class ID	Course Title	Topic
Codev/Coinstr(2009-)	BME 524	Drug And Contrast Agent Discovery	Smart Imaging and Therapy
Coord/instr (2010)	BME 596	BME Seminar Series	Various Speakers
Codev/Coinstr(2008-)	OPTI 638	Medical Imaging	Advanced Topics in Ultrasound
Codev/Coinstr (2005)	BME 599	Neural Engineering	FES, Spinal Cord, Func Imaging
Co-instruct (2004-05)	BME 519	Quantitative Physiology	Cell Biology/Neural Systems
Co-lecturer (2003-05)	BME 458	Biomed Instrumentation & Design	MRI and Ultrasound
Co-instruct (2002)	BME 599	Neural Implants/Prosthetics Systems	Auditory and Visual Prosthetics
Guest lecturer (2001)	ECE 194	Introduction to Engineering Design	Algorithms and Problems Solving
Guest lecturer (2001)	BME 598	Advanced Physiology for Engin.	Electrophysiology/Brain Maps
Co-developer (1999)	BME 598	Design of Neural Prosthetics	Auditory Prosthetics

INVITED TALKS (EXTERNAL)

Bioengineer Lecture. Center for Neuroscience, Univ. of California, Davis (Mar 20, 2002)
 Bioengineer Lecture. Pierce Laboratory, Yale Univ., New Haven, Connecticut (Feb 21, 2002)
 Bioengineer Lecture. Dept of Bioengineering, Univ. of Utah, Salt Lake City, Utah (Jan 24, 2002)
 Institute of Biomaterials and Biomed Eng, Univ. of Toronto, Toronto, ON, CA (May 16, 2006)
 Department of Radiology/ARIBI, Univ. of Arizona, Tucson, AZ (Feb 28, 2007)
 Department of Bioengineering, Univ. of Illinois at Chicago, Chicago, IL (Apr 6, 2007)
 Center for Neural Communication Technology Summit Meeting, Ann Arbor, MI (June 18, 2007)
 Biomedical Engineering Society Fall Meeting, Los Angeles, CA (Sept 29, 2007)
 Brain Imaging Lecture, Barrow Neurologic Institute, Phoenix AZ, (Jan 13, 2009)
 3rd Intern. Symp. on Cancer Metastasis and Lymphovascular System, San Francisco, (May 8, 2009)
 American Association of Physicists in Medicine Conference, Anaheim, CA, (July 28, 2009)
 10th Annual Ultrasonic Transducer Engineering Conference, Los Angeles, CA, (April 16, 2010)
 Arizona Imaging and Microanalysis Society, Tucson, AZ, (Mar 24, 2011)
 4th Intern. Symp. on Cancer Metastasis and Lymphovascular System, New York, (May 14, 2011)

PUBLICATIONS

Dr. Daryl Kipke was my doctoral advisor at Arizona State University (1996-2002)
Dr. Matt O'Donnell was my postdoctoral advisor at Univ. of Michigan (2002-07)
Dr. John Faulkner was my NIH Training Fellowship Mentor at Univ. Michigan (2004-06)

Dissertations

- cv.1 **Witte, R.S.** Micro-electrode investigation of neural coding and learning-induced plasticity in auditory cortex. **PhD Thesis.** Advisor: Daryl R Kipke, PhD, Associate Professor of Bioengineering, Arizona State University, May 2002.
- cv.2 **Witte, R.S.** Fiber Optics: A Vision of the Future? **Honors Thesis** (required for graduation with honors). Advisor: William Bickel, PhD, Professor of Physics, University of Arizona, August 1993.

Refereed Journal Articles (articles in review are listed last)

- cv.3 Qin, Y, Z Wang, C.P. Ingram, Q Li, **R.S. Witte.** Optimizing frequency and pulse shape for ultrasound current source density imaging. IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, *accepted* (2012).
- cv.4 Peyman GA, C.P. Ingram, L.G Montilla, **R.S. Witte.** A High-Resolution 3D Ultrasonic System for Rapid Evaluation of the Anterior and Posterior Segment. Ophthalmic Surg Lasers Imaging. Jan 12, 2012:1-9. doi: 10.3928/15428877-20120105-01.
- cv.5 Wang, Z., R. Olafsson, P. Ingram, Q. Li, and **R.S. Witte.** "Four-Dimensional Ultrasound Current Source Density Imaging of a Dipole Field." Applied Physics Letters, 99, 113701 (2011).
- cv.6 Roach, M, A.P. Pecking, J.L. Alberini, A. Testori, F. Verrecchia, J. Soteldo, U. Ganswindt, J.L. Joyal, J.W. Babich, R.S. Witte, E. Unger, R. Gottlieb. "Diagnostic and Therapeutic Imaging Cancer: Therapeutic Considerations and Future Directions." J Surgical Oncology, 103: 587-601 (2011). [Review Article].
- cv.7 Bauer, D. R. R. Olafsson, L. Montilla, and R.S. Witte. "3D photoacoustic and pulse echo imaging of prostate tumor progression in the mouse window chamber," J. Biomed. Opt. 16, 026012 (Feb 22, 2011); doi:10.1117/1.3540668.
- cv.8 Olafsson, R, D.R. Bauer, L. Montilla, R.S. Witte. "Real-time, contrast enhanced photoacoustic imaging of cancer in a mouse window chamber." Opt. Express 18, 18625-18632 (2010).
- cv.9 Jia, C, R. Olafsson, K. Kim, T. J. Koliass, J. M. Rubin, W. F. Weitzel, R.S. Witte, S-W. Huang, M. S. Richards, C. X. Deng and M. O'Donnell. "Two-dimensional Elasticity Imaging of Controlled Rabbit Hearts." Ultrasonics in Medicine and Biology, 35:9, 1488-1501 (2009).

Refereed Journal Articles (Continued)

- cv.10 Olafsson, R, **R.S. Witte**, C. Jia, S-W Huang, K Kim, M. O'Donnell. "Cardiac Activation Mapping Using Ultrasound Current Source Density Imaging (UCSDI)". IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, 56:3 (2009).
- cv.11 Hou, Y, S-W. Huang, S Ashkenazi, **R.S. Witte**, M. O'Donnell. "Thin polymer etalon arrays for high-resolution photoacoustic imaging." J. Biomedical Optics, Dec 23 (13): 064033 (2008).
- cv.12 Huang, S-W. J. Rubin, H. Xie, **R.S. Witte**, C. Jia, R. Olafsson, M. O'Donnell. "Analysis of Correlation Coefficient Filtering in Elasticity Imaging." IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, 55:11, 2426-41 (2008).
- cv.13 **Witte, R.S.**, T. Hall, S-W. Huang, R Olafsson, M O'Donnell. "Inexpensive Acoustoelectric Hydrophone For Mapping High Intensity Ultrasonic Fields." Journal of Applied Physics, 104: 054701 (2008).
- cv.14 Olafsson, R., **R.S. Witte**, S-W Huang and M. O'Donnell. "Ultrasound Current Source Density Imaging." IEEE Transactions on Biomedical Engineering, 55 (7): 1840-1848 (2008).
- cv.15 Kim, K., S. Huang, T.L. Hall, **R.S. Witte**, T.L. Chenevert, and M. O'Donnell. "Arterial Vulnerable Plaque Characterization using Ultrasound Induced Thermal Strain Imaging (TSI)." IEEE Transactions on Biomedical Engineering, 55:1, 171-180 (2008).
- cv.16 **Witte, R.S.**, R. Olafsson and M. O'Donnell. "Imaging current flow in lobster nerve cord using the acoustoelectric effect." Applied Physics Letters, Apr 9 (90): 163902 (2007). Special selection by American Physical Society for Virtual Journal of Biological Physics Research.
- cv.17 Huang, S., K. Kim, **R. S. Witte**, R. Olafsson, M. O'Donnell. "Inducing and Imaging Thermal Strain Using a Single Ultrasound Linear Array." IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control. 54:9, 1718-1719, September 2007
- cv.18 **Witte, R.S.**, P.J. Rousche and D.R. Kipke. "Fast wave propagation in auditory cortex of an awake cat using a microelectrode array." Journal of Neural Engineering, 4: 68-78 (2007).
- cv.19 **Witte, R.S.** and D.R. Kipke. "Enhanced contrast sensitivity in auditory cortex as cats learn to discriminate sound frequencies." Cognitive Brain Research May 23 (2-3): 171-184 (2005).
- cv.20 Shi, Y., **R.S. Witte**, M. O'Donnell, "Identification of vulnerable plaque using IVUS-based thermal strain imaging," IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, 5: 844-850 (2005).
- cv.21 Shi Y., **R.S. Witte**, S.M. Milas, J.H. Neiss, X.C. Chen, C.A. Cain, M. O'Donnell. "Microwave-induced thermal imaging of tissue dielectric properties." Ultrasonic Imaging 25:109-121 (2003).
- cv.22 **Witte, R.S.**, K. J. Otto, J.C. Williams, D.R. Kipke. "Pursuing dynamic reorganization in auditory cortex using chronic, multichannel unit recordings in awake, behaving cats." Neurocomputing Jun; 26-27: 593-600 (1999).
- cv.23 Clement, R.C., **R.S. Witte**, D.R. Kipke. "Functional connectivity in auditory cortex using chronic, multichannel unit recordings." Neurocomputing Jun; Vol 26-27: 347-354 (1999).
- cv.24 Montilla, L.G., R. Olafsson, D. Bauer, **R.S. Witte**, "An Inline Adapter for Real-time Photoacoustic and Pulse Echo Imaging: A Simple Solution for Commercial Ultrasound Scanners." Radiology, in revision (2011).
- cv.25 Wang, Z., R. Olafsson, P. Ingram, Q. Li, and **R.S. Witte**. "Design Considerations and Performance of MEMS Acoustoelectric Ultrasound Detectors," IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, *revised* (2011).
- cv.26 Unger, E., R. Olafsson, **R.S. Witte**. "Acoustic properties of dodecafluoropentane emulsion for oxygen delivery." Ultrasound in Medicine and Biology

Refereed Conference Proceedings and Book Chapters

- cv.27 Qian Li, Y Qin, Z Wang, CP Ingram, and **R.S. Witte**. "Ultrasound Current Source Density Imaging Using a Clinical Intracardiac Catheter." Proc. IEEE UFFC, in press (2011).
- cv.28 Qin, Yexian, Z Wang, CP Ingram, Q Li, and **R.S. Witte**. "Optimizing frequency and pulse shape for ultrasound current source density imaging." Proc. IEEE UFFC, in press (2011).
- cv.29 Bauer, D.R., X Wang, J Vollin, H Xin, and **R.S. Witte**. "Thermoacoustic Imaging and Spectroscopy for Enhanced Breast Cancer Detection." Proc. IEEE UFFC, in press (2011).
- cv.30 Montilla, L., R. Olafsson, and **R.S. Witte**. "In Vivo Photoacoustic and Pulse Echo Imaging of a Pancreatic Tumor Using a Hand Held Device," Proc. IEEE UFFC, pp. 2147-2150 (2010).
- cv.31 Li, Q., R. Olafsson, P. Ingram, Z. Wang, and **R.S. Witte**. "Measuring the Acoustoelectric Interaction Constant in Cardiac Tissue using Ultrasound Current Source Density Imaging", Proc. IEEE UFFC, pp. 245-248 (2010).
- cv.32 Wang, Z., R. Olafsson, P. Ingram, Q. Li, and **R.S. Witte**. "Multichannel Ultrasound Current Source Density Imaging of a 3D Dipole Field", Proc. IEEE UFFC, pp. 406-413 (2010).
- cv.33 Ingram, P. CL Greenlee, Z Wang, R Olafsson, RA Norwood, **R.S. Witte**. "Fabrication and characterization of an indium tin oxide acoustoelectric hydrophone." Proc. 2010 SPIE Medical Imaging 76290O-10 (2010).
- cv.34 Wang Z, P Ingram, R Olafsson, CL Greenlee, RA Norwood, **R.S. Witte**. "Simulation-Based Optimization of the Acoustoelectric Hydrophone for Mapping an Ultrasound Beam." Proc. 2010 SPIE Medical Imaging 76290Q-12 (2010).
- cv.35 Wang Z, P Ingram, R Olafsson, Q Li, and **R.S. Witte**. "Detection of Multiple Electrical Sources in Tissue Using Ultrasound Current Source Density Imaging." Proc. 2010 SPIE Medical Imaging 76290H-9 (2010).
- cv.36 Bauer, D. R. R. Olafsson, L. Montilla, and **R.S. Witte**. "In vivo multi-modality and photoacoustic tracking of prostate tumor growth using a mouse window chamber model," Proc. SPIE 75643B-10 (2010).
- cv.37 Montilla, L., R. Olafsson, and **R.S. Witte**. "Real-time pulse echo and photoacoustic imaging using an ultrasound array and in-line reflective illumination," Proc. SPIE, 75643C-10 (2010).
- cv.38 Olafsson, R, Q Li, Z Wang, P, **R.S. Witte**. "Ultrasound Current Source Density Imaging of a Time-varying Current Field in a Multielectrode Nerve Chamber," Proc. 2009 IEEE Ultrasonics, Ferroelectrics and Frequency Control, p333-336 (2009).
- cv.39 Olafsson, R, L Montilla, P Ingram, **R.S. Witte**. "Tracking contrast agents using real-time 2D photoacoustic imaging system for cardiac applications." Proc. 2009 SPIE 7177: 71771R (2009).
- cv.40 Olafsson, R, **R.S. Witte**, C. Jia, S-W Huang, K Kim, M. O'Donnell. "Mapping Cardiac Currents using Ultrasound Current Source Density Imaging." Proc. IEEE Ultrasonics, Ferroelectrics and Frequency Control: 757-760 (2008).
- cv.41 Cheng, X., J. Chen, S-W Huang, **R.S. Witte**, P. Lin. An implantable capacitive micromachined ultrasonic imager for photoacoustic imaging. Proc. Solid-State Sensors, Actuators, and Microsystems Conference, 312-315 (2008).
- cv.42 **Witte, R.S.**, K Kim, A Ashish, R Kopelman, N Kotov, D Kipke, M O'Donnell. "Enhanced photoacoustic neuroimaging with gold nanorods and PEBBLEs." Proc. 2008 SPIE: 685614-1 (2008).
- cv.43 Kim, A. Agarwal, A. M. McDonald, R. M. Moore, D. D. Myers, Jr., **R. S. Witte**, S.-W. Huang, S. Ashkenazi, M. J. Kaplan, T. W. Wakefield, M. O'Donnell, and N. A. Kotov. "In vivo imaging of inflammatory responses by photoacoustics using cell-targeted gold nanorods (GNR) as contrast agent." Proc. 2008 SPIE: 68560H (2008).

Refereed Conference Proceedings and Book Chapters (Continued)

- cv.44 **Witte, R.S.**, T. Hall, R. Olafsson, S-W Huang and M. O'Donnell. "Inexpensive acoustoelectric hydrophone for measuring high intensity ultrasound fields." Proc. 2007 IEEE Ultrasonics Symposium, 737-740 (2007).
- cv.45 Olafsson, R., **R.S. Witte**, S-W Huang and M. O'Donnell. "Detection of electrical current in a live rabbit heart using." Proc. 2007 IEEE Ultrasonics Symposium, 989-992 (2007).
- cv.46 Jia, C. R. Olafsson, K. Kim, **R.S. Witte**, S. Huang, T. J. Koliass, J. M. Rubin, W. F. Weitzel, C. X. Deng, M. O'Donnell." Proc. 2007 IEEE Ultrasonics Symposium, 745-748 (2007).
- cv.47 Huang, S., J.M. Rubin, **R. S. Witte**, C. Jia, R. Olafsson, M. O'Donnell. "Error Analysis of Axial Displacement Estimation in Elasticity Imaging." Proc. 2007 IEEE Ultrasonics Symposium, 1969-1972 (2007).
- cv.48 **Witte, R.S.**, S Huang, S Ashkenazi, M O'Donnell. "Hybrid imaging system for developing novel neural contrast agents." Proc. IEEE Neural Engineering Conf, 229-232 (2007).
- cv.49 Olafsson, R., **R.S. Witte**, M. O'Donnell (2007). "Measurement of a 2D Electric Dipole Field using the Acousto-Electric Effect." Proc. 2007 SPIE Med. Imaging 6513: 65130S (2007).
- cv.50 **Witte, R.S.**, S Huang, S Ashkenazi, K. Kim, M O'Donnell. "Contrast-enhanced photoacoustic imaging of live lobster nerve cord." Proc. 2007 SPIE 6437: 64370J (2007).
- cv.51 Huang, S., S. Ashkenazi, Y. Hou, **R. S. Witte**, M. O'Donnell (2007). "Toward fiber-based high-frequency 3D ultrasound imaging." Proc. 2007 SPIE 6437: 643728 (2007).
- cv.52 **Witte, R.S.**, R. Olafsson, M. O'Donnell. "Acoustoelectric Detection of Current Flow in a Neural Recording Chamber." Proc. 2006 IEEE Ultrasonics Symposium (2006), 5-8.
- cv.53 Huang, S., K. Kim, **R.S. Witte**, T. L. Hall, S. Ashkenazi. "Feasibility of Inducing and Imaging Thermal Strain for High-Risk Plaque Identification in Peripheral Arteries Using Ultrasound Arrays." Proc. 2006 IEEE Ultrasonics Symposium (2006), 1333-1336.
- cv.54 **Witte, R.S.**, K. Kim, B. J. Martin, M. O'Donnell. "Effect of fatigue on muscle elasticity in the human forearm using ultrasound strain imaging." Proc. 28th IEEE EMBS in New York, SaA15.5: 4490-4493 (2006).
- cv.55 **Witte, R.S.**, K. Kim, B.J. Martin and M. O'Donnell. "Ultrasound Elasticity Imaging of Muscle Fatigue in the Human Forearm: Implications for Muscle Injury and Recovery." Proc. of the 5th World Congress of Biomechanics: Munich, Germany, G729C2438: 101-105 (2006).
- cv.56 Olafsson, R., **R.S Witte**, K. Kim, S. Ashkenazi, M. O'Donnell. "Cardiac current mapping using the acousto-electric effect." Proc. 2006 SPIE Medical Imaging 6147, 61470O (2006).
- cv.57 Panchangam, A., **R.S. Witte**, D.R. Clafin, M. O'Donnell and J.A. Faulkner. "A novel optical imaging system for investigating sarcomere dynamics in single skeletal muscle fibers." Proc. 2006 SPIE 6088, 608808 (2006).
- cv.58 Kim, K., **R.S. Witte**, K. Kim, M. O'Donnell. "Early detection of dental caries using photoacoustics." Proc. 2006 SPIE 6086, 60860G (2006).
- cv.59 Ashkenazi, S., **R.S. Witte**, K. Kim, S. Huang, Y. Hou and M. O'Donnell. "2D Optoacoustic array for high resolution imaging." Proc. 2006 SPIE 6086, 60861H (2006).
- cv.60 Kim, K., **R.S. Witte** and M. O'Donnell. "Arterial lipid characterization by high resolution thermal strain imaging." Proc. 2005 IEEE Ultrasonics Symposium, 1.18-21: 137-40 (2005).
- cv.61 Ashkenazi, S., **R.S. Witte**, M. O'Donnell. "High frequency ultrasound imaging using Fabry-Perot optical etalon." Proc. 2005 SPIE 5750, 289 (2005).
- cv.62 Ashkenazi, S., **R.S. Witte**, K. Kim, Y. Hou, and M. O'Donnell. "Tissue microscopy using optical generation and detection of ultrasound." Proc. 2005 IEEE Ultrasonics Symposium 05CH37716C, pp. 269-272 (2005).

Refereed Conference Proceedings and Book Chapters (Continued)

- cv.63 Ashkenazi, S., **R.S. Witte**, M. O'Donnell, "High-frequency photoacoustic imaging using Fabry-Perot optical etalon." Proc. 2005 SPIE Medical Imaging Conference 5750-58 (2005).
- cv.64 **Witte, R.S.**, D. E. Dow, R. Olafsson, Y. Shi, M. O'Donnell. "High resolution ultrasound imaging of skeletal muscle dynamics and effects of fatigue." Proc. 2004 IEEE Ultrasonics Symposium 764-767 (2004).
- cv.65 Shi, Y., **R.S. Witte**, F.J. de Ana, X.C. Chen, H. Xie, M. O'Donnell, "Application of ultrasonic thermal imaging in IVUS systems," Proc. 2004 IEEE Ultrasonics Symposium 1130-1133 (2004).
- cv.66 Shi, Y., **R.S. Witte**, S.M. Milas, J.H. Neiss, X.C. Chen, C.A. Cain, M. O'Donnell, "Ultrasonic thermal imaging of microwave absorption", Proc. 2003 IEEE Ultrasonics Symposium 1: 224-227 (2003).
- cv.67 Si, J., D.R. Kipke, **R.S. Witte**, Jing Lan, Sming Lin. "Self-Organizing Maps. Multivariate Learning Algorithms and Applications to Auditory Spike Train Analysis." Book Chapter: Biocomputing, P. Pardalos (editor), Kluwer Academic Publishers (2002).
- cv.68 Si, J., **R.S. Witte**, Jing Hu, D.R. Kipke, "Mining the neural code of a guinea pig auditor cortex." Proc. 2001 Info-tech and Info-net (2001).

Abstracts (Presentations at International Meetings)

- cv.53 Peyman, Gholam A., C. P. Ingram, **R.S. Witte**. "A high resolution 3D ultrasonic system for rapid evaluation of the anterior/posterior segment." Abstract Accepted, American Society of Cataract and Refractive Surgery, annual conference (2011).
- cv.54 Montilla, L., R. Olafsson, and **R.S. Witte**. "In Vivo Photoacoustic and Pulse Echo Imaging of a Pancreatic Tumor Using a Hand Held Device." Poster Presentation, IEEE UFFC, San Diego, CA (2010).
- cv.55 Li, Q., R. Olafsson, P. Ingram, Z. Wang, and **R.S. Witte**. "Measuring the Acoustoelectric Interaction Constant in Cardiac Tissue using Ultrasound Current Source Density Imaging." Podium Presentation, IEEE UFFC, San Diego, CA (2010).
- cv.56 Wang, Z., R. Olafsson, P. Ingram, Q. Li, and **R.S. Witte**. "Multichannel Ultrasound Current Source Density Imaging of a 3D Dipole Field." Podium Presentation, IEEE UFFC, San Diego, CA (2010).
- cv.57 Ingram, P. CL Greenlee, Z Wang, R Olafsson, RA Norwood, **R.S. Witte**. "Fabrication and characterization of an indium tin oxide acoustoelectric hydrophone." Podium Presentation, SPIE Medical Imaging, San Diego, CA (2010).
- cv.58 Wang Z, P Ingram, R Olafsson, CL Greenlee, RA Norwood, **R.S. Witte**. "Simulation-Based Optimization of the Acoustoelectric Hydrophone for Mapping an Ultrasound Beam." Podium Presentation, SPIE Medical Imaging, San Diego, CA (2010).
- cv.59 Wang Z, P Ingram, R Olafsson, Q Li, and **R.S. Witte**. "Detection of Multiple Electrical Sources in Tissue Using Ultrasound Current Source Density Imaging." Poster Presentation, SPIE Photonics West, San Francisco, CA (2010).
- cv.60 Montilla, L., R. Olafsson, and **R.S. Witte**. "Real-time pulse echo and photoacoustic imaging using an ultrasound array and in-line reflective illumination," Poster Presentation, SPIE Photonics West, San Francisco," Poster Presentation, SPIE Photonics West, San Francisco, CA (2010).

Abstracts (Continued)

- cv.61 L.G. Montilla, M.D. Risi, M.F. Salek, D.R. Bauer, A.F. Gmitro, **R.S. Witte**. "Tracking Contrast Agents in Space and Time using Simultaneous Laser Induced Fluorescence and Photoacoustic Imaging." Poster Presentation at the World Molecular Imaging Conference (WMIC) Sept 10, 2011.
- cv.62 Gao, L.; Geffre, C.; Sivek, J.; Taljanovic, M. S.; Latt, L. D.; and **R.S. Witte**: Ultrasound Elasticity Imaging of Human Posterior Tibial Tendon. In International Conference on the Ultrasonic Measurement and Imaging of Tissue Elasticity 2010. Snowbird, Utah, 2010.
- cv.63 **Witte, R.S.** "Acoustoelectric Ultrasound Sensors." Invited Podium Presentation. 10th Annual Ultrasonic Transducer Engineering Conference, Los Angeles, CA, (April 16, 2010).
- cv.64 Olafsson R., **R.S. Witte** et al. "Ultrasound Current Source Density Imaging and Unipolar Ultrasound Pulses." Invited Podium Presentation. 10th Annual Ultrasonic Transducer Engineering Conference, Los Angeles, CA, (April 16, 2010).
- cv.65 Unger, Evan, T Matsunaga, A Kerschen, M Dolezal, J Johnson, R Olafsson, **R.S. Witte**. "Dodecaperfluoropentane emulsion for oxygen delivery." J Acoust Soc Am. 2010 Mar;127(3):1975.
- cv.66 **Witte, R.S.** "Where Sound Meets Electricity: The Acoustoelectric Effect in Biomedicine." *Invited*. American Assoc. of Physicists in Medicine Conference, Anaheim, CA (July 28, 2009)
- cv.67 **Witte, R.S.** "Frontiers of Ultrasound and Photoacoustics for Cancer Imaging and Therapy." *Invited*. 3rd International Symposium on Cancer Metastasis and the Lymphovascular System, San Francisco, CA (May 8, 2009).
- cv.68 **Witte, R.S.**, K. Kim, S-W Huang, B Martin, M. O'Donnell (2007). "Least-Squares Spline for Reducing Tracking Error in Muscle Strain Imaging." Proc. 6th International Conf. on the Ultrasonic Measurement of Tissue Elasticity: Santa Fe, NM (Nov 4, 2007).
- cv.69 Huang, S-W., R. Olafsson, C. Jia, **R.S. Witte**, M. O'Donnell, J.M. Rubin (2007). "Improvement of Speckle Tracking in Elasticity Imaging Using Phase Rotation." Proc. 6th International Conf. on the Ultrasonic Measurement of Tissue Elasticity: Santa Fe, NM (Nov 4, 2007).
- cv.70 **Witte, R.S.**, S-W Huang, W Fan, R Kopelman, A Agarwal, N Kotov, M O'Donnell, D Kipke (2007). "A Photoacoustic Imaging System For Developing Novel Neural Contrast Agents." BMES Annual Meeting: Los Angeles, CA (Sept 29, 2007). **INVITED TALK**
- cv.71 Olafsson, R., **R.S. Witte** and M. O'Donnell (2007). "Measurement of a 2D Electric Dipole Field using the Acousto-Electric Effect." SPIE Symposium on Medical Imaging: San Diego, CA (Feb 2007).
- cv.72 **Witte, R.S.**, S. Huang, K. Kim and M. O'Donnell (2007). "Contrast-enhanced photoacoustic imaging of live lobster nerve cord." SPIE Photonics West Conf.: San Jose, CA (Jan 2007).
- cv.73 **Witte, R.S.**, R. Olafsson and M. O'Donnell (2006). "Acoustoelectric Detection of Current Flow in a Neural Recording Chamber." Biomedical Engineering Society Fall Meeting, Chicago, IL.
- cv.74 Kim, K. S. Huang, **R. Witte**, T. Hall, S. Ashkenazi, R. Olafsson and M. O'Donnell (2006). "Feasibility of Ultrasound Induced Thermal Strain Imaging (TSI)." Biomedical Engineering Society Fall Meeting, Chicago, IL.
- cv.75 **Witte, R.S.**, K. Kim, B.J. Martin and M. O'Donnell (2005). "*In vivo* high resolution functional imaging of human skeletal muscle using ultrasound." Biomedical Engineering Society Fall Meeting, p25, #205, Baltimore, MD.
- cv.76 Ashkenazi, S., **R.S. Witte**, K. Kim, Y Hou, and M. O'Donnell (2005). "Combined optical generation and detection of ultrasound for tissue microscopy." Biomedical Engineering Society Fall Meeting, p61, #976, Baltimore, MD.
- cv.77 Kim, K., **R.S. Witte**, M. O'Donnell (2005). "High Resolution Thermal Strain Imaging using the Acoustic Microscope." Biomedical Engineering Society Fall Meeting, p47, 696, Baltimore MD.

Abstracts (Continued)

- cv.78 **Witte, R.S.**, D. E. Dow, R. Olafsson, Y. Shi and M. O'Donnell (2004). "High-resolution ultrasound imaging of muscle dynamics and effects of fatigue." IEEE International Ultrasonics, Ferroelectrics, and Frequency Control 50th Anniversary Joint Conference, August 26, 2004, Montreal, Canada.
- cv.79 **Witte, R.S.** and M. O'Donnell. "Noninvasive Neural Imaging." Presentation at DARPA Annual PI meeting in Arlington, Virginia. July 24, 2003.
- cv.80 **Witte, R.S.**, and D.R. Kipke (2001). "Multichannel cluster recording reveals auditory cortical reorganization as cats learn to discriminate sound frequency." Soc Neurosci Abstr, 27: 166.4, San Diego, CA.
- cv.81 **Witte, R.S.**, and D.R. Kipke (2001). "Functional micro-imaging using multi-electrode arrays" Annual DARPA BIM meeting (Bio, Info and Micro), San Francisco, CA.
- cv.82 **Witte, R.S.**, and D.R. Kipke (2001). "Micro-imaging the Auditory Cortex: Spatiotemporal Integration of Neural Ensemble Recording." Biomedical Engineering Society Fall Meeting, P10.6, Durham, NC.
- cv.83 Si, Jennie and **R.S. Witte** and D.R. Kipke (2001). "Predicting Sound Frequency from Ensemble Responses of Auditory Cortical Neurons." Biomedical Engineering Society Fall Meeting, P10.10, Durham, NC.
- cv.84 **Witte, R.S.**, P.J. Rousche and D.R. Kipke (2000). "Cortical processing and receptive field dynamics in awake cats trained at a frequency discrimination task using chronic, multichannel microelectrodes." Assoc Res in Otolaryngol Abstr, 4868, St. Petersburg, FL.
- cv.85 **Witte, R.S.**, P.J. Rousche and D.R. Kipke (1999). "Long-term trends in auditory cortex population responses in awake, behaving cats using chronic neural recordings from fixed multichannel microwires." Soc Neurosci Abstr, 25: 666.6, Miami, FL.
- cv.86 **Witte, R.S.** and D.R. Kipke (1999). "Evidence of competing neural assemblies in background activity of neurons in auditory cortex of awake guinea pig." Presented at the Annual Meeting for Computation and Neural Systems, July 1999, Pittsburgh, PA.
- cv.87 **Witte, R.S.**, P.J. Rousche and D.R. Kipke (1999). "Freq. selectivity and temporal response properties of neural ensembles in the auditory cortex of the awake guinea pig display different degrees of short-term variability." Assoc Res in Otolaryngol, 141, St. Pete, FL.
- cv.88 **Witte, R.S.**, P.J. Rousche and D.R. Kipke (1998). "Daily variation of frequency response areas to passive stimulation in auditory cortex of awake cat and guinea pig using chronic, multichannel microwires." Soc Neurosci Abstr, 24: 906, Los Angeles, CA.
- cv.89 Clement, R.C., **R.S. Witte**, P.J. Rousche and D.R. Kipke (1998). "Variation in functional connectivity with passive stimulation in auditory cortex using chronic, multichannel microelectrodes in awake cat and guinea pig." Soc Neurosci Abstr, 24:906.6, Los Angeles.
- cv.90 **Witte, R.S.**, K. J. Otto, J.C. Williams, D.R. Kipke (1998). "Pursuing Dynamic Reorganization in Auditory Cortex Using Chronic, Multichannel Microelectrodes in Awake, Behaving Animals." Presented at the Annual Meeting for Computation and Neural Systems, July 1998, Santa Barbara, CA.
- cv.91 **Witte, R.S.**, J.C. Williams and D.R. Kipke (1998). "Investigation of Dynamic Reorganization in Auditory Cortex Using Chronic, Multichannel Neural Recordings." Assoc Res in Otolaryngol Abstr, 588, St. Petersburg, FL.
- cv.92 Williams, J.C., **R.S. Witte** and D.R. Kipke (1998). "Long-term Unit Stability in Chronic, Multichannel Recordings in Auditory Cortex." Assoc Res in Otolaryngol Abstr, 587, St. Petersburg, FL.

Inventions

- cv.92 Ashkenazi, S., R. Kopelman, **R.S. Witte**, Tom Horvath, Guangseon Kim. "Photoacoustic Indicators." US Patent 7576334. Licensed to Endra.
- cv.93 Kim, K., S-W Huang, **R. S. Witte**, and M. O'Donnell. "Thermal Strain Imaging With a Linear Array." UM FILE 3530 (patent pending), Univ. of Michigan.
- cv.94 **Witte, R.S.**, R. Olafsson, M. O'Donnell. "Current Mapping of Biopotentials using the Acousto-Electric Effect." UM FILE 3236 (patent pending), Univ. of Michigan. ISSUED 11/2011
- cv.95 **Witte, R.S.**, R. Olafsson, S-W Huang, T. Hall, M. O'Donnell. "Acoustic Sensors Utilizing the Acoustoelectric Effect," UM FILE 3677 (patent pending), Univ. of Michigan.
- cv.96 **Witte, R.S.**, L. G. Montilla, R. Olafsson. "Method and Apparatus for In-Line Photoacoustic Imaging." UA FILE 10-062 (provisional patent pending), Univ. of Arizona.
- cv.97 **Witte, R.S.**, R. A. Norwood, C. M. Ingram, C. Greenlee, R. Olafsson & Z. Wang. "Photolithographic Method for Producing Acoustic Detectors." UA FILE 10-063 (provisional patent pending), Univ. of Arizona.
- cv.98 **Witte, R.S.**, L. Montilla, R. Olafsson, C. M. Ingram, Z. Wang, R.A. Norwood, C. Greenlee, "Ultrasonic/Photoacoustic Imaging Devices and Methods." U.S. and Foreign Patent Application (PCT/US2011/022420). Filed 1/15/11 through the University of Arizona.

Industrial Collaborators

- 1) Sonetics Inc (Ann Arbor, Michigan)
- 2) Zonare Medical Systems (Mountain View, CA)
- 3) Visualsonics (Toronto, ON)
- 4) Raytheon Missile Systems (Tucson, AZ)
- 5) Brevin Technology (Tucson, AZ)
- 6) Pixel Velocity (Ann Arbor, MI) [letter for grant]

Student Advising (as of Dec 31, 2010)

- 1) PhD advisor, Opt. Sciences graduate student Leonardo Montilla (Photoacoustic imaging of cancer)
- 2) PhD advisor, Opt. Sciences graduate student Daniel Bauer (Thermoacoustic imaging of brain/cancer)
- 3) PhD advisor, Opt. Sciences graduate student Qian Li (Ultrasound Current Source Density Imaging)
- 4) PhD advisor, Opt. Sciences graduate student Liang Gao (Elasticity/Photoacoustic Imaging)
- 5) PhD advisor, ECE graduate student Zhaohui Wang (Acoustoelectric effects: sensors and UCSDI)
- 6) Undergrad advisor, Biochemistry undergraduate Nathan Allen (Photoacoustic contrast agents)
- 7) High school advisor, Robert Reyes (Acoustoelectric US sensors for focused US therapy)
- 8) Capstone Senior Design Team Project Mentor (part of Eng 498) (Novel acoustoelectric US detectors for photoacoustic imaging) (5 undergraduates during FALL '09/SPR '10 semesters)=>won top awards
- 9) Mentored BME Graduate Student Rotation of Matt Risi (Real-Time Laser Induced Fluorescent and Photoacoustic Imaging For In Vivo Lymphatic Flow Measurement)
- 10) Mentored Opt Sci Graduate Student Rotation of Jonathan Brand (Optical resolution photoacoustics)

Member of the following Graduate Student InterDisciplinary Programs (GIDPs) at the UofA:

- 1) Applied Mathematics
- 2) Neuroscience
- 3) Biomedical Engineering