

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL AND COLLEGE OF ENGINEERING
BIOMEDICAL ENGINEERING

Timothy M. Bruns, Ph.D., assistant professor of biomedical engineering, Department of Biomedical Engineering, Medical School and College of Engineering, is recommended for promotion to associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, Medical School and College of Engineering.

Academic Degrees:

Ph.D.	2009	Case Western Reserve University
M.S.	2001	Arizona State University
B.S.	2000	University of Illinois

Professional Record:

2013-present	Assistant Professor of Biomedical Engineering, University of Michigan
2009-2009	Research Associate of Biomedical Engineering, Case Western Reserve University
2006-2009	Biomedical Engineer, Louis Stokes Cleveland Department of Veterans Affairs Medical Center
2002-2005	Principal Systems Engineer, Baxter Healthcare

Summary of Evaluation:

Teaching: Dr. Bruns has been course director for ten biomedical engineering courses. He lectures in a number of neuroscience and biomedical engineering courses and is heavily involved in course development and didactic teaching. His mentees are successful and hold him in high regard, having mentored over 40 students. He has served on 22 dissertation committees and evaluations reflect his excellence in teaching. In 2018, Dr. Bruns was awarded the Endowment for the Basic Sciences Teaching Award from the University of Michigan.

Research: Dr. Bruns' research focuses on two related areas in neural engineering: lower spinal cord dysfunction and bioelectronics medicine. Until recently, electronic implants were used exclusively to treat neurological disorders, such as deafness, paralysis, blindness, and movement disorders. Recently, modulation of the autonomic nervous system has shown promise in a number of diseases. The Bruns lab, among other things, has developed a new animal model for monitoring and controlling bladder function leading to a collaboration with a technology leader on device integration. This project on bladder control is an on-going concern for spinal cord injury patients that Dr. Bruns is addressing with innovative technology that enables fundamental studies of spinal cord neurophysiology. From this project on bladder control, Dr. Bruns has spun-off a project on nerve stimulation of pelvic nerves to treat sexual dysfunction, by eliciting sexual arousal responses that has improved function in animal and clinical subjects. He is stimulating kidney nerves as a potential new way to control blood glucose levels, and has collaborated on the development of novel microelectrode arrays for dorsal root ganglia, the vagus nerve, and other small nerves. Dr. Bruns has been well-funded for his research by the

National Institutes of Health, industry and foundations. He has also received a CAREER award from the National Science Foundation. Dr. Bruns has published 23 peer-reviewed articles, and has been invited to present his research on numerous occasions regionally, nationally and internationally. He holds two patents.

Service: Dr. Bruns is an associate editor of *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. He has served on both NIH and VA grant panels, and has served as session and track co-chairs at several national meetings. Institutionally, Dr. Bruns has served on committees for graduate admissions, faculty recruitment and curriculum for the Department of Biomedical Engineering. He has been a reviewer for 17 journals, including the *Annals of Biomedical Engineering*, the *Journal of Computational Neuroscience* and the *Journal of Urology*.

Recent and Significant Publications:

Zimmerman L, Gupta P, O’Gara F, Langhals N, Berger M, Bruns T: Transcutaneous electrical nerve stimulation to improve female sexual dysfunction symptoms: a pilot study. *Neuromodulation: Technology at the Neural Interface* 21:707-713, 2018.

Sperry Z, Na K, Parizi S, Chiel H, Seymour J, Yoon E, Bruns T: Flexible microelectrode array for interfacing with the surface of neural ganglia. *Journal of Neural Engineering* 15:036027, 2018.

Ross S, Ouyang Z, Rajagopalan S, Bruns T: Evaluation of decoding algorithms for estimating bladder pressure from dorsal root ganglia recordings. *Annals of Biomedical Engineering* 46(2): 233-246, 2018.

Khurram A, Ross S, Sperry Z, Ouyang A, Stephan C, Jiman A, Bruns T: Chronic monitoring of lower urinary tract activity via a sacral dorsal root ganglia interface. *Journal of Neural Engineering* 14: 036027, 2017.

Rice I, Zimmerman L, Ross S, Berger M, Bruns T: Time-frequency analysis of increases in vaginal blood perfusion elicited by long-duration pudendal neuromodulation in anesthetized rats. *Neuromodulation: Technology at the Neural Interface* 20(8): 807-815, 2017.

External Reviewers:

Reviewer A: “One could also consider his field to be the now-defined area of ‘bioelectric medicine’ – developing techniques and advancing the underlying physiological science of using neural stimulation to control organ (dis)function... While I believe this topic has significant long-term promise, when I have attended events and PI meetings and served on review panels, I see very little current or proposed work from Assistant Professors, and Dr. Bruns is a positive exception to that observation.”

Reviewer B: “I give my highest recommendation for Dr. Bruns’s promotion to Associate Professor. He is a rising leader in the neural engineering field, an effective mentor of students and fellows, and poised to continue being successful in managing and performing high quality research in the field of neural engineering.”

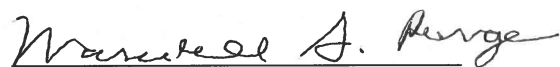
Reviewer C: “He has also been listed as the last author on 51 abstracts. This is a very good dissemination rate! These publications have greatly contributed to the field of peripheral prostheses. They have helped delineate the role that peripheral neural prostheses can play in bladder and sexual dysfunction.”

Reviewer D: “He has developed and implemented an impressive set of tools relevant to this goal, demonstrating the feasibility of recording afferent signals and using them to control both limb and bladder function. Though this work began during his postdoctoral training, Tim has emerged as a leader in this field. His novel contributions have been the basis of his prestigious NSF CAREER award and two current awards from NIH.”

Reviewer E: “This relatively novel nerve-electrode interface is an emerging area of academic and clinical research, where new classes of neuroprosthetic devices are expected to be developed in the near future. Dr. Bruns is one of very few researchers who are making significant contributions to this area of research... It is quite exciting to see how Dr. Bruns is meticulously constructing a system that can provide long-term measurement of bladder function.”

Summary of Recommendations:

Dr. Bruns is a well-funded and highly collaborative faculty member internally and externally and is a strong team scientist in neural engineering. His teaching and mentoring activities are very highly valued, and he has strong service. I am pleased to recommend Tim M. Bruns, M.D. for promotion to associate professor of biomedical engineering, with tenure, Department of Biomedical Engineering, Medical School and College of Engineering.



Marschall A. Runge, M.D., Ph.D.
Executive Vice President for Medical Affairs
Dean, Medical School



Alec D. Gallimore, Ph.D.
Robert J. Vlasic Dean of Engineering
College of Engineering

May 2019