

## Curriculum Vitae

*Kevin John Otto*

Associate Professor

J. Crayton Pruitt Family Department of Biomedical Engineering

University of Florida

363 NEB

1064 Center Drive

Gainesville, FL 32611

Electronic mail: [kevin.otto@bme.ufl.edu](mailto:kevin.otto@bme.ufl.edu)

### **Education**

2003-2006	Post-Doctoral Training, University of Michigan, Ann Arbor, MI.
2000-2003	Ph.D., Bioengineering, Arizona State University, Tempe, AZ.
1997-2000	M.S, Bioengineering, Arizona State University, Tempe, AZ.
1993-1997	B.S., Chemical Engineering, <i>cum laude</i> , Colorado State University, Fort Collins, CO.

### **Academic positions**

2017-Present	Affiliate Faculty, Department of Materials Science and Engineering, the University of Florida
2016-Present	Affiliate Faculty, Department of Neurology, the University of Florida
2014-Present	Affiliate Faculty, Department of Neuroscience, the University of Florida
2014-Present	Associate Professor, J. Crayton Pruitt Family Department of Biomedical Engineering, the University of Florida ( <i>with tenure</i> )
2014-2016	Adjunct Professor, the Weldon School of Biomedical Engineering, Purdue University
2012-2014	Associate Professor, the Department of Biological Sciences and the Weldon School of Biomedical Engineering, Purdue University ( <i>with tenure</i> )
2006-2012	Assistant Professor, the Department of Biological Sciences and the Weldon School of Biomedical Engineering, Purdue University
2003-2006	Post-Doctoral Fellow, Program in Hearing, Balance and Chemical Senses, Kresge Hearing Research Institute, University of Michigan
2001-2003	Research Staff, Neural Engineering Laboratory, Biomedical Engineering Department, University of Michigan
1998-2001	Research Assistant, Neural Computation Laboratory, Bioengineering Department, Arizona State University
Spring 1998	Teaching Assistant, Surgical Techniques, Arizona State University
Spring 1998	Teaching Assistant, Heat and Mass Transfer, Arizona State University
Fall 1997	Teaching Assistant, Introduction to Bioengineering, Arizona State University

---

**Research interests**

Neural engineering. Sensory repair and prostheses. Brain-machine interfaces. Sensation induced by activation of neural tissue. Neural coding and plasticity. Autonomic neural engineering.

---

**Honors and Awards**
**Personal**

- 1990 Eagle Scout Award Recipient
- 1991 Hugh O'Brian Youth Foundation Fellow
- 1992 The American Legion Boys' State Fellow
- 1992 Congressional Scholar (Congressional Youth Leadership Council)
- 1993 University Distinguished Scholars Recipient (Colorado State University)
- 1993 BrushWellman Scholarship Recipient
- 1993 Danforth Award Recipient
- 1993 Robert C. Byrd Scholarship Recipient
- 1993 Runner-up, Mathematics, Sterling Scholars of Central Utah
- 1993 Tandy Technology Scholar Award; Outstanding Mathematics
- 1994 Arthur T. Corey Award Recipient
- 1997 Graduate Academic Scholarship (Arizona State University)
- 1997 Honors degree in Chemical Engineering, *cum laude*
- 1999 First Place Graduate Student, ASU Biomedical Engineering Society Poster Competition
- 2000 Neurosciences Institute Neural Engineering Traineeship
- 2001 Graduate Academic Scholarship (Arizona State University)
- 2003 University of Michigan College of Engineering Research Mentor Award
- 2003 Kresge Hearing Research Institutional National Research Service Award Fellowship
- 2003 IEEE-EMBS Neural Engineering Conference Fellowship
- 2004 Kresge Hearing Research Institutional National Research Service Award Fellowship
- 2005 Neural Interfaces Workshop Student Travel Assistance Program Recipient
- 2005 Individual Post-Doctoral Ruth L. Kirschstein National Research Service Award
- 2006 Selected 1 of 100 participants; 4th Annual National Academies Keck Futures Initiative Conference on "Smart Prosthetics: Exploring Assistive Devices for the Body and Mind"; Nov. '06, Irvine, CA.
- 2006 International Workshop on Neural Interface Technologies and Applications Scholarship
- 2006 Purdue Research Foundation International Travel Grant
- 2009 Outstanding Faculty Award, Weldon School of Biomedical Engineering Graduate Student Association
- 2011 Seed for Success, Purdue University
- 2012 Faculty Service Award, Weldon School of Biomedical Engineering
- 2012 Purdue Research Foundation International Travel Grant

**Laboratory Members**

- 2007 First Place, College of Science, Purdue University Undergraduate Poster Competition (primary author: AL Pierce)
- 2007 Dean's Award, College of Engineering, Purdue University Undergraduate Poster Competition (primary author: AL Pierce)

- 2008 Second Place, College of Science, Purdue University Undergraduate Poster Competition (primary author: AL Pierce)
- 2009 College of Science Peer Award, Purdue University Undergraduate Poster Competition (primary author: LM Lincoln)
- 2010 Student Excellence in Neural Interfacing Award, Neural Interfaces Conference (awarded to Seth Wilks)
- 2010 Intel Excellence in Computer Science Award, Indiana State Science Fair Competition (primary author: A Sankari)
- 2010 First Place in Excellence in Human Health, Biology or Life Sciences, Indiana State Science Fair Competition (primary author: A Sankari)
- 2010 First Place, College of Science, Purdue University Undergraduate Poster Competition (primary author: H Desai)
- 2010 Top Winner/International Fair Delegate, Science and Engineering Fair, Lafayette Regional Science & Engineering Fair (primary author: A Sankari)
- 2010 Honorable Mention, Purdue University Sigma Xi Graduate Poster Competition (primary author: A Koivuniemi)
- 2011 College of Science Dean's Choice Award, Purdue University Undergraduate Poster Competition (primary author: LM Lincoln)
- 2011 Engineering Council Choice Award, Purdue University Undergraduate Poster Competition (primary author: TJ Hinton)
- 2012 College of Science Dean's Choice Award, Purdue University Undergraduate Poster Competition (primary author: A Filley)
- 2012 2<sup>nd</sup> Place Biological Sciences, Purdue University Undergraduate Poster Competition (primary author: J McGee)
- 2013 Honorable Mention in Nikon's 2013 Small World Competition (primary author: A Woolley)
- 2013 College of Engineering Dean's Choice Award, Purdue University Undergraduate Poster Competition (primary author: M Youngs)
- 2013 College of Engineering Student's Choice Award, Purdue University Undergraduate Poster Competition (primary author: A Filley)
- 2015 Second Place in J. Crayton Pruitt Family Department of Biomedical Engineering Photo Contest (primary author: A Woolley)

---

***Professional affiliations***

American Association for the Advancement of Science  
 Auditory Cognitive Neuroscience Society  
 Biomedical Engineering Society  
 Institute of Electrical and Electronics Engineers  
 Sigma Xi  
 Society for Neuroscience  
 Alpha Eta Mu Beta Bioengineering Honor Society  
 Golden Key National Honor Society  
 Omega Chi Epsilon Chemical Engineering Honor Society  
 Tau Beta Pi Engineering Honor Society

---

**Invited presentations**

- “Investigating Neural Coding and Plasticity in Auditory Cortex using Real-Time Feedback from Ensemble Neural Recordings.” Computational Neuroscience Annual Meeting, Santa Barbara, CA, 1999.
- “Brain-Machine Interface Strategies and Implications.” DARPA Bio:Info:Micro 2<sup>nd</sup> Annual Principal Investigator’s Meeting Invited Talk, Washington DC, 2002.
- “Introduction to Brain-Machine Communication Strategies.” Brain-Machine Interface Symposium, University of Michigan, 2002.
- “The Benefits of Modular Brain-Machine Interface System Design.” The 25<sup>th</sup> Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Cancun, Mexico, 2003.
- “Brain-Machine Interfaces in Rat Motor Cortex: Implications of Adaptive Decoding Algorithms.” IEEE-EMBS 1P<sup>st</sup>P Annual Neural Engineering Conference, Capri, Italy, 2003.
- “Microstimulation in Auditory Cortex Provides a Substrate for Detailed Behaviors.” Hearing, Balance and Chemical Senses Seminar Series Invited Speaker, Kresge Hearing Research Institute, University of Michigan, 2004.
- “Cortical Control: History and Implications.” Biomedical Instrumentation and Design Course, University of Michigan, 2004.
- “Auditory Prostheses.” Special Lectures in Neuroscience Series, Purdue University, 2005.
- “Cortical Microstimulation and Brain-Machine Interfaces for Neuroprosthesis Applications.” Department of Biological Sciences Invited Speaker, Purdue University, 2005.
- “Toward an Auditory Cortical Prosthesis.” The Department of Speech, Language and Hearing Sciences Brown Bag Lunch Seminar Series, Purdue University, West Lafayette, IN, 2006.
- “Rejuvenation and Neural Interface Improvement in Bidirectional Neural Prostheses.” NeuroengineeringNow Conference, University of Texas at Dallas, 2006.
- “Auditory Cortex Implants.” Purdue Acoustics Research Community Workshop, Purdue University, 2006.
- “The Function of the Electrode-Tissue Interface for an Auditory Cortical Prosthesis.” The 17<sup>th</sup> Annual Meeting of the Biomedical Engineering Society, Chicago, IL, 2006.

- “The Optimal Stimulation Depth for an Auditory Cortical Prosthesis.” The 36<sup>th</sup> Annual Meeting of the Society for Neuroscience, Atlanta, GA, 2006.
- “Intracortical Neuroprostheses: Playing Well With Others.” PULSe Seminar Series, Purdue University, 2007.
- “Neuroprostheses: Helping People Hear.” Local Biomedical Engineering Society Meeting, Purdue University, 2007.
- “Electrode-Tissue Interface Estimation and Manipulation for a Cortical Prosthesis.” Indiana University-Purdue University Indianapolis, 2007.
- “Microstimulation and the Reactive Tissue Response.” Workshop on Brain Machine Interfaces, International Joint Conference on Neural Networks, Orlando, FL, 2007.
- “Microstimulation and the Reactive Tissue Response with Chronically Implanted Neuroprosthetic Devices.” The Wadsworth Center, Albany, NY, 2007.
- “Stimulating Sensory Neuroprostheses.” Center for Neural Communication Technology Summit Meeting, University of Michigan, 2007.
- “Measurement and Manipulation of Chronic Neural Interfaces with Microelectrodes.” Auditory Research Group Seminar Series, Southern Illinois University School of Medicine, 2008.
- “Cortical Microstimulation for Neural Prostheses.” Summer Undergraduate Research Seminar Series, Purdue University, 2008.
- “Measurement, Manipulation and Imaging of Chronic Neural Interfaces with Microelectrodes.” Advanced Imaging Group Seminar Series, University of Wisconsin, 2008.
- “*In Vitro* and *In Vivo* Investigations of AC Waveforms for Manipulation of Chronic Neural Interfaces.” The 19<sup>th</sup> Annual Meeting of the Biomedical Engineering Society, St. Louis, MO, 2008.
- “Evaluation of Micro-Electrocorticographic Electrodes for Electrostimulation.” The 31st Annual IEEE EMBS International Conference. Minneapolis, MN, 2009. Presented by Seth Wilks.
- “Strategies for Improving Chronic Neural Interfaces with Microelectrodes.” The Bioengineering Department Seminar Series, University of Illinois at Chicago, Chicago, IL, 2009.
- “Neural Microdevices.” Alpha Eta Mu Beta Engineering Devices and Research Session, the 20th Annual Meeting of the Biomedical Engineering Society. Pittsburgh, PA, 2009.

- “The Application of Bias Potentials for Manipulation of the Neural Electrode-Tissue Interface.” The 20th Annual Meeting of the Biomedical Engineering Society. Pittsburgh, PA, 2009.
- “Micro-Electrocorticographic Electrodes for Stimulation Neuroprostheses.” The 20th Annual Meeting of the Biomedical Engineering Society. Pittsburgh, PA, 2009. Presented by Seth Wilks.
- “Strategies for Improving Chronic Neural Microelectrode Interfaces.” The Weldon School of Biomedical Engineering Seminar Series, Purdue University, West Lafayette, IN, 2010.
- “Reliable Chronic Neural Stimulation via Micro-devices.” Brain Machine Interfaces: Implications for Science, Clinical Practice and Society, Ystad Saltsjöbad, Sweden, 2010.
- “Chronic Neural Microstimulation: the Effect of Interfacial Quality.” Chemical and Biological Engineering Seminar Series, Colorado State University, 2010.
- “The Effect of Interfacial Quality on Chronic Neural Microstimulation.” Biomedical Engineering Seminar Series, University of Iowa, 2010.
- “Neural-Tissue Interfacial Quality Effects on the Efficacy of Chronic Microstimulation.” Biomedical Engineering Seminar Series, University of Wisconsin, 2010.
- “Normal and Accelerated Failure Assessment of New Quantitative *In Vitro* and *In Vivo* Neural Interfaces.” DARPA Neural Engineering, Science, and Technology Forum, San Diego, CA, 2010.
- “Reliable Chronic Neural Interfacing Via Micro-Devices.” Biological Sciences Departmental Seminar Series, Purdue University, West Lafayette, IN, 2011.
- “On the Reliability of Longitudinal Cortical Microstimulation.” The 22<sup>nd</sup> Annual Meeting of the Biomedical Engineering Society. Hartford, CT, 2011.
- “Normal and Accelerated Failure Assessment of New Quantitative *In Vitro* and *In Vivo* Neural Interfaces.” DARPA RE-NET PI Review Meeting, Austin, TX, 2011.
- “Waveform and pulse rate affect behavioral detection threshold of intracortical microstimulation.” The 36<sup>th</sup> Annual Midwinter Meeting of the Association for Research in Otolaryngology, San Diego, CA, 2012. Presented by Andrew Koivuniemi.
- “Reliable Neural Interfacing with Micro-Devices.” The 6<sup>th</sup> International Symposium on Intelligent Drug Delivery Systems, Seoul, South Korea, 2012.
- “Parameters of Cortical Microstimulation for Brain-Machine Interface Feedback.” The 22<sup>nd</sup> Annual Conference of the Society for the Neural Control of Movement. Venice, Italy, 2012.

- “Normal and Accelerated Failure Assessment of New Quantitative *In Vitro* and *In Vivo* Neural Interfaces.” 40<sup>th</sup> Neural Interfaces Conference. Salt Lake City, Utah, 2012.
- “*In vivo* Imaging of Microelectrode Arrays Implanted in the Cortex: A Novel Preparation to Investigate Longitudinal Reliability.” IEEE International Conference of the Engineering in Medicine & Biological Science. San Diego, CA, 2012.
- “The Depth, Waveform and Pulse Rate for Electrical Microstimulation of the Auditory Cortex.” IEEE International Conference of the Engineering in Medicine & Biological Science. San Diego, CA, 2012.
- “Towards Optimal Parametric Identification for Electrical Microstimulation of the Auditory Cortex.” The Annual Conference of the International Functional Electrical Stimulation Society. Banff, Canada, 2012.
- “Optimal Depth, Waveform, and Rate for Electrical Stimulation of Auditory Cortex.” The 23<sup>rd</sup> Annual Meeting of the Biomedical Engineering Society. Atlanta, GA, 2012.
- “Normal and Accelerated Failure Assessment of New Quantitative *In Vitro* and *In Vivo* Neural Interfaces.” DARPA RE-NET PI Review Meeting, New Orleans, LA, 2012.
- “Multiscale bidirectional neural interfaces for comprehensive central nervous system interface reliability improvement.” DARPA RE-NET PI Review Meeting, New Orleans, LA, 2012.
- “Electrical Waveform Parameters for ICMS of the Brain.” Center for Sensorimotor Neural Engineering Technical Workshop: Microelectrode Technology. Seattle, WA, 2013.
- “On the Relationship of Chronic Microstimulation and Neural-Tissue Interfacial Quality.” Seminars in Hearing Research, Purdue University. West Lafayette, IN, 2013.
- “Chronic Microstimulation and Neural-Tissue Interfacial Quality.” Biomedical Engineering Seminar Series, University of Delaware, 2013.
- “Chronic Microstimulation and Neural-Tissue Interfacial Quality.” JAX-Purdue Engineers Symposium, The Jackson Laboratory, Bar Harbor, Maine, 2013.
- “Microstimulation of Sensory Cortices and Mitigation of Degradation in Neural-Tissue Interfacial Quality.” Affinity Research Collaborative Seminar Series, Beth Israel Deaconess Medical Center, Harvard Medical School, 2013.
- “Normal and Accelerated Failure Assessment of New Quantitative *In Vitro* and *In Vivo* Neural Interfaces.” DARPA RE-NET PI Review Meeting, Phoenix, AZ 2014.
- “Neuroengineering the Interface of Micro-devices with the Brain.” Biomedical Engineering Seminar Series, University of Florida, Gainesville, FL, 2014.

- “On the Performance Dependence of the Neural Microdevice-Tissue Interface” Center of Neural Engineering and Computation Research Seminar Series, Columbia University, New York City, NY, 2014.
- “Micro-neural Interfaces.” Biomedical Engineering Seminar Series, University of Texas at Dallas, Richardson, TX, 2014.
- “Controlled Protein Release via Thin Film Tetramethyl Orthosilicate Sol-Gel for Mitigation of the Reactive Tissue Response to Chronically Implanted Central Nervous System Devices.” The 7<sup>th</sup> International Symposium on Intelligent Drug Delivery Systems, Seoul, South Korea, 2014.
- “*In Vitro* and *In Vivo* Evaluation of Neural Interfaces.” Tissue Response to Active Medical Devices Conference, Herndon, VA, 2014.
- “NeuroProstheses in Biomedical Engineering and Regenerative Medicine.” First International Congress on Biomedical Engineering & Mathematical Modeling in Biosciences, Quito, Ecuador, 2014.
- “The cellular role of cortical neuroprosthetic failure.” Department of Neuroscience Seminar Series, University of Florida. Gainesville, FL, 2014.
- “Systemic assessment of markers of inflammation to intracortical microelectrodes.” Biomedical Engineering Society Annual Meeting. Tampa, FL. 2015. Presented by J Gaire.
- “Inflammation and Neural Implants.” Neurotech Dinners, University of Florida. Gainesville, FL, 2015.
- “Neuroengineering the interface of micro-devices with the brain.” Invited Keynote Presentation, International Biomedical Engineering Conference. Gyeongju, Korea, 2015.
- “Towards Reliable Neural-Interface Technology Using Penetrating Micro-devices.” 13<sup>th</sup> Annual World Congress of the Society for Brain Mapping & Therapeutics. Miami, FL. 2016.
- “What’s Right and What’s Wrong with Micro-neural Interfaces?” School of Biological & Physical Sciences Seminar Series, Daytona State College, Daytona Beach, FL. 2016.
- “Quadruple labelled mouse to study tissue response to brain implanted devices.” Biomedical Engineering Society Annual Meeting. Minneapolis, MN. 2016. Presented by J Gaire.
- “Neural Prostheses and You!” Engineering Week, University of Florida, Gainesville, FL. 2017.



“Neural Engineering.” Student Science Training Program, University of Florida, Gainesville, FL, 2017.

“Understanding Fiber Recruitment of Peripheral Nerves During Intrafascicular Stimulation via Computational Modeling.” Biomedical Engineering Society Annual Meeting. Phoenix, AZ. 2017. Presented by E Patrick.

“In Vivo Validation of a flexible CMOS-compatible Neural Interface.” Biomedical Engineering Society Annual Meeting. Phoenix, AZ. 2017. Presented by A Kundu.

“Investigating the Role of Inflammation in the Functionality of Intracortical Devices.” Biomedical Engineering Society Annual Meeting. Phoenix, AZ. 2017. Presented by J Gaire.

“Electrical Evaluation Of Micro-Electrode Arrays Coated With Thin Films For Minocycline Release.” Biomedical Engineering Society Annual Meeting. Phoenix, AZ. 2017. Presented by KP Olczak.

***Publications: Ph.D. Dissertation (Daryl R. Kipke, advisor)***

1. Intracortical microstimulation for sensory inputs in brain-machine interfaces: Arizona State University Department of Bioengineering. 2003

***Publications: books and chapters in books***

*(note: Bold indicates self, § indicates graduate student mentees)*

1. **Otto, KJ**, KA Ludwig, and DR Kipke. (2011). Intracortical neural interfaces for BCI Systems In J Wolpaw and EW Wolpaw (Eds.), *Brain-Computer Interfaces: Principles and Practice* (pp. 81-105). ISBN-13: 978-0195388855. Oxford University Press, USA.
2. Camarillo, IG, F Xiao, S Madhivanan, T Salameh, M Nichols, LM Resse, JF Leary, **K Otto**, A Natarajan, A Ramesh, and R Sundararajan. (2014). Low and high voltage electrochemotherapy for breast cancer: an *in vitro* model study. In R Sundararajan (Ed.), *Electroporation-based therapies for cancer: From basics to clinical applications* (pp. 55-99). ISBN: 978-1-907568-15-2. Woodhead Publishing, USA.
3. Koivuniemi, AS<sup>§</sup>, **KJ Otto**. (2017). Central nervous system stimulation. In K. Horch and D.R. Kipke (Eds.), *Neuroprosthetics: Theory and Practice* (pp. 348-376). ISBN: 978-9813207141. World Scientific Publishing Company; 2 edition, USA.

***Publications: books reviews/editorials***

1. **Otto, KJ** and JC Williams. Normal and accelerated failure assessment of novel in vitro and in vivo neural interfaces. *IEEE pulse* 3 (1), 27. 2012.

---

***Publications: refereed journals, refereed proceedings, and reviews***

(note: Underline indicates the Senior/principal author, **Bold** indicates self, <sup>g</sup> indicates graduate student mentees, <sup>p</sup> indicates post-doctoral fellow mentees, and <sup>&</sup> indicates undergraduates and other mentees)

**Refereed Journals:**

1. Witte, RS, **KJ Otto**, JC Williams, and DR Kipke. Pursuing dynamic reorganization in auditory cortex using chronic multichannel unit recordings in awake, behaving cats. *Neurocomputing*, 26-27:593-600. 1999.
2. Rousche, PJ, **KJ Otto**, and DR Kipke. Single electrode micro-stimulation of rat auditory cortex: an evaluation of behavioral performance. *Hearing Research*, 179(1-2): p. 62-71. 2003.
3. Gage, GJ, KA Ludwig, **KJ Otto**, EL Ionides, and DR Kipke. Naïve coadaptive cortical control, *Journal of Neural Engineering*, 2:35-41. 2005.
4. **Otto, KJ**, PJ Rousche, and DR Kipke. Cortical microstimulation in auditory cortex of rat elicits best-frequency dependent behaviors. *Journal of Neural Engineering*, 2:42-51. 2005.
5. Johnson, MD, **KJ Otto**, and DR Kipke. Repeated rejuvenation improves unit recordings by consistently reducing high tissue impedances, (Invited), *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 13(2):160-165. 2005.
6. **Otto, KJ**, PJ Rousche, and DR Kipke. Microstimulation in auditory cortex provides a substrate for detailed behaviors. *Hearing Research*, 210(1-2):112-117. 2005.
7. **Otto, KJ**, MD Johnson, and DR Kipke. Bias voltages change neural interface properties and improve unit recordings with chronically implanted microelectrodes. *IEEE Transactions on Biomedical Engineering*, 53(2):333-40. 2006.
8. Pierce AP<sup>g</sup>, SS Sommakia<sup>g</sup>, JL Rickus, and **KJ Otto**. Thin-film silica sol-gel coatings for neural microelectrodes. *Journal of Neuroscience Methods*, 180:106-110. 2009.
9. Wilks, SJ<sup>g</sup>, SM Richardson-Burns, JL Hendricks, DC Martin, and **KJ Otto**. Poly(3,4-ethylene dioxythiophene) (PEDOT) as a micro-neural interface material for electrostimulation. *Frontiers in Neuroengineering*, 3:3. doi:10.3389/neuro.16.007.2009. 2009.
10. Nunamaker, EA, **KJ Otto**, and DR Kipke. Investigation of the material properties of alginate for the development of hydrogel repair of dura mater. *Journal of the Mechanical Behavior of Biomedical Materials*, 4(1):16-33. 2010.

11. McCarthy, PT, **KJ Otto**, and MP Rao. Robust penetrating microelectrodes for neural interfaces realized by titanium micromachining. *Biomedical Microdevices*, 13:503-515. 2011.
12. McCarthy, PT, MP Rao, and **KJ Otto**. Simultaneous recording of rat auditory cortex and thalamus via a titanium-based multi-channel, microelectrode device. *Journal of Neural Engineering*, 8 046007. 2011. doi: 10.1088/1741-2560/8/4/046007.
13. Koivuniemi, AK<sup>g</sup>, SJ Wilks<sup>g</sup>, AJ Woolley<sup>g</sup>, and **KJ Otto**. Multimodal, longitudinal assessment of intracortical microstimulation. *Progress in Brain Research*, 194:131-144. 2011.
14. Lempka, S, MD Johnson, M Moffitt, **KJ Otto**, DR Kipke, and C McIntyre. Theoretical Analysis of Intracortical Microelectrode Recordings. *Journal of Neural Engineering*, 8 045006. 2011.
15. Woolley, AJ<sup>g</sup>, H Desai<sup>&</sup>, MA Steckbeck<sup>&</sup>, N Patel<sup>&</sup>, and **KJ Otto**. *In situ* characterization of the brain-microdevice interface using Device Capture Histology. *Journal of Neuroscience Methods* 201:67-77. 2011.
16. Koivuniemi, AS<sup>g</sup> and **KJ Otto**. Optimized waveforms for electrical microstimulation of auditory cortex. *IEEE Transactions in Neural Systems and Rehabilitation*, 19(5):468-476. 2011.
17. Sundararajan, R, F Xiao, T Salameh, LM Reece, L Campana, IG Camarillo, JF Leary, and **KJ Otto**. Effective proliferation control of human cancer cells using electrical pulses. *IEEE Transactions on Dielectrics and Electrical Insulation*, 19(6):2225-2236. 2012.
18. Wilks, SJ<sup>g</sup>, TJ Richner, JC Williams, and **KJ Otto**. Voltage Biasing, Cyclic Voltammetry, & Electrical Impedance Spectroscopy for Neural Interfaces. *Journal of Visualized Experiments* J. Vis. Exp. (60), e3566, DOI: 10.3791/3566. 2012.
19. Nunamaker, EA, **KJ Otto**, JE Artwohl, and JD Fortman. Leaching of heavy metals from water bottle components into the drinking water of rodents. *Journal of the American Association for Laboratory Animal Science*, 52(1):22-27. 2013.
20. Woolley, AJ<sup>g</sup>, HA Desai, J Gaire, AL Ready, and **KJ Otto**. Intact histological characterization of brain-implanted microdevices and surrounding tissue. *Journal of Visualized Experiments*, (72), e50126, doi:10.3791/50126. 2013.
21. Woolley, AJ<sup>g</sup>, HA Desai, and **KJ Otto**. Chronic intracortical microelectrode arrays induce non-uniform, depth-related tissue responses. *Journal of Neural Engineering*, 10(2):026007. DOI: 10.1088/1741-2560/10/2/026007. 2013. Selected as one of Journal of Neural Engineering's Highlights of 2013.

22. Ochoa M, Wei P, Woolley, AJ<sup>§</sup>, **KJ Otto**, and B Ziaie. A hybrid PDMS-Parylene subdural multi-electrode array. *Biomedical Microdevices*, 15:437-443. DOI 10.1007/s10544-013-9743-2. 2013.
23. Chen, KH, JF Dammann, JL Boback, FV Tenore, RA Gaunt, **KJ Otto**, and SJ Bensmaia. The effect of chronic intracortical microstimulation on impedance and voltage excursion across different regimes of stimulation. *Journal of Neural Engineering*. 11 026004. doi:10.1088/1741-2560/11/2/026004. 2014.
24. Sommakia, S<sup>§</sup>, J Gaire<sup>§</sup>, JL Rickus, and **KJ Otto**. Resistive and reactive changes to the impedance of intracortical microelectrodes can be mitigated with polyethylene glycol under acute in vitro and in vivo settings. *Frontiers in Neuroengineering*, Aug 4;7:33. doi: 10.3389/fneng.2014.00033, 2014.
25. Koivuniemi, AS<sup>§</sup> and **KJ Otto**. When “Altering Brain Function” becomes “Mind Control”. *Frontiers in Systems Neuroscience*. 14;8:202. doi: 10.3389/fnsys.2014.00202. 2014.
26. Sommakia, S<sup>§</sup>, JL Rickus, and **KJ Otto**. Glial cells, but not neurons, exhibit a controllable response to a localized inflammatory microenvironment in vitro. *Frontiers in Neuroengineering*. 14;7:41. doi: 10.3389/fneng.2014.00041. 2014.
27. Wodicka, JR<sup>&</sup>, NI Onunkwo<sup>§</sup>, AJ Woolley<sup>§</sup>, A Panitch, and **KJ Otto**. A cell-penetrating peptide for inhibiting MAPKAP Kinase 2-mediated inflammatory cytokine release following glial cell activation. *World Journal of Neuroscience* 5 (02), 115. 2015.
28. Ward, M, **K Otto**, K Qing, R Worth, S John, and P Irazoqui. A flexible platform for biofeedback-driven control and personalization of electrical nerve stimulation therapy. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, PP(99):1-1. 2015.
29. Rajan, AT, JL Boback, JF Dammann, FV Tenore, BA Webster, **KJ Otto**, RA Gaunt, and SJ Bensmaia. The effects of chronic intracortical microstimulation on neural tissue and fine motor behavior. *Journal of Neural Engineering*, 12 (6), 066018. 2015.
30. Rossi, PJ, A. Gunduz, J Judy, L Wilson, A Machado, J Giordano, WJ Elias, MA Rossi, CL Butson, MD Fox, CC McIntyre, N Pouratian, NC Swann, C de Hemptinne, R Gross, HJ Chizeck, M Tagliati, AM Lozano, W Goodman, J-P Langevin, RL Alterman, U Akbar, GA Gerhardt, M Hallett, T Herrington, J Herron, C van Horne, B Kopell, A Lang, C Lungu, D Martinez-Ramirez, AY Mogilner, R Molina, E Opri, **KJ Otto**, KG Oweiss, Y Pathak, A Shukla, J Shute, S Sheth, LC Shih, KG Steinke, AI Tröster, N Vanegas, KA Zaghoul, L Cendejas-Zaragoza, L Verhagen, KD Foote, MS Okun. Proceedings of the Third Annual Deep Brain Stimulation Think Tank: A Review of Emerging Issues and Technologies. *Frontiers in Neuroscience*, 10:34. 2016.
31. Lee, HC<sup>§</sup>, F Ejserholm, J Gaire<sup>§</sup>, S Currell<sup>§</sup>, J Schouenborg, L Wallman, M Bengtsson, K Park, and **KJ Otto**. Histological evaluation of flexible neural implants; flexibility limit for reducing the tissue response? *Journal of Neural Engineering*, 14:3, 2017.

32. Lee HC<sup>g</sup>, J Gaire<sup>g</sup>, B Roysam, and **KJ Otto**. Placing sites on the edge of planar silicon microelectrodes enhances chronic recording functionality. *IEEE Transactions on Biomedical Engineering*. DOI: 10.1109/TBME.2017.2715811.
33. Lee HC<sup>g</sup>, J Gaire<sup>g</sup>, SW Currin<sup>g</sup>, MD McDermott<sup>g</sup>, K Park, and **KJ Otto**. Foreign body response to intracortical microelectrodes is not altered with dip-coating of polyethylene glycol (PEG). *Frontiers in Neuroscience*, 11:513, doi: 10.3389/fnins.2017.00513. 2017.
34. Park, D-W, JP Ness, SK Brodnick, C Esquibel, J Novello, F Atry, D-H Baek, H Kim, J Bong, KI Swanson, AJ Suminski, **KJ Otto**, R Pashaie, JC Williams, and Z Ma. Electrical neural stimulation and simultaneous in vivo monitoring with transparent graphene electrode arrays implanted in GCaMP6f mice. (*submitted*)
35. McDermott, MD<sup>g</sup>, A Filley<sup>&</sup>, **KJ Otto**. Controlled protein release via thin film tetramethyl orthosilicate sol-gel. (*submitted*).
36. J Gaire<sup>g</sup>, HC Lee, R Ward<sup>&</sup>, S Currin<sup>g</sup>, E Atkinson<sup>g</sup>, AJ Woolley, JE Coleman, **KJ Otto**. Characterization and application of a transgenic mouse model expressing fluorophores in four different brain cell types. (*submitted*).

#### **Refereed Proceedings:**

1. **Otto, KJ**, RJ Vetter, TC Marzullo, and DR Kipke. Brain-machine interfaces in rat motor cortex: implication of adaptive decoding algorithms. *Proceedings of the 1<sup>st</sup> International IEEE EMBS Conference on Neural Engineering*. 1:100-103. 2003.
2. Vetter, RJ, **KJ Otto**, TC Marzullo, and DR Kipke. Brain-machine interfaces in rat motor cortex: neuronal operant conditioning to perform a sensory detection task. *Proceedings of the 1<sup>st</sup> International IEEE EMBS Conference on Neural Engineering*. 1:637-640. 2003.
3. **Otto, KJ**, PJ Rousche, and DR Kipke. The benefits of modular brain-machine interface system design. *Proceedings of the 25<sup>th</sup> Annual IEEE EMBS International Conference*. 3: 2208-2211. 2003.
4. Gage, GJ, **KJ Otto**, KA Ludwig, and DR Kipke. Co-adaptive Kalman filtering in a naive rat cortical control task. *Proceedings of the 26<sup>th</sup> Annual IEEE EMBS International Conference*. 6:4367-4370. 2004.
5. Ghovanloo, M, **KJ Otto**, DR Kipke, and K Najafi. In vitro and in vivo testing of a wireless multichannel stimulating telemetry microsystem. *Proceedings of the 26<sup>th</sup> Annual IEEE EMBS International Conference*. 6:4294-4297. 2004.
6. Johnson, MD, **KJ Otto**, JC Williams, and DR Kipke. Bias voltages at microelectrodes change neural interface properties in vivo. *Proceedings of the 26<sup>th</sup> Annual IEEE EMBS International Conference*. 6:4103-4106. 2004.

7. Lempka, SF, MD Johnson, DW Barnett, MA Moffitt, **KJ Otto**, DR Kipke and CC McIntyre. Optimization of microelectrode design for cortical recording based on thermal noise considerations. *Proceedings of the 28<sup>th</sup> Annual IEEE EMBS International Conference*, August, 1:3361-3364. 2006.
8. Sundararajan, R, D Campbell, J Harper, F Xiao, R Ma, and **KJ Otto**. Characterization of fruit juices treated with electrical pulses. *Annual Report of the IEEE Conference on Electrical Insulation & Dielectric Phenomena*, 26-29 Oct., 1:536-539. 2008.
9. Elman A<sup>&</sup>, EL Bartlett, N Kong, and **KJ Otto**. Applying data mining techniques to studying complex sensory stimuli in the thalamocortical loop. *Proceedings of the 3<sup>rd</sup> INFORMS Workshop on Data Mining and Health Informatics*, DM-HI. 2008.
10. Xiao, F, **Otto, KJ**, Camarillo, I, and R Sundararajan. Impedance spectroscopy studies of electroporated breast cancer cells. *Proceedings of IEEE Conference on Electrical Insulation & Dielectrics*, 470-3. 2009.
11. McCarthy, PT, R Madangopal, **KJ Otto**, and MP Rao. Titanium-based multi-channel, micro-electrode arrays for brain machine interface devices. *Proceedings of the 31<sup>st</sup> Annual IEEE EMBS International Conference*, 2062-5. 2009.
12. Sommakia, SS<sup>g</sup>, Rickus, JL, and **KJ Otto**. Effects of adsorbed proteins and an antifouling agent on the impedance of silicon-based neural microelectrodes. *Proceedings of the 31<sup>st</sup> Annual IEEE EMBS International Conference*, 7139-42. 2009.
13. Wilks, SJ<sup>g</sup>, AS Koivuniemi<sup>g</sup>, S Thongpang, JC Williams, and **KJ Otto**. Evaluation of micro-electrocorticographic electrodes for electrostimulation. *Proceedings of the 31<sup>st</sup> Annual IEEE EMBS International Conference*, 5510-3. 2009.
14. Wilks, SJ<sup>g</sup>, AJ Woolley<sup>g</sup>, L Ouyang, DC Martin, and **KJ Otto**. In vivo polymerization of poly(3,4-ethylenedioxythiophene) (PEDOT) in rodent cerebral cortex. *Proceedings of the 33<sup>rd</sup> Annual IEEE EMBS International Conference*, 5412-5. 2011.
15. Koivuniemi, AS<sup>g</sup>, OB Regele<sup>&</sup>, JH Brenner<sup>&</sup>, and **KJ Otto**. Rat behavioral model for high-throughput parametric studies of intracortical microstimulation. *Proceedings of the 33<sup>rd</sup> Annual IEEE EMBS International Conference*, 7541-4. 2011.
16. Woolley, AJ<sup>g</sup>, HA Desai, and **KJ Otto**. Imaging the tissue response around brain-implanted microdevices. *Microscopy and Microanalysis*, 17 146-147. 2011.
17. Sundararajan, R, F Xiao, **KJ Otto**, and IG Camarillo. The dielectric properties of electroporated human breast cancer cells. *2012 IEEE 10<sup>th</sup> International Conference on the Properties and Applications of Dielectric Materials (ICPADM)*, 1-5. 2012.
18. Koivuniemi, AS<sup>g</sup> and **KJ Otto**. The depth, waveform, and pulse rate for electrical microstimulation of the auditory cortex. *Proceedings of the 34<sup>th</sup> Annual IEEE EMBS International Conference*, 2489-92. 2012.

19. Regele, OB<sup>§</sup>, AS Koivuniemi<sup>§</sup>, and **KJ Otto**. Constant RMS versus constant peak modulation for the perceptual equivalence of sinusoidal amplitude modulated signals. *Proceedings of the 35th Annual IEEE EMBS International Conference*, 3115-3118. 2013.
20. Woolley, AJ<sup>§</sup>, HA Desai, J Gaire<sup>§</sup>, AL Ready<sup>§</sup>, and **KJ Otto**. A systemic triple label strategy for fluorescent microscopy of inflammation in CNS and non-CNS tissue. *Microscopy and Microanalysis*, 19(S2):196-197. 2013.
21. Lee, HC<sup>§</sup>, J Gaire<sup>§</sup>, S McDowell<sup>&</sup>, and **KJ Otto**. The effect of site placement within silicon microelectrodes on the long-term electrophysiological recordings. *Proceedings of the 36th Annual IEEE EMBS International Conference*, 2014.
22. Lycke, R<sup>§</sup>, A Schendel, JC Williams, and **KJ Otto**. In vivo evaluation of a  $\mu$ ECoG array for chronic stimulation. *Proceedings of the 36th Annual IEEE EMBS International Conference*, 2014.
23. Sommakia, S<sup>§</sup>, S Wyatt, **KJ Otto**, A Vadlamani, and AL Garner. Nanosecond pulsed electric field interactions with microglia and astrocytes. *Proceedings of the IEEE 2014 International Power Modulator and High Voltage Conference*. 2014.
24. Vedam-Mai, V, AT Yachnis, **KJ Otto**, A Gunduz, A Wagle Shukla, C Hess, and MS Okun. Histopathological observations from 50 human deep brain stimulation cases. *Movement Disorders*, 30;S292. 2015.
25. McDermott MD<sup>§</sup>, J Zhang<sup>§</sup>, and **KJ Otto**. Improving the brain machine interface via multiple Tetramethyl Orthosilicate sol-gel coatings on microelectrode arrays. *Proceedings of the 7th International IEEE/EMBS Conference on Neural Engineering*, 2015.
26. McDermott, MD<sup>§</sup>, **KJ Otto**. The effect of multiple thin-film coatings of protein loaded sol-gel on total multi-electrode array thickness. *Proceedings of the 38th Annual IEEE EMBS International Conference*, 2016.
27. Desai, V, B Spearman, C Shafor, S Natt, B Teem, J Graham<sup>&</sup>, E Atkinson<sup>§</sup>, R Wachs, E Nunamaker, **KJ Otto**, C Schmidt, and J Judy. Design, fabrication, and characterization of a scalable tissue-engineered electronic nerve interface. *Proceedings of the 8th International IEEE/EMBS Conference on Neural Engineering*, 2017.
28. Graham, JP, E Atkinson<sup>§</sup>, EA Nunamaker, B Spearman, V Desai, C Shafor, S Natt, R Wachs, C Schmidt, J Judy, and **KJ Otto**. Histological evaluation of chronically implanted tissue-engineered-electronic-neural-interface (TEENI) Devices. *Proceedings of the 8th International IEEE/EMBS Conference on Neural Engineering*, 2017.
29. McDermott, MD<sup>§</sup>, K Olczak<sup>§</sup>, and **KJ Otto**. Electrical analysis of minocycline eluting layer-by-layer thin-films from functional micro-electrode arrays. *Proceedings of the 8th International IEEE/EMBS Conference on Neural Engineering*, 2017.

30. Nunamaker EA, B Spearman, J Graham<sup>P</sup>, E Atkinson<sup>g</sup>, V Desai, C Shafor, S Natt, R Wachs, C Schmidt, J Judy, and **KJ Otto**. Implantation methodology development for tissue-engineered electronic neural interface (TEENI) devices. *Proceedings of the 8<sup>th</sup> International IEEE/EMBS Conference on Neural Engineering*, 2017.
31. Spearman B, R Wachs, V Desai, C Shafor, J Graham<sup>P</sup>, E Atkinson<sup>g</sup>, E Nunamaker, **KJ Otto**, C Schmidt, and J Judy. Development of mechanically-tunable hydrogel scaffold for a regenerative peripheral nerve interface. *Proceedings of the 8<sup>th</sup> International IEEE/EMBS Conference on Neural Engineering*, 2017.

### Reviews

1. Sommakia, S<sup>g</sup>, HC Lee<sup>g</sup>, J Gaire<sup>g</sup>, and **KJ Otto**. Materials approaches for modulating neural tissue responses to implanted microelectrodes through mechanical and biochemical means. *Current Opinion in Solid State & Materials Science*, 18 (6), 319-328. 2014.
2. Spearman, BS, V Desai, S Mobini, MD McDermott<sup>g</sup>, JB Graham<sup>P</sup>, **KJ Otto**, J Judy, and C Schmidt. Tissue-engineered peripheral nerve interfaces. *Advanced Functional Materials*, 1701713. <https://doi.org/10.1002/adfm.201701713>, 2017.
3. Urdaneta, ME<sup>g</sup>, AS Koivuniemi, **KJ Otto**. Towards whole-brain micro-neuromodulation. *Current Opinion in Biomedical Engineering*, 4:65-77. 2017.

---

### **Abstracts**

(note: Bold indicates self, solid underlining indicates graduate student mentees, and dotted underlining indicates undergraduate student mentees)

1. Witte, RS, **KJ Otto**, JC Williams, and DR Kipke. Pursuing dynamic reorganization in auditory cortex using chronic, multichannel microelectrodes in awake, behaving animals. *Computational Neuroscience Annual Meeting Abstracts*. Santa Barbara, CA. 1998.
2. Kipke, DR, PJ Rousche, JC Williams, RS Clement, RS Witte, **KJ Otto**, RL Rennaker, and DS Pellinen. Individual unit responses to simple stimuli can change within large neural ensembles in auditory cortex. Evidence for dynamic neural assemblies? *Beyond Neurons and Synchrony, Dynamical Neuroscience Satellite Symposium Abstracts*. Los Angeles, CA. 1998.
3. **Otto, KJ**, PJ Rousche, and DR Kipke. Aversive fear conditioning utilizing feedback control based on neural signals from auditory cortex: a novel method to study neuronal plasticity. *Association for Research in Otolaryngology Abstracts*. St. Petersburg, FL. 1999.
4. **Otto, KJ**, PJ Rousche, and DR Kipke. Investigating neural coding and plasticity in auditory cortex using real-time feedback from ensemble neural recordings. *Computational Neuroscience Annual Meeting Abstracts*. Pittsburg, PA. 1999.



5. **Otto, KJ**, PJ Rousche, and DR Kipke. Intracortical microstimulation (ICMS) in rat auditory cortex: examination of relationship between perceptual generalization and stimulus location. *Society for Neuroscience Abstracts*. San Diego, CA. 2001.
6. Rousche, PJ, **KJ Otto**, and DR Kipke. Intracortical microstimulation (ICMS) in rat auditory cortex: examination of relationship between pure tone and ICMS-evoked generalization gradient curves. *Society for Neuroscience Abstracts*. San Diego, CA. 2001.
7. **Otto, KJ**, PJ Rousche, and DR Kipke. Intracortical microstimulation and perceptual generalization in rat auditory cortex. *Proceedings of the 12<sup>th</sup> annual Biomedical Engineering Society*. Raleigh-Durham, N.C. 2001.
8. Rousche, PJ, **KJ Otto**, and DR Kipke. Cortical neuroprosthesis development: dynamic Range and threshold for intracortical microstimulation (ICMS) of auditory cortex. *Proceedings of the 12<sup>th</sup> annual Biomedical Engineering Society*. Raleigh-Durham, N.C. 2001.
9. **Otto, KJ**, PJ Rousche, and DR Kipke. Examination of perceptual generalizations elicited by intracortical microstimulation of adult rat auditory cortex. *Computational Neuroscience Annual Meeting Abstracts*. Chicago, IL. 2002.
10. **Otto, KJ**, and DR Kipke. The perceptual effects of multi-electrode spatiotemporal microstimulation in rat auditory cortex. *Society for Neuroscience Abstracts*. Orlando, FL. 2002.
11. **Otto, KJ**, and DR Kipke. A closed-loop brain machine interface in the rat utilizing cortical microstimulation and ensemble neuronal recordings. *Society for Neuroscience Abstracts*. New Orleans, LA. 2003.
12. Vetter, RJ, **KJ Otto**, and DR Kipke. Brain machine interface systems utilizing local field potentials recorded on silicon microelectrodes at multiple depths in rat motor cortex. *Society for Neuroscience Abstracts*. New Orleans, LA. 2003.
13. **Otto, KJ**, MD Johnson, W Shain, and DR Kipke. Rejuvenation of chronically implanted neural probes. *Society for Neuroscience Abstracts*. San Diego, CA. 2004.
14. **Otto, KJ**, JC Middlebrooks. Rejuvenation of chronically implanted microelectrodes in the primary auditory cortex of guinea pigs. *Neural Interfaces Workshop*. Washington D.C. 2005.
15. **Otto, KJ**. The role of neural interface improvement via rejuvenation in bidirectional neural prostheses. *International Workshop on Neural Interface Technologies and Applications*. Kunming, China. 2006.

16. Lempka, SF, MD Johnson, DW Barnett, MA Moffitt, **KJ Otto**, DR Kipke, CC McIntyre. Theoretical optimization of silicon microelectrode contact surface area. *Neural Interfaces Workshop*. Washington, DC. 2006.
17. **Otto, KJ**, AJ Woolley, NI Onunkwo, RD Muir, JM Colby. Research and development of an auditory cortical prosthesis. *National Academies Keck Futures Initiative Conference on Smart Prostheses*. Irvine, CA. 2006.
18. Woolley, AJ and **KJ Otto**. Cortical prostheses: exploring the role of neural plasticity. *Indiana Health Industry Forum Conference - Innovention 2007*. Indianapolis, IN. 2007.
19. Wilks, SJ and **KJ Otto**. *In vitro* characterization of activation and deactivation of iridium oxide stimulating microelectrodes for cortical prostheses. *Indiana Health Industry Forum Conference - Innovention 2007*. Indianapolis, IN. 2007.
20. Muir, RD and **KJ Otto**. An investigation of charge-balanced waveforms for manipulation of chronic neural implant interfaces. *Proceedings of the 18<sup>th</sup> annual Biomedical Engineering Society*. Los Angeles, CA. 2007.
21. Onunkwo, NI and **KJ Otto**. The use of DC electric fields to improve long-term functionality of chronically implanted cortical microelectrodes. *Proceedings of the 18<sup>th</sup> annual Biomedical Engineering Society*. Los Angeles, CA. 2007.
22. Pierce, AL and **KJ Otto**. Silica sol-gel coatings for chronically implanted neural electrodes. *Proceedings of the 18<sup>th</sup> annual Biomedical Engineering Society*. Los Angeles, CA. 2007.
23. **Otto, KJ**, RD Muir, NI Onunkwo, SJ Wilks and JM Colby. Electrode-tissue interface estimation and manipulation for a cortical prosthesis. *Society for Neuroscience Abstracts*. San Diego, CA. 2007.
24. Woolley, AJ and **KJ Otto**. Neural plasticity and auditory cortical prostheses. *Society for Neuroscience Abstracts*. San Diego, CA. 2007.
25. **Otto, KJ**. Cortical prosthesis microelectrode-tissue interface estimation and manipulation. *Gordon Research Conference: Biointerface Science*. Aussios, France. 2008.
26. Wilks, SJ and **KJ Otto**. Improving stability of activated iridium oxide stimulating microelectrodes for neural prostheses. *Proceedings of the 19<sup>th</sup> annual Biomedical Engineering Society*. St. Louis, MO. 2008.
27. Pierce, AL, D. Woehrle, S. Vaidyanathan, SS Sommakia, JL Rickus and **KJ Otto**. Thin film silica sol-gel coatings for chronically implanted neural recording microelectrodes. *Proceedings of the 19<sup>th</sup> annual Biomedical Engineering Society*. St. Louis, MO. 2008.

28. Sommakia, SS, **KJ Otto**, JL Rickus, and SL Voytk-Harbin. An *in vitro* brain injury model for implantable neural prostheses. *Proceedings of the 19<sup>th</sup> annual Biomedical Engineering Society*. St. Louis, MO. 2008.
29. Langhals, NB, KJ Coulter, KL Smith, **KJ Otto**, S Madewell, CS Bjornsson, W Shain, DR Kipke. CNCT training course on implantable neuroprosthetics. *Society for Neuroscience Abstracts*. Washington, DC. 2008.
30. Onunkwo NI, AJ Woolley, and **KJ Otto**. The use of DC electric fields to induce directional growth of cortical neurons *in vitro*. *Society for Neuroscience Abstracts*. Washington, DC. 2008.
31. Pierce, AL, D Woehrle, S Vaidyanathan, SS Sommakia, JL Rickus and **KJ Otto**. Sol-gel derived ultra-porous silica coatings for neural microelectrodes. *Society for Neuroscience Abstracts*. Washington, DC. 2008.
32. **Otto, KJ**, RD Muir, and SS Sommakia. The application of bias potentials for manipulation of the neural electrode-tissue interface. *Proceedings of the 20<sup>th</sup> annual Biomedical Engineering Society*. Pittsburgh, PA. 2009.
33. Wilks, SJ, AS Koivuniemi, S Thongpang, JC Williams, and **KJ Otto**. Micro-electrocorticographic electrodes for stimulation neuroprostheses. *Proceedings of the 20<sup>th</sup> annual Biomedical Engineering Society*. Pittsburgh, PA. 2009.
34. Sommakia, SS, JL Rickus, and **KJ Otto**. Potential strategy for the modulation of protein adsorption onto neural microelectrodes. *Society for Neuroscience Abstracts*. Chicago, IL. 2009.
35. Onunkwo NI, A Panitch, and **KJ Otto**. New approaches to counteracting the reactive tissue response to intracortical microelectrodes. *Society for Neuroscience Abstracts*. Chicago, IL. 2009.
36. Woolley, AJ, BL Garman, and **KJ Otto**. Imaging biological changes around implanted microelectrodes in intact rat cortex. *Society for Neuroscience Abstracts*. Chicago, IL. 2009.
37. Langhals, NB, RM Miriani, Patel, PR, KJ Coulter, KL Smith, **KJ Otto**, W Shain, DR Kipke. Center for neural communication technology training course on neuroprosthetics: technologies & techniques. *Society for Neuroscience Abstracts*. Chicago, IL. 2009.
38. Koivuniemi A, **KJ Otto**. Optimizing brain microstimulation with a conditioned avoidance task. *Sigma Xi Graduate Student Research Awards Competition*. West Lafayette, IN. 2010.
39. Woolley AJ, H Desai, MA Steckbeck, N Patel, **KJ Otto**. Imaging tissue changes around implanted microelectrodes in rat cortex. *Sigma Xi Graduate Student Research Awards Competition*. West Lafayette, IN. 2010.

40. Desai H, AJ Woolley, MA Steckbeck, N Patel, KJ Otto. Investigating the glial cell response around microelectrodes in brain tissue. *Undergraduate Research Poster Symposium, Purdue University*. West Lafayette, IN. 2010.
41. Desai H, AJ Woolley, MA Steckbeck, N Patel, KJ Otto. Investigating the glial cell response around microelectrodes in brain tissue. *Undergraduate Research Symposium, Butler University*. Indianapolis, IN. 2010.
42. Wilks, SJ, AS Koivuniemi, KJ Otto. Microelectrode coating performance of PEDOT versus IrOx for chronic neural stimulation. *Neural Interfaces Conference*. Long Beach, CA. 2010.
43. Wilks, SJ, AS Koivuniemi, KJ Otto. *In vitro* stability and *in vivo* performance of PEDOT coatings for neural microstimulation. *Proceedings of the 21<sup>st</sup> annual Biomedical Engineering Society*. Austin, TX. 2010.
44. Woolley, AJ, H Desai, MA Steckbeck, NI Onunkwo, N Patel, S Sommakia, KJ Otto. Characterization of tissue at intracortical microelectrode interfaces using *in vitro*, *in situ* and *in vivo* imaging strategies. *Proceedings of the 21<sup>st</sup> annual Biomedical Engineering Society*. Austin, TX. 2010.
45. Vaidyanathan S, S Sommakia, JL Rickus, KJ Otto. Controlled release of biomolecules from silica sol-gel thin films. *Proceedings of the 21<sup>st</sup> annual Biomedical Engineering Society*. Austin, TX. 2010.
46. Koivuniemi, AS, SJ Wilks, KJ Otto. Evaluation of auditory cortical microstimulation in behaving rats. *Society for Neuroscience Abstracts*. San Diego, CA. 2010.
47. Sommakia S, AJ Woolley, JL Rickus, KJ Otto. Cellular response of mixed cortical primary cultures to PEG, sol-gel silica coated microwire. *Society for Neuroscience Abstracts*. San Diego, CA. 2010.
48. Brenner, JH, AS Koivuniemi, and KJ Otto. The role of interphase delay in detection of brain microstimulation. *Undergraduate Research Poster Symposium, Purdue University*. West Lafayette, IN. 2011.
49. Clark, JV, AS Koivuniemi, and KJ Otto. Modeling of cortical pyramidal cells for behavior prediction. *Undergraduate Research Poster Symposium, Purdue University*. West Lafayette, IN. 2011.
50. Desai, HA, AJ Woolley, MA Steckbeck, NK Patel, and KJ Otto. Characterizing the brain tissue response to implanted microelectrodes using a novel technique. *Undergraduate Research Poster Symposium, Purdue University*. West Lafayette, IN. 2011.

51. Grey, CA, A Truong, CM Rodda, AM Einterz, K Crosby, B Haley, JE Huber, JP Garner, and **KJ Otto**. Another test? A look at a rat model of pre-diagnosis cognitive symptoms of Parkinson's disease. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2011.
52. Lincoln, LM, NI Onunkwo, and **KJ Otto**. Understanding the astrocyte response to electrical stimulation by implanted microelectrodes. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2011.
53. Steckbeck, MA, AJ Woolley, S Sommakia, HA Desai, and **KJ Otto**. Evaluating microglia motility using *in vitro* time-lapse microscopy. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2011.
54. Hinton, TJ, NK Patel, AJ Woolley, SJ Wilks, and **KJ Otto**. Modeling lubrication of intracortical microelectrodes. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2011.
55. Regele, OB, AS Koivuniemi, and **KJ Otto**. The role of frequency in lowering detection thresholds for auditory cortex prostheses. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2011.
56. Xavier, M, M McDermott, and **KJ Otto**. Method for releasing BSA as a model of drug release. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2011.
57. Koivuniemi, AS, JH Brenner, OB Regele, and **KJ Otto**. Effects of stimulus waveform and electrode depth on detection of cortical microstimulation. *Joint meeting of the American Society for Clinical Investigators and Association of American Physicians*. Chicago, IL. 2011.
58. Woolley, AJ, H Desai, **KJ Otto**. Imaging the tissue response around brain-implanted microdevices. *Microscopy and Microanalysis*. Nashville, TN. 2011.
59. Regele, OB, AS Koivuniemi, **KJ Otto**. The role of pulse rate and waveform shape in lowering detection thresholds for auditory cortex prostheses. *Proceedings of the 22<sup>nd</sup> annual Biomedical Engineering Society*. Hartford, CT. 2011.
60. Woolley, AJ, H Desai, **KJ Otto**. Recent insights gathered through imaging the intact neural electrode-tissue interface. *Proceedings of the 22<sup>nd</sup> annual Biomedical Engineering Society*. Hartford, CT. 2011.
61. Desai H, AJ Woolley, MA Steckbeck, N Patel, **KJ Otto**. Investigating the oligodendrocyte response to implanted microelectrode arrays. *Society for Neuroscience Abstracts*. Washington DC. 2011.

62. AJ Woolley, Desai H, **KJ Otto**. *In vivo* assessment of tissue surrounding brain-implanted microelectrodes using a cranial window. *Society for Neuroscience Abstracts*. Washington DC. 2011.
63. Koivuniemi, AS and **KJ Otto**. Effects of stimulus waveform and electrode depth on detection of cortical microstimulation. *Society for Neuroscience Abstracts*. Washington DC. 2011.
64. Filley, A, AJ Woolley, H Desai, A Shands, **KJ Otto**. Clearing Solution Comparison to Improve Deep Tissue Imaging. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2012.
65. Shands, A, AJ Woolley, H Desai, A Filley, **KJ Otto**. Minimizing Tissue Movement While Imaging With a Laser Confocal Microscope. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2012.
66. Haley, B, JE Huber, A Truong, **KJ Otto**. An evaluation of a rat model of Parkinson's disease: Examining the effects on vocalizations. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2012.
67. McGee, J, A Truong, **KJ Otto**. Analysis of Injection of 6-Hydroxy Dopamine for Induced Parkinsonian Symptoms in Rats. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2012.
68. Slabaugh, R, A Truong, H Desai, AJ Woolley, JE Huber, **KJ Otto**. Assessing the Autonomic Nervous System in the 6-OHDA Rat Model of Parkinson's Disease. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2012.
69. Regele, O, JH Brenner, AS Koivuniemi, **KJ Otto**. The role of Pulse Rate and Stimulation Depth in Lowering Detection Thresholds for Auditory Cortex Prostheses. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2012.
70. Brenner, J, AS Koivuniemi, **KJ Otto**. The Role of Interphase Delay in Detection of Brain Microstimulation. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2012.
71. Koivuniemi, AS, **KJ Otto**. Auditory cortical microstimulation's optimal electrode depth, waveform, and pulse rate. *Neural Interfaces Conference Abstracts*. Salt Lake City, UT. 2012.
72. Woolley, AJ, HA Desai, TJ Richner, SK Brodnick, KW Eliceiri, JC Williams, **KJ Otto**. Imaging of the intracortical microelectrode interface through a thinned-skull window. *Neural Interfaces Conference Abstracts*. Salt Lake City, UT. 2012.

73. Woolley, AJ, HA Desai, TJ Richner, SK Brodnick, KW Eliceiri, JC Williams, **KJ Otto**. *In vivo* imaging of the intracortical microelectrode interface through a thinned-skull window. *Biomedical Engineering Society Abstracts*. Atlanta, GA. 2012.
74. Woolley, AJ, HA Desai, TJ Richner, SK Brodnick, KW Eliceiri, JC Williams, **KJ Otto**. *In vivo* microscopy of neural tissue dynamics surrounding intracortical microelectrode arrays. *Society for Neuroscience Abstracts*. New Orleans, LA. 2012.
75. Sommakia, S, JL Rickus, **KJ Otto**. Quantitative evaluation of polyethylene glycol (PEG) as a therapeutic for the reactive response of brain cells in primary mixed cortical cultures. *Society for Neuroscience Abstracts*. New Orleans, LA. 2012.
76. Ward, MP, G. Albers, **KJ Otto**, RM Worth, PP Irazoqui. Vagal nerve activation control: a new approach to electrical stimulation-based therapy for treatment-resistant temporal lobe epilepsy. *American Epilepsy Society Abstracts*. Las Vegas, NV. 2012.
77. Youngs, M, R Lycke, AS Koivuniemi, A Schendel, JC Williams, and **KJ Otto**. Developing micro-electrocorticographic stimulation of the rat auditory cortex. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2013.
78. Zhang, J, M McDermott, **KJ Otto**. The Effect of Multiple TMOS Coatings upon Impedance and Charge Carrying Capacity. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2013.
79. Filley, A, M McDermott, **KJ Otto**. Controlled Release to Attenuate Foreign Body Response of Neural Tissue to Electrode Implantation. *Undergraduate Research Poster Symposium*, Purdue University. West Lafayette, IN. 2013.
80. Woolley, AJ, H Desai, J Gaire, A Ready, **KJ Otto**. A Systemic Triple Label Strategy for Fluorescent Microscopy of Inflammation in CNS and Non-CNS Tissue. *Microscopy and Microanalysis*. Indianapolis, IN. 2013.
81. Koivuniemi, AS, O Regele, R Verner, R Lycke, M Youngs, **KJ Otto**. Development of Cortical Sensory Prostheses. *Biomedical Engineering Society Abstracts*. Seattle, WA. 2013.
82. Schendel, A, R Lycke, TJ Richner, SK Brodnick, **KJ Otto**, JC Williams. Electrical stimulation via micro-ECoG devices for therapeutic and rejuvenation purposes. *Society for Neuroscience Abstracts*. San Diego, CA. 2013.
83. Truong, A and **KJ Otto**. A novel rat model of pre-diagnosis cognitive symptoms in Parkinson's disease. *Society for Neuroscience Abstracts*. San Diego, CA. 2013.
84. Wheeler, JJ, P Karande, **KJ Otto**, DW Moran. An ECoG-based synchronous bi-directional brain-computer interface. *Society for Neuroscience Abstracts*. San Diego, CA. 2013.

85. Youngs, M, R Verner, **KJ Otto**. Exploring experimental methods to measure the efficacy of voltage biasing in the rat auditory cortex. *DiscoverU Poster Symposium*, Purdue University. West Lafayette, IN. 2014.
86. Filley, A, N DiCola, M McDermott, **KJ Otto**. Can controlled release minimize the foreign body response of neural tissue to electrode implantation? An exploration of multiple neat coats. *DiscoverU Poster Symposium*, Purdue University. West Lafayette, IN. 2014.
87. Dale, J, J Gaire, **KJ Otto**. Quantification of LPS Eluate from Coated Microelectrode Devices. *Summer Undergraduate Research Fellows Symposium Abstracts*. West Lafayette, IN. 2014.
88. Harden, MA, MD McDermott, **KJ Otto**. Thin-Film Sol-Gel as Controlled Delivery Platform for Neural Microelectrodes. *Summer Undergraduate Research Fellows Symposium Abstracts*. West Lafayette, IN. 2014.
89. Lee, HC, J Gaire, M McDermott, J Zhang, **KJ Otto**. Improving the performance of intracortical microelectrodes via structural modifications and biochemical intervention strategies. *Biomedical Engineering Society Abstracts*. San Antonio, TX. 2014.
90. Truong, A and **KJ Otto**. Impairments in attentional set-shifting in a rat model of Parkinson's disease. *Society for Neuroscience Abstracts*. Washington, DC. 2014.
91. Vedam-Mai V, AT Yachnis, KJ Otto, A Gunduz, A Wagle Shukla, C Hess, MS Okun. Histopathological observations from 50 human deep brain stimulation cases. *Movement Disorders Abstracts*. San Diego, CA. 2015.
92. Gaire, J and **KJ Otto**. Systemic Assessment of Markers of Inflammation to Intracortical Microelectrodes. *Biomedical Engineering Society Abstracts*. Tampa, FL. 2015.
93. Lee, HCL, J Gaire, **KJ Otto**. Perspectives on Using Device Capture Histology (DCHist) for in situ Evaluation of Implantable Microelectrodes. *Biomedical Engineering Society Abstracts*. Tampa, FL. 2015.
94. McDermott, M and **KJ Otto**. Adjusting Tetramethyl Orthosilicate Layer Composition and Loading Paradigm to Ameliorate the Acute Phase of Inflammation Associated with Microdevice Implantation. *Biomedical Engineering Society Abstracts*. Tampa, FL. 2015.
95. Gaire, J and **KJ Otto**. Evaluation of Systemic and Histological Changes Using Accelerated Failure Studies in Mice Implanted with Intracortical Device. *Society for Neuroscience Abstracts*. Chicago, IL. 2015.
96. Lee, HC, F Ejserholm, S Currlin, J Gaire, J Schouenborg, L Wallman, M Bengtsson, and **KJ Otto**, Quantitative histological assessment of probe flexibility. *Proceedings of the 38<sup>th</sup> Annual IEEE EMBS International Conference*, Orlando, FL. 2016.



97. Graham, J, EW Atkinson, EA Nunamaker, BS Spearman, RA Wachs, VH Desai, CS Shafor, **KJ Otto**, CE Schmidt, and JW Judy. Histological evaluation of implanted tissue-engineered electronic neural interface (TEENI) devices. *Proceedings of the 38<sup>th</sup> Annual IEEE EMBS International Conference*, Orlando, FL. 2016.
98. Spearman, B, RA Wachs, VH Desai, CS Shafor, JB Graham, EW Atkinson, EA Nunamaker, **KJ Otto**, CE Schmidt, and JW Judy. Development of mechanically tunable hydrogel scaffold for a regenerative peripheral nerve interface. *Proceedings of the 38<sup>th</sup> Annual IEEE EMBS International Conference*, Orlando, FL. 2016.
99. Desai, V, CS Shafor, BS Spearman, RA Wachs, JB Graham, EW Atkinson, EA Nunamaker, **KJ Otto**, CE Schmidt, and JW Judy. Design and fabrication of a scalable tissue-engineered electronic nerve interface (TEENI). *Proceedings of the 38<sup>th</sup> Annual IEEE EMBS International Conference*, Orlando, FL. 2016.
100. Gaire, J, HC Lee, and **KJ Otto**. Quadruple labelled mouse to study tissue response to brain implanted devices. *Biomedical Engineering Society Abstracts*. Minneapolis, MI. 2016.
101. Gaire, J, HC Lee, S Currlin, and **KJ Otto**. Characterization of a transgenic mouse expressing fluorophores in neurons, microglia, astrocytes, and oligodendrocytes. *Society for Neuroscience Abstracts*. San Diego, CA. 2016.
102. **Otto, KJ**. Quantification and Manipulation of the Microelectrode-Tissue Interface for Neural Prostheses. ECS Meeting, National Harbor, MD. 2017
103. Gaire, J, HC Lee, NL Hilborn, MK Regan, and **KJ Otto**. Investigating the Role of Inflammation in the Functionality of Intracortical Devices. *Biomedical Engineering Society Abstracts*. Phoenix, AZ. 2017.
104. Kundu, A, EE Patrick, A Fahmy, F Delgado, S Currlin, RA Madler, KJ Otto, N Maghari, and R Bashirulla. In Vivo Validation of a flexible CMOS-compatible Neural Interface. *Biomedical Engineering Society Abstracts*. Phoenix, AZ. 2017.
105. McDermott, M and **KJ Otto**. The Impact of Protein Loaded Thin-film Sol-Gel on Electrical Impedance Spectroscopy and Charge Carrying Capacity. *Biomedical Engineering Society Abstracts*. Phoenix, AZ. 2017.
106. Olczak, K, M McDermott and **KJ Otto**. Electrical Evaluation Of Micro-Electrode Arrays Coated With Thin Films For Minocycline Release. *Biomedical Engineering Society Abstracts*. Phoenix, AZ. 2017.
107. Patrick, E, **KJ Otto**, R Bashirulla, and A Gunduz. Understanding Fiber Recruitment of Peripheral Nerves During Intrafascicular Stimulation via Computational Modeling. *Biomedical Engineering Society Abstracts*. Phoenix, AZ. 2017.

108. Kundu, A, EE Patrick, A Fahmy, RA Madler, F Delgado, S Currin, J Principe, A Gunduz, N Maghari, M Op d Beeck, **KJ Otto**, D Braeken, R Bashirulla. Design and assessment of stimulation parameters for a novel peripheral nerve interface. *Society for Neuroscience Abstracts*. Washington DC. 2017.
109. Graham, JB, and **KJ Otto**. Cortical implants disrupt perineuronal nets. *Society for Neuroscience Abstracts*. Washington DC. 2017.
110. Gaire, J, HC Lee, E Atkinson, S Currin, R Ward, A Woolley, J Coleman, and **KJ Otto**. Characterization and application of a quadruple labelled mouse line. *Society of Neuroscience Abstracts*. Washington DC. 2017.

### ***Technology Transfer***

#### **Provisional Patent Filing**

- Reduction of Electrode-Tissue Impedance After Onset of Reactive Tissue Response Through Application of a Charge-Balanced Voltage Waveform, R Muir, **KJ Otto**, 9/26/2007.
- Directed Attraction and Wiring of Neurons to Implanted Electrodes by DSCAM-Silica Sol-Gel Coatings, **KJ Otto**, JL Rickus, J Clemens, 2/10/2009.
- Titanium-Based Multi-Channel, Micro-Electrode Array for Recording Neural Signals, MP Rao, **KJ Otto**, PM McCarthy, R Madangopal 11/19/2009.
- MK2 Inhibitor Compositions and Methods to Enhance Neurite Outgrowth, Neuroprotection, and Nerve Regeneration, A Panitch, **KJ Otto**, AJ Woolley, N Onunkwo, 3/3/2011.
- Tissue-Engineered Electronic Peripheral Nerve Interface, J Judy, CE Schmidt, **KJ Otto**, 8/14/2011.
- Stimulating Spinal Cord Motor Neurons Using Electrical Signals, DD Fuller, **KJ Otto**, MD Sunshine, 8/31/2017.

#### **Nonprovisional Patent Filing**

- Titanium-Based Multi-Channel Microelectrode Array for Electrophysiological Recording and Stimulation of Neural Tissue, MP Rao, **KJ Otto**, and PM McCarthy, 9/2/2010.

### ***Teaching***

#### **Undergraduate Courses**

1. BIOL 455 – *Developed* – Quantitative Physiology (Purdue University, Spring 2007)
2. BME 595-006 – *Developed* – Quantitative Physiology Seminar (Purdue University, Fall 2008, 2009)

3. BME 1008 – Introduction to Biomedical Engineering (University of Florida, Spring 2015)
4. BME 4503/BME 550 – Biomedical Instrumentation (University of Florida, Fall 2015)
5. BME 4931/6938 – *Developed* – Neural Instrumentation (University of Florida, Spring 2016)
6. BME 4509 – Quantitative Physiology (University of Florida, Fall 2016, 2017)
7. BME 4931 – Neural Engineering (University of Florida, Spring 2017)

**Graduate Courses**

1. BiomedE 599 – *Co-Developed* – Neural Engineering (University of Michigan, Fall, 2006)
2. BIOL 696N/BME 595 – *Developed* – Neural Engineering and Neuroprostheses (Purdue University, Fall 2006)
3. BIOL 595I – *Developed* – Quantitative Physiology (Purdue University, Spring 2008)
4. BIOL 599 – Quantitative Physiology (Purdue University, Spring 2009 – 2014)
5. BME 695 – *Developed* – Neural Prostheses (Purdue University, Spring 2009, Fall 2009, Fall 2012)
6. BIOL 695/PSY 633 – Special Lectures in Neuroscience: “Neural Stimulation for Neural Engineering”, (Purdue University, Fall 2010)
7. BME 528/ECE 528 – Measurement & Stimulation of the Nervous System (Purdue University Spring 2013, 2014)
8. BME 6936 – Biomedical Engineering Seminar (University of Florida, Spring 2015)
9. BME 4503/5500 – Biomedical Instrumentation (University of Florida, Fall 2015)
10. BME 4931/6938 – *Developed* – Neural Instrumentation (University of Florida, Spring 2016)

---

***Mentoring*****Post-Doctoral Mentoring**

1. Andrew Woolley, Purdue University Life Sciences Program – (2011 – 2012). Presently Scientist at Symic Biomedical, Emeryville, CA.
2. James Graham, University of Florida – (2016 – present).
3. Frank Delgado, University of Florida – (2016 – present).
4. Hugh Lee, University of Florida – (2017 – 2017). Presently a Post-doctoral fellow at UT Southwestern.

**Doctoral Research – Major Professor**

1. Nnadozie Onunkwo, Weldon School of Biomedical Engineering, Purdue University – (2006 – 12/2010). Presently Medical Scientific Manager at Allergan, Miami, FL.
2. Andrew Woolley, Purdue University Life Sciences Program, Purdue University – (2006 – 05/2011). Presently Scientist at Symic Biomedical, Emeryville, CA.
3. Seth Wilks, Weldon School of Biomedical Engineering, Purdue University (2007 – 05/2011). Presently Principal Research Scientist at CVRx, Minneapolis, MN.
4. Andrew Koivuniemi, Weldon School of Biomedical Engineering, Purdue University (2009 – 07/2013). Presently completing Neurosurgical Residency at Indiana University School of Medicine.
5. Salah Sommakia, Weldon School of Biomedical Engineering, Purdue University (Co-Chairman with Jenna Rickus, 2007 – 12/2013). Presently working as a post-doctoral associate at the University of Utah.

6. Hugh Lee, Biomedical Engineering, Weldon School of Biomedical Engineering, Purdue University (2012 – 12/2016). Presently working as a post-doctoral associate at the University of Texas, Southwestern.
7. Matt McDermott, Biomedical Sciences Doctoral Track, Purdue University (2010 – 06/2017). Presently working as a post-doctoral associate at Indiana University, Purdue University, Indianapolis.
8. Janak Gaire, Neuroscience, University of Florida (2012 – 05/2017)
9. Kaitlynn Olczak, Biomedical Engineering, University of Florida (2015 – 05/2020)
10. Eric Atkinson, Neuroscience, University of Florida (2015 – 05/2020)
11. Seth Currin, Neuroscience, University of Florida (2015 – 05/2020)
12. Jamie Murbach, Materials Science & Engineering, University of Florida (2016 – 05/2021).
13. Elliott Dirr, Biomedical Engineering, University of Florida (2016 – 06/2021).

#### **Doctoral Research – Committee Member**

1. Hananeh Esmailbeigi, Bioengineering, University of Illinois, Chicago – (Patrick Rousche, Chairman; 2008-05/2009)
2. Patrick McCarthy, Mechanical Engineering, Purdue University – (Masa Rao, Chairman; 2007-2009)
3. Cal Rabang, Biomedical Engineering, Purdue University – (Ed Bartlett, Chairman; 2007-08/2011)
4. Pingsheng Wei, Electrical and Computer Engineering, Purdue University – (Babak Ziaie, Chairman; 2008-08/2011)
5. Yamini Venkatamaran, Biomedical Engineering, Purdue University – (Ed Bartlett, Chairman; 2008-08/2012)
6. Aravindakshan Parthasarathy, Psychology, Purdue University – (Ed Bartlett, Chairman; 2008-08/2012)
7. Benjamin Richardson, Pharmacology, Southern Illinois University – (Don Caspary, Chairman; 2007-05/2012)
8. Shaoyu Qiao, Biomedical Engineering, Purdue University – (Ken Yoshida, Chairman; 2009-05/2014)
9. Josephat Asiago, Medicinal Chemistry, Purdue University – (Chris Rochet, Chairman; 2009-05/2012)
10. Matthew Ward, Biomedical Engineering, Purdue University – (Pedro Irazoqui, Chairman; 2008-05/2012)
11. Meghan Robinson, Biomedical Engineering, Purdue University – (Tom Talavage, Chairman; 2008-05/2012)
12. Jesse Wheeler, Biomedical Engineering, Washington University – (Dan Moran, Chairman; 2010-05/2012)
13. Paul Miller, Biomedical Engineering, Purdue University – (David Stocum, Chairman; 2010-05/2016)
14. Jonghyuck Park, Biomedical Sciences, Purdue University – (Riyi Shi, Chairman; 2011-05/2014)

15. Henry Mei, Biomedical Engineering, Purdue University – (Pedro Irazoqui, Chairman; 2011-05/2014)
16. Melissa Tully, Biomedical Engineering, Purdue University – (Riyi Shi, Chairman; 2011-05/2014)
17. Cynthia Overstreet, Bioengineering, Arizona State University – (Steve Helms-Tillery, Chairman; 2012-05/2014)
18. Jonathan Shute, Biomedical Engineering, University of Florida – (Ayse Gunduz, Chairman; 2015-2016)
19. Manish Sapkota, Biomedical Engineering, University of Florida – (Lin Yang, Chairman; 2015-2018)
20. Benjamin Spearman, Biomedical Engineering, University of Florida – (Lin Yang, Chairman; 2015-2018)
21. Jinzheng Cai, Biomedical Engineering, University of Florida – (Lin Yang, Chairman; 2015-2019)
22. Enrico Opri, Biomedical Engineering, University of Florida – (Ayse Gunduz, Chairman; 2016-2020)
23. Michael Sunshine, Rehabilitation Sciences, University of Florida – (David Fuller, Chairman; 2017-2021)
24. Jackson Cagle, Biomedical Engineering, University of Florida – (Ayse Gunduz, Chairman; 2017-2021)

#### **Master's Research – Major Professor**

1. Ryan Muir, Electrical Engineering & Technology, Purdue University – (2006 – 05/2008)
2. Andrew Pierce, Biomedical Engineering, Purdue University – (2008 – 05/2009)
3. Oliver Regele, Biomedical Engineering, Purdue University – (2012 – 05/2013)
4. Andrew Ready, Biomedical Engineering, Purdue University – (2012 – 05/2014)
5. Ashley Eidsmore, Electrical Engineering, Purdue University – (2013 – 05/2015)
6. Albert Sueiras, Biomedical Engineering, University of Florida – (2015 – 2015)
7. Ishan Kulkarni, Biomedical Engineering, University of Florida – (2015 – 2016)
8. Jake Rieke, Biomedical Engineering, University of Florida – (2015 – 2016)
9. Elliott Dirr, Biomedical Engineering, University of Florida – (2015 – 2017)
10. Alec Simon, Biomedical Engineering, University of Florida – (2016 – 2018)

#### **Master's Research – Committee Member**

1. Nick Geirut, Biomedical Engineering, Purdue University – (2006 – 05/2008)
2. Mike Pargett, Biomedical Engineering, Purdue University – (2007 – 05/2009)
3. Patrick McCarthy, Mechanical Engineering, Purdue University – (2008 – 05/2009)
4. Jenna Sullivan, Biomedical Engineering, Purdue University – (Evan Morris, Co-Chairman; 2008-05/2009)
5. Sonal Sadaria, Biomedical Engineering, Purdue University – (2010-2011)
6. Arjun Jaitli, Biomedical Engineering, Purdue University – (2011-2012)

7. Emily Cook, Biomedical Engineering, Purdue University – (2011-2012)
8. Ian Dryg, Biomedical Engineering, Purdue University – (2011-2012)
9. Henry Zhang, Biomedical Engineering, Purdue University – (2011-2012)
10. Stephen Chabot, Biomedical Engineering, Purdue University – (2011-2013)
11. Puja Tanwani, Biomedical Engineering, Purdue University – (2013-2014)
12. Daniela Changkuon, Biomedical Engineering, Purdue University – (2013-2014)

### **Undergraduate Research**

*Selected from approximately 90 students*

1. Casey Roth, Biological Sciences, Purdue University – (2006 – 05/2009)
2. Elizabeth Lenzi, Biological Sciences, Purdue University – (2006 – 05/2008)
3. Harsha Ranganath, Biomedical Engineering, Purdue University – (2006 – 05/2008)

### **Pre-collegiate Research**

1. Fuhe Xu, Harrison High School – (2006)
2. Elizabeth Villafuerte, Jefferson High School – (2008 – 2009)
3. Lynlee Ferguson, West Lafayette High School – (2009)
4. Ashley Sankari, Jefferson High School – (2009 – 2010)
5. Claire Cassa-Santa, Jefferson High School – (2011 – 2012)
6. Alexxi Spillers, Jefferson High School – (2013 – 2014)

---

### ***Engagement and Technology Transfer: Appearances in media interviews and other coverage***

1. Zielinska, E. Of cells and wires. *The Scientist*, 23(1):32-37. 2009.  
*-Quoted as expert on implantable brain-machine interfaces.*
2. Boyd, D. Professor develops stretchable electrodes to help study cardiac cells. *The Exponent*, 02/02/2009.  
[http://www.purdueexponent.org/?module=article&story\\_id=14640](http://www.purdueexponent.org/?module=article&story_id=14640).  
*-Quoted as expert on bio-electrode technologies.*
3. Keim, B. Twitter telepathy: researchers turn thoughts into tweets. *Wired Science*, 04/20/2009. <http://blog.wired.com/wiredscience/2009/04/braintweet.html>.  
*-Quoted as expert on brain-machine interfaces.*
4. Green, RA. Brain-Twitter project offers hope to paralyzed patients. *CNN*, 04/23/2009.  
<http://edition.cnn.com/2009/HEALTH/04/22/twitter.locked.in/index.html>.  
*-Quoted as expert on brain-machine interfaces.*
5. Leggett, H. The next hacking frontier: your brain? *Wired Science*, 07/9/2009.  
<http://www.wired.com/wiredscience/2009/07/neurosecurity/>.  
*-Quoted as expert on brain-machine interfaces.*

6. Cossins, D. A Brain-to-Brain Interface for Rats. *The Scientist*, 02/28/2013.  
<http://www.the-scientist.com/?articles.view/articleNo/34547/title/A-Brain-to-Brain-Interface-for-Rats/>  
 -Quoted as expert on brain-machine interfaces.
7. Shen, H. Artificial arms get closer to the real thing. *Nature | News*, 10/8/2014.  
<http://www.nature.com/news/artificial-arms-get-closer-to-the-real-thing-1.16111>  
 -Quoted as an expert on neuroprostheses.
8. UF Herbert Wertheim College of Engineering, Engineering the Brain. Neuroscience at Gator Engineering. <https://www.eng.ufl.edu/research/strategic-priorities/health/#engineering-brain>  
 -Quoted as an expert in *Engineering the Brain*.
9. Jaffee, M. UF Receives up to \$8.4 million from DoD to study brain training using electric stimulation. <https://ufhealth.org/news/2017/uf-receives-84-million-dod-study-brain-training-using-electric-stimulation>  
 -Media coverage of DARPA TNT program funding announcement.
10. Swetlitz, I. Can zapping your neck help you quickly learn a foreign language?  
<https://www.statnews.com/2017/04/28/vagus-nerve-brain-learning-darpa/>  
 -Media coverage of DARPA TNT program funding announcement.
11. Reddit Ask Me Anything  
[https://www.reddit.com/r/science/comments/6ajjkh/science\\_ama\\_series\\_were\\_karim\\_ow\\_eiss\\_kevin\\_otto/](https://www.reddit.com/r/science/comments/6ajjkh/science_ama_series_were_karim_ow_eiss_kevin_otto/)  
 -Coverage of DARPA TNT program funding announcement.

---

### ***Engagement and Technology Transfer: Public lectures***

“Societal Benefits from Neural Engineering.” Science on Tap Series, Lafayette Brewing Company, Lafayette, IN, 2011.

---

### ***Sponsored Research Projects***

#### **Pending**

Judy, JW (Director), **Otto, KJ** (Deputy Director)

**Pending**; National Science Foundation

“NSF Engineering Research Center for Autonomic Neural Engineering”

08/2017-07/2022

\$19,753,683 (total costs)

#### **Active**

Fried, S (PI), **Otto, KJ** (CO-I)

**Active**; NIH-U01NS099700



“Micro-coil implants for cortical activation”

09/2016-06/2019

\$433,138 (direct costs)

**Otto, KJ (PI)**

**Active**; DARPA # HR0011-17-2-0019

“Cognitive Augmentation through Neuroplasticity”

01/2017-12/2018

\$4,196,164 (total costs)

Bashirulla, R (PI), **Otto, KJ** (Subcontract PI)

**Active**; DARPA # N66001-15-C-4018

“Implantable Multimodal Peripheral Recording and Stimulation System (IMPRESS)”

04/2017-12/2018

\$126,266 (direct costs)

Campbell-Thompson M (PI), **Otto, KJ** (CO-PI)

**Active**; NIH-1OT2OD023861-01

“Neuromodulation-based treatment of diabetes: identifying anatomical and physiological pancreatic innervation targets”

09/2016-07/2018

\$5,389 (direct costs)

Judy, JW (PI), **Otto, KJ** (CO-PI)

**Active**; DARPA # HR0011516376

“Tissue-Engineered Electronic Nerve Interfaces (TEENI)”

09/2015-09/2017

\$370,868 (direct costs)

### **Completed**

Miyamoto, R (PI), **Otto, KJ** (Subcontract PI)

**Completed**; DARPA

“MELD Mind Electromagnetic Localization Device”

01/2017-03/2017

\$52,000 (total costs)

Bashirulla, R (PI), **Otto, KJ** (Subcontract PI)

**Completed**; DARPA # N66001-15-C-4018

“Implantable Multimodal Peripheral Recording and Stimulation System (IMPRESS)”

03/2016-10/2016

\$23,901 (direct costs)

Williams, JC (PI), **Otto, KJ** (CO-PI)

**Completed**; DARPA # N66001-12-C-4025

“Multiscale bidirectional neural interfaces for comprehensive central nervous system interface reliability improvement”

01/2012-02/2016

\$212,304 (direct costs)

**Otto, KJ (PI)**

**Completed;** Indiana Clinical & Translational Science Institute Core Pilot Award  
“fMRI of cortical microstimulation for sensory restoration”  
\$9,900 (direct costs)

Roysam, B (PI), **Otto, KJ (CO-I)**

**Completed;** DARPA # N66001-11-1-4015  
“Multi-spectral 3-D histology & predictive statistical technologies for identifying the critical combination of factors impacting long-term performance of implanted neuroprosthetics”  
05/2012-01/2015  
\$135,928 (direct costs)

**Otto, KJ (PI)**

**Completed;** DARPA # N66001-11-1-4013  
“Normal and accelerated failure assessment of new quantitative *in vitro* and *in vivo* neural interfaces”  
01/2011-01/2015  
\$1,729,865 (direct costs)

**Otto, KJ (PI)**

**Completed;** Indiana Clinical & Translational Science Institute  
“The safe limits of intracortical microstimulation for sensory prostheses”  
07/2011-06/2012  
\$36,218 (direct costs)

Garner, J (PI), **Otto, KJ (CO-PI)**

**Completed;** Showalter Trust # 10098191  
“A novel rat model of pre-diagnosis cognitive symptoms in Parkinson’s Disease”  
07/2010-06/2011  
\$62,500 (direct costs)

**Otto, KJ (PI)**

**Completed;** NIH-R03DC009339-02 NIDCD Small Grant Program  
“Neural microstimulation parameters and interfacial quality effects”  
07/2009-06/2012  
\$300,000 (direct costs)

Rickus, JL (PI), **Otto, KJ (CO-PI)**

**Completed;** Indiana Spinal Cord and Brain Injury Fund Research Grant Program #00015115  
“Bio-inorganic coatings to reduce tissue reaction in cortical neural prostheses”  
01/2009-12/2010  
\$102,564 (direct costs)

**Otto, KJ (PI)**

**Completed;** NIDCD F32 DC007826-01A1  
“Cortical response dynamics to chronic cochlear implants”  
10/2005-06/2006  
\$34,000 (direct costs)

**Otto, KJ (PI)**

**Completed;** Purdue Research Foundation XR Grant #203103

“Novel peptide-presenting sol-gel coatings for improving biocompatibility of cortical implants”

07/2008-06/2009

\$16,375 (direct costs)

Rao, M (PI), **Otto, KJ (CO-PI)**

**Completed;** Showalter Trust # 00011659

“Development of advanced multifunctional brain-machine interface devices with enhanced reliability for chronic implantation applications”

07/2008-06/2009

\$62,493 (direct costs)

---

**Service**

Session Organizer, Satellite Session on Advanced Microelectrode Implant Technology, 2nd International Brain-Computer Interface Workshop, Rensselaerville Institute, Rensselaerville, New York (June, 2002).

Hearing, Balance and Chemical Senses Training Program Admissions Committee Member for the Kresge Hearing Research Institute, University of Michigan (February, 2004).

Mentor Volunteer, University of Michigan College of Engineering Mentorship Workshop. (April, 2004).

Hearing, Balance and Chemical Senses Seminar Series Speaker-Student Luncheon Coordinator (Fall, 2004).

Colorado State University Department of Chemical and Biological Engineering Professional Advisory Board Member (2005-Present).

Purdue University Weldon School of Biomedical Engineering Graduate Admissions Committee Member (2005-2009).

Purdue University Weldon School of Biomedical Engineering Animal Care Committee Faculty Representative (2005-2011).

Purdue University Department of Biological Sciences PRF Research Proposal Evaluator (2006).

Center for Neural Communications Technology “Implantable Neuroprosthetics: Technologies and Techniques” Course Instructor (2007-2010).

Purdue University Biomedical Engineering Graduate Student Association advisor (2007-2014).

Purdue University Undergraduate Research and Poster Symposium Judge (2007-2010).

Purdue University Weldon School of Biomedical Engineering Intern Mentor (2008-2009).

Purdue University Integrative Neuroscience Program Retreat Co-Chair (2008).

Purdue University BMES Student Association advisor (2008-2012).

Session chair, *19<sup>th</sup> annual Biomedical Engineering Society*. 2008. St. Louis, MO.

Purdue University Integrative Neuroscience Program Retreat Chair (2009).

Purdue University Weldon School of Biomedical Engineering CLA Subcommittee Member (2009).

Session chair, *31<sup>st</sup> Annual IEEE EMBS International Conference*. 2009. Minneapolis, MN.

Session chair, *20<sup>th</sup> annual Biomedical Engineering Society*. 2009. Pittsburgh, PA.

Purdue University Department of Biological Sciences Graduate Admissions Committee Member (2009-2014).

Purdue University Weldon School of Biomedical Engineering Graduate Committee Member (2009-2011).

Purdue University Interdisciplinary Life Sciences Program Recruitment Committee (2010-2014).

Purdue Society of Business Engineers/National Organization of Business Engineers advisor (2010-2013).

Purdue University Biomedical Engineering Graduate Student Association Research Symposium Panel Member/Poster Judge (2010).

Presented as Part of the Purdue University Women in Engineering Recruiting Presentation for Seniors Exploring Engineering (2010).

Purdue University Purdue Undergraduate Life Sciences Program Integrative Sciences Training Group Recruitment Committee Chair (2011-2014).

Purdue University Weldon School of Biomedical Engineering Awards committee chair (2011-2014).

Purdue University College of Engineering Awards committee member (2011-2014).

Indiana Clinical and Translational Sciences Institute Pre-doctoral Traineeship Research Proposal Evaluator (2012-2014).

Sigma Xi Purdue Chapter Executive Committee (2012-2014).

Sigma Xi Purdue Chapter Vice-President (2012-2014).

Sigma Xi Purdue Chapter Distinguished Lecturer Committee Chair (2012-2014).

40<sup>th</sup> Neural Interfaces Conference Panel Discussion Moderator (2012).

Session chair, *23<sup>rd</sup> annual Biomedical Engineering Society*. 2012. Atlanta, GA.

IEEE-EMBS Contributed Paper Reviewer (2012-2014).

NIH ETTN Study Section Member (2013-present).

ClevelandNEW Conference Executive Committee Member (2013-present).

41<sup>st</sup> Neural Interfaces Conference Session Organizer (2014).

NIH BRAIN Initiative Study Section Member (2014-present).

NIH ZDC1 SRB-K(16) Study Section Reviewer (2014).

University of Florida J. Crayton Pruitt Family Department of Biomedical Engineering  
Graduate Program Committee Member (2014-2015).

University of Florida J. Crayton Pruitt Family Department of Biomedical Engineering Awards  
Committee Member (2014-2015).

University of Florida J. Crayton Pruitt Family Department of Biomedical Engineering  
Research Committee Member (2014-2015).

University of Florida College of Engineering Safety Steering Committee Member (2014-  
2015).

University of Florida J. Crayton Pruitt Family Department of Biomedical Engineering Tenure  
& Promotion Committee Member (2014-Present).

University of Florida J. Crayton Pruitt Family Department of Biomedical Engineering  
Executive Committee Member (2015-Present).

University of Florida J. Crayton Pruitt Family Department of Biomedical Engineering Faculty  
Search Committee Member (2015-Present).

University of Florida J. Crayton Pruitt Family Department of Biomedical Engineering Awards  
Committee Chair (2015-Present).

Neural Engineering Track Co-chair, *25<sup>th</sup> annual Biomedical Engineering Society*. 2014. San  
Antonio, TX.

Review Editor for Neural Technology, a specialty of Frontiers in Neuroscience (2015-present).

University of Florida College of Engineering Awards Committee Member (2016-Present).

Scientific Committee Member, *Southeastern Biomedical Engineering Conference*, 2016. Shreveport, LA.

Member of the Editorial Board of the *International Journal of Computational & Neural Engineering*, (2016-present).

42<sup>nd</sup> Neural Interfaces Conference Session Organizer (2016).

University of Florida College of Medicine Graduate Program Admissions Committee Member, 2016.

University of Florida College of Veterinary Medicine Preeminent Faculty Search Committee (2016-present).

Member of the Editorial Board of *Bioelectronics in Medicine*, (2016-present).

NIH BNVT Ad Hoc Study Section Member (2017).

NIH R13/U13 Ad Hoc Study Section Member (2017).

VA RRD5 Ad Hoc Study Section Member (2017).

Program co-chair, 27<sup>th</sup> annual *Biomedical Engineering Society*. 2017. Phoenix, AZ

Biomedical Engineering Society National Meetings Committee Member (2017-present).

IEEE EMBS Gainesville Chapter Treasurer (2017-present).

Review Editor for the Neuroprosthetics, a specialty of Frontiers in Neuroscience (2017-present).

Member of the Editorial Board of *Techniques in Neurosurgery & Neurology*, (2017-present).

43<sup>rd</sup> Neural Interfaces Conference Steering Committee (2017-2018).

University of Florida McKnight Brain Research Outreach and Education Committee Member (2017-present).

Reviewer: ACS Applied Materials & Interfaces  
Advanced Functional Materials  
Biochemical Sciences  
Biomedical Microdevices  
Current Opinion in Solid State & Materials Science

European Journal of Neuroscience  
IEEE Transactions on Biomedical Engineering  
IEEE Transactions on Neural Systems and Rehabilitation Engineering  
Journal of Neural Engineering  
Journal of Neuroscience Methods  
Neuroscience  
PLOS One  
Progress in Brain Research  
Scientific Reports  
Sensors and Actuators: B  
Small

---

**Collaborators** (*selected*)

- Rizwan Bashirulla, Ph.D., Galvani Bioelectronics
- Jen Bizon, Ph.D., University of Florida
- Sara Burke, Ph.D., University of Florida
- Martha Campbell-Thompson, Ph.D., D.V.M., University of Florida
- Shelley Fried, Ph.D., Massachusettes General Hospital
- Rick Johnson, Ph.D., University of Florida
- Jack Judy, Ph.D., University of Florida
- Damon Lamb, Ph.D., University of Florida
- Dave Martin, Ph.D., University of Delaware
- Andrew Maurer, Ph.D., University of Florida
- Christine Schmidt, Ph.D., University of Florida
- Jens Schouenborg, Ph.D., Lund University
- Barry Setlow, Ph.D., University of Florida
- Justin Williams, Ph.D., University of Wisconsin

---

**References**

**Dr. Christine E. Schmidt**

Pruitt Family Professor & Chair,

J. Crayton Pruitt Family Department of Biomedical Engineering

1275 Center Drive

Biomedical Sciences Building JG42

Gainesville, FL 32611

[schmidt@bme.ufl.edu](mailto:schmidt@bme.ufl.edu)

ph: 352-273-9222

fax: 352-273-9221

**Dr. Richard Kuhn**

Professor and Head, Department of Biological Sciences, Purdue University

915 W. State St.

West Lafayette, IN 47907

[kuhnr@purdue.edu](mailto:kuhnr@purdue.edu)

ph: 765-494-4407

fax: 765-494-0876

**Dr. John Middlebrooks**

Professor, Department of Otolaryngology, University of California, Irvine

*Post-doctoral advisor*

Medical Sciences D, room D404

University of California, Irvine

Irvine, CA 92697-5310

[j.midd@uci.edu](mailto:j.midd@uci.edu)

ph: 949-824-0119

fax: 949-824-0118

**Dr. Daryl Kipke**

Executive Director, NeuroNexus Technologies

*Ph.D. and post-doctoral advisor*

655 Fairfield Ct, Ste. 100

Ann Arbor, MI 48108

[dkipke@neuronexus.com](mailto:dkipke@neuronexus.com)

ph: 734-730-9164

**Dr. Andrew Schwartz**

Visiting Professor, Department of Neurobiology, University of Pittsburgh

Room 245.09

McGowan Center

Pittsburgh, PA 15261

[abs21@pitt.edu](mailto:abs21@pitt.edu)

ph: 412-383-7021

fax: 412-648-1441