SYMPOSIUM SM3

Advanced Biomaterials for Neural Interfaces
April 18 - April 20, 2017

Symposium Organizers
Mohammad Reza Abidian, University of Houston
Stephanie Lacour, Ecole Polytechnique Federale de Lausanne, Switzerland
Kip Ludwig, Mayo Clinic
Laura Poole-Warren, University of New South Wales

Proceedings Statement
All authors are invited to submit articles based on their 2017 MRS Spring Meeting presentations to the journals in the MRS portfolio (www.mrs.org/publications-news). Papers submitted and accepted for publication in MRS Advances (www.mrs.org/mrs-advances) will be available as symposium collections. Visit the MRS/Cambridge University Press Publications Booth #100 in the Exhibit Hall to learn more, including MRS Advances print options available at special rates during the meeting week only.

* Invited Paper

SESSION SM3.1/SM1.1/SM4.1: Joint Session I
Session Chairs: Mohammad Reza Abidian, Martin Kaltenbrunner and Jonathan Rivnay
Tuesday Morning, April 18, 2017
PCC North, 100 Level, Room 121 AB

10:30 AM *SM3.1.01/SM1.1.01/SM4.1.01
Nano-Bioelectronics: From Biological Sensor Chips to Cyborg Tissues and Seamless Brain-Electronics Implants Jae-Hyun Lee; Harvard University, United States.

11:00 AM *SM3.1.02/SM1.1.02/SM4.1.02
Soft Wearable Robots Improve Walking Function and Economy after Stroke and Grasping Function after Spinal Cord Injury Conor Walsh; Harvard School of Engineering, United States.

SESSION SM3.2/SM1.2/SM4.2: Joint Session II: Bioelectronics
Session Chairs: Mohammad Reza Abidian, Martin Kaltenbrunner and Jonathan Rivnay
Tuesday Afternoon, April 18, 2017
PCC North, 100 Level, Room 121 AB

1:30 PM *SM3.2.01/SM1.2.01/SM4.2.01
Skin-Inspired Materials, Devices and Applications Zhenan Bao; Stanford University, United States.

2:00 PM *SM3.2.02/SM1.2.02/SM4.2.02
Biocompatible Gel Electrodes and Ultraflexible Organic Devices for Implantable Electronics Takao Someya; University of Tokyo, Japan.

2:30 PM *SM3.2.03/SM1.2.03/SM4.2.03
Interfacing with the Brain Using Organic Electronics George G. Malliaras; ENSM Saint-Etienne, France.

3:00 PM BREAK

3:30 PM *SM3.2.04/SM1.2.04/SM4.2.04
Materials and Devices Designs for Flexible, Active Electronic Interfaces to the Brain and the Heart John A. Rogers; Northwestern University, United States.

4:00 PM *SM3.2.05/SM1.2.05/SM4.2.05
Conformal, Microfabricated Electrode Array for Optimization of Spectral Content in the Auditory Brainstem Implant (ABI) Stephanie P. Lacour; Ecole Polytechnique Federale de Lausanne, Switzerland, Switzerland.

4:30 PM *SM3.2.06/SM1.2.06/SM4.2.06
Interfacing Neurons with Electronic Devices Andreas Offenhaeusser; Forschungszentrum Juelich, Germany.

SESSION SM3.3: Neural Interfaces I
Session Chairs: Mohammad Reza Abidian and Laura Poole-Warren
Wednesday Morning, April 19, 2017
PCC North, 100 Level, Room 121 C

8:30 AM SM3.3.01
Curvature-Dependent Neuronal Membrane Deformation Probed by Correlative Fluorescence and Electron Microscopy Francesca Santoro; Stanford University, United States.

8:45 AM SM3.3.02
A Novel Polymeric Retinal Prosthesis Restores Vision in a Rat Model of Degenerative Blindness Maria Rosa Antognazza; Istituto Italiano di Tecnologia, Italy.

9:00 AM *SM3.3.03
CMOS Neural Probes Ken Shepard; Columbia, United States.

9:30 AM *SM3.3.04
Stability and Reliability of Neural Implants—A View from Materials to Systems Thomas Stieglitz; University of Freiburg, Germany.

10:00 AM BREAK

10:30 AM *SM3.3.05
Communication with Neurons—New Materials and New Dimensions Gordon Wallace; University of Wollongong, Australia.

11:00 AM SM3.3.06
Fabrication of 3D Neural Probes Using Photolithography in Fibers Andres Canales; Massachusetts Institute of Technology, United States.

11:15 AM SM3.3.07
Coupling of Active and Passive 1D Nanostructure Devices to Record Neuronal Activity—From Extra to Intracellular Interfacing Adrien Casanova; LAAS-CNRS, Université de Toulouse, CNRS, France.

11:30 AM *SM3.3.08
Nano-Fractal Platinum-Iridium Bioelectrodes James Weiland; University of Southern California, United States.

SESSION SM3.4: Neural Interfaces II
Session Chair: Kip Ludwig
Wednesday Afternoon, April 19, 2017
PCC North, 100 Level, Room 121 C

2:00 PM SM3.4.01
From Soft and Stretchable Conductive Materials to a Fully Functional Neuromodulation Device Mattia Marelli; WISE, Italy.

2:15 PM SM3.4.02
Investigation of Glassy Carbon Microelectrode Arrays for Multi-Analyte Biosensing Applications Maria Vomero[1, 3]; [1]University of Freiburg, Germany; [3]Center for Sensorimotor Neural Engineering, United States.

2:30 PM BREAK

3:30 PM SM3.4.03
Integration of Microfluidic Channels for Hybrid Drug-Delivery Mechanism in Mechanically-Adaptive Neural Probes Allison Hess-Dunning[1, 2]; [1]Louis Stokes Cleveland VA Medical Center, United States; [2]Advanced Platform Technology Center, United States.

3:45 PM SM3.4.04
Removal of Targeted Pathway on Blood-Derived Immune Cells Improves Intracortical Recordings Hillary W. Bedell; Case Western Reserve University, United States.

4:00 PM *SM3.4.05
Overview of NIH-Funded Material and Device Advances as well as Future Opportunities in Neural Interfaces Nick Langhals; National Institute of Neurological Disorders and Stroke (NINDS), United States.

4:30 PM SM3.4.06
MEASSuRE—A Novel Tool to Mechanically Stretch, Record Electrophysiological Activity and Image Cells, All at the Same Time Oliver Graudejus[1, 2]; [1]Arizona State University, United States; [2]BMSEED LLC, United States.

SESSION SM3.5: Neural Interfaces III
Session Chairs: Mohammad Reza Abidian and Laura Poole-Warren
Thursday Morning, April 20, 2017
PCC North, 100 Level, Room 121 C

8:30 AM SM3.5.01
All-in-One Fabrication Process of a Rigidified Flexible Neural Probe Jolien Pas; EMSE, France.

8:45 AM SM3.5.02
Conducting Polymer Nanotubes for Axonal Guidance Milad Khorrami; University of Houston, United States.

9:00 AM *SM3.5.03
Molecular Design, Synthesis, Microstructure, Mechanics and Transport Behavior of Functionalized Conjugated Polymers for Biomedical Devices David C. Martin; University of Delaware, United States.

9:30 AM *SM3.5.04
Biomimetic Neural Implant Design towards Seamless Tissue Interface Xinyan T. Cui; University of Pittsburgh, United States.

10:00 AM BREAK

10:30 AM *SM3.5.05
Highly Durable PEDOT-Based Electrode Materials for Clinical Use Jeff Hendricks; Biotectix, United States.

11:00 AM SM3.5.06
Conducting Polymers for Axonal Regeneration—Effect of Surface Topography on Neurite Outgrowth Martin Antensteiner; University of Houston, United States.

11:15 AM SM3.5.07
Implantable OECT-Based Metabolic Sensors for In Vivo Prediction of Seizure Onset Mary J. Donahue; ENS Mines-St. Etienne, France.

SESSION SM3.6: Neural Interfaces IV
Session Chair: Kip Ludwig
Thursday Afternoon, April 20, 2017
PCC North, 100 Level, Room 121 C

1:30 PM *SM3.6.01
Nanofiber-Based Conduits with a Honeycomb Structure for Peripheral Nerve Repair Younan Xia; Georgia Institute of Technology, United States.

2:00 PM SM3.6.02
Conductive Elastomeric Electrodes for Interfacing with Peripheral Nervous System Kevin Woeppel[1, 2]; [1]University of Pittsburgh, United States; [2]University of Pittsburgh, United States.

2:15 PM SM3.6.03
Hydrogel-Elastomer Hybrid Material with Tunable Mechanical Properties for Intracortical Probe Jennifer Macron; Bertarelli Foundation Chair in Neuroprosthetic Technology, Laboratory for Soft Bioelectronic Interfaces, Centre for Neuroprosthetics, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland.

2:30 PM BREAK

3:00 PM *SM3.6.04
Materials-Based, Biologically-Inspired, Anti-Oxidative, Anti-Inflammatory Approaches to Enable Next-Generation Intracortical Microelectrodes Jeffrey R. Capadona[1, 2]; [1]Case Western Reserve University, United States; [2]Department of Veterans Affairs, United States.

3:30 PM *SM3.6.05
Organic Mixed Conductors for Bioelectronic Applications Jonathan Rivnay; Northwestern University, United States.

4:00 PM SM3.6.06
Thermal Damage to the Blood-Brain Barrier during Craniotomy Procedure—Implications for Intracortical Recording Microelectrodes Andrew J. Shoffstall[2, 1]; [1]Case Western Reserve University, United States; [2]Louis Stokes Cleveland Department of Veterans Affairs Medical Center, United States.

SESSION SM3.7: Poster Session: Neural Interfaces
Session Chairs: Mohammad Reza Abidian and Kip Ludwig
Thursday Afternoon, April 20, 2017
8:00 PM - 10:00 PM
Sheraton, Third Level, Phoenix Ballroom

SM3.7.01
Invasive Microscale Probe for Intracellular Measurements Manjunath C. Rajagopal; University of Illinois at Urbana-Champaign, United States.

SM3.7.02
Highly Durable PEDOT-Based Medical Coatings for Recording and Stimulating Electrodes Nandita Bhagwat; Biotectix, United States.

SM3.7.03
Rupture Characteristics of Elastically Stretchable Microcracked Gold Conductors for Stretchable Microelectrode Array Applications Adam B. Pak; Arizona State University, United States.

SM3.7.04
Therapeutic Inhibition of Innate Immunity to Improve Intracortical Microelectrode Longevity John K. Hermann[1, 2]; [1]Case Western Reserve University, United States; [2]Louis Stokes Cleveland VA Medical Center, United States.

SM3.7.05
Self-Softening Shape Memory Polymers as a Scaffold for Neural Electrodes Melanie Ecker; The University of Texas at Dallas, United States.

SM3.7.06
Wet Chemical Synthesis of IrO_x Film for Biostimulating Interface Kuang Chih Tso; Graduate Program for Science and Technology of Accelerator Light Source, Taiwan.

SM3.7.07
Connected Node Engineering of Neuronal Systems Using Laser Direct Write Benjamin Vinson; Tulane University, United States.

SM3.7.08
Investigating the Biostability of Three-Dimensional Graphene Foam for Regenerative Neural Stem Cell Culture Tanveer A. Tabish; University of Exeter, United Kingdom.

SM3.7.09
Architectural Surface Modifications of Intracortical Microelectrode for Reduced Foreign Body Response Evon S. Ereifej[2, 1]; [1]Veteran Affairs Medical Center, United States; [2]Case Western Reserve University , United States.