SYMPOSIUM SM1

Bioelectronics—Materials, Processes and Applications
April 18 - April 20, 2017

Symposium Organizers
Magnus Berggren, Linkoping University
Rylie Green, Imperial College London
Jonathan Rivnay, Northwestern University
Ni Zhao, The Chinese University of Hong Kong

Symposium Support
MilliporeSigma
Suzhou Fangsheng Optoelectronics Co., Ltd
Vigor Tech USA LLC

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 SM1.1./SM3.1./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 *SM1.1.01/SM3.1.01/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 *SM1.1.02/SM3.1.02/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 SM1.2/SM3.2/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 *SM1.2.01/SM3.2.01/SM4.2.01
Skin-Inspired Materials, Devices and Applications Zhenan Bao; Stanford University, United States.

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

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

3:00 PM BREAK

3:30 PM *SM1.2.04/SM3.2.04/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 *SM1.2.05/SM3.2.05/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 *SM1.2.06/SM3.2.06/SM4.2.06
Interfacing Neurons with Electronic Devices Andreas Offenhaeusser; Forschungszentrum Juelich, Germany.

SESSION SM1.3: Poster Session
Session Chairs: Paul Meredith, Jonathan Rivnay and Ni Zhao
Tuesday Afternoon, April 18, 2017
8:00 PM - 10:00 PM
Sheraton, Third Level, Phoenix Ballroom

SM1.3.01
Real Time Monitoring of Osteogenic Differentiation of Human Mesenchymal Stem Cells Using 2D and 3D Capacitance Cell Sensors Jun Ho Song; Yonsei University, Korea (the Republic of).

SM1.3.02
Nanowire-Mesh Templated Three Dimensional Fuzzy Graphene as Electrochemical Sensors Raghav Garg; Carnegie Mellon University, United States.

SM1.3.03
3D Printed Flexible and High Transconductance Organic Electrochemical Transistors Jiaxin Fan[1,2]; [1]University of Alberta, Canada; [2]Ingenuity Lab, Canada.

SM1.3.04
Epidermal Surgical Monitoring Device—Skin-Mounted, Flexible Integrated Chips to Monitor Nerve-Muscle Function during Peripheral Nerve, Spine and Cranial Nerve Surgery YuHao Liu[1,2]; [1]University of Illinois at Urbana-Champaign, United States; [2]Northwestern Memorial Hospital, United States.

SM1.3.05
Three-Dimensional Graphite-Polymer Flexible Strain Sensors with Ultrasensitivity and Durability for Real-Time Human Vital Signal Monitoring and Posture Correction of Musical Instrument Learners Weigu Li; University of Texas at Austin, United States.

SM1.3.06
Wearable Graphene Temperature Sensor Arrays for Diabetic Ulcer Prevention Eric P. Boon; Stevens Institute of Technology, United States.

SM1.3.07
Multifunctional Flexible Piezoelectric Tactile Sensor Sung-Ho Shin; Chungnam National University, Korea (the Republic of).

SM1.3.08
Bioinspired Anisotropic Carbon Network for Highly Selective Pressure Sensing Yan Huang; The Chinese University of Hong Kong, Hong Kong.

SM1.3.09
Integrated Electrochemical-Biological Systems for the Production of Fuels and Chemicals from CO_2 Antaeres Antoniuk-Pablant; Stanford University, United States.

SM1.3.10
Mussel-Inspired Fabrication of a Flexible Biocathode Based on Bacterial Cellulose for Implantable Glucose Fuel Cells Yi Sun; University of Science and Technology Beijing, China.

SM1.3.11
Thermally-Drawn Nano Electrode for Photosynthetic Energy Harvesting from Algal Cells Dasom Yang; Yonsei University, Korea (the Republic of).

SM1.3.12
Ultrahigh and Selective Cr(VI) Detection Based on a Doubly-Clamped Si Microbeam Ansoon Kim[1, 2]; [1]Korea Research Institute of Standards & Science, Korea (the Republic of); [2]University of Science & Technology, Korea (the Republic of).

SM1.3.13
Proton Conductivity of Carbon Nanotubes John A. Selberg; University of California Santa Cruz, United States.

SM1.3.14
Biobased Hydrogel/Carbon Nanotubes Nanocomposites for the Electrostimulated Transdermal Delivery of Insulin Jean-Francois Guillet[1, 2, 3]; [1]Univ Toulouse 3-Paul Sabatier, France; [2]CNRS - CIRIMAT, France; [3]CNRS - IPBS, France.

SM1.3.15
Non-perturbative Quantification of Ionic Charge Transfer through Nm-Scale Protein Pores Using Graphene Microelectrodes Jinglei Ping; University of Pennsylvania, United States.

SM1.3.16
Organic Optoelectronics for Integrated Lateral Flow Immunoassay-Based Diagnostic System Vishak Venkatraman; University of Cincinnati, United States.

SM1.3.17
Unidirectional Polarization Alignment of Self-Assembled M13 Bacteriophage for Piezoelectric Energy Harvesters Ju-Hyuck Lee[1, 2]; [1]University of California, Berkeley, United States; [2]Lawrence Berkeley National Laboratory, United States.

SM1.3.18
Synthesis of PEDOT:Polyssacharide Dispersions as Versatile Materials for Bioelectronics Isabel del Agua[1, 2]; [1]Ecole de mines de Saint Etienne, France; [2]University of the Basque Country, Spain.

SM1.3.19
Water-Stable Transparent Microelectrode Arrays Based on Biocompatible Crystalline PEDOT:PSS Youngseok Kim; Gwangju Institute of Science and Technology, Korea (the Republic of).

SM1.3.20
High-Adhesion Stretchable Electrodes Based on Nanopile Interlocking Zhiyuan Liu; Nanyang Technological University, Singapore.

SM1.3.21
DOPA-Engineered M13 Bacteriophage Based Conductive Porous 3D Architectures Templated by Ice Crystals Ju Hun Lee[1, 2]; [1]University of California, Berkeley, United States; [2]Lawrence Berkeley National Laboratory, United States.

SM1.3.22
Transferrable, Ultra-Flexible Organic Transistor with Sub-Micron Thickness and Its Integration with Medial Catheter for Biomarker Detection Xudong Ji; University of Hong Kong, Hong Kong.

SM1.3.23
Effects of Spin and Cluster Size on Electrochemical and Photophysical Properties of Nucleotide Base Ligated Silver Cluster Mohammed A. Jabed; North Dakota State University, United States.

SM1.3.24
50-µm-Wide Silver Nanowire Electrodes Patterned on Hydrophilic/Hydrophobic Treated Surface for Transparent Organic Transistors Ashuya Takemoto[2, 1]; [1]Osaka University, Japan; [2]Osaka University, Japan.

SM1.3.25
Self-Aligned, Conductive and Lithography-Less Patterns for Stretchable and Skin-Conformal Sensors Youngjin Park; Sungkyunkwan University, Korea (the Republic of).

SM1.3.26
Transient Thermoresponsive Conductive Materials Xin Zhang; Vanderbilt University, United States.

SM1.3.27
DNA and DNA-CTMA Polyelectrolytes for Biodegradable Light-Emitting Electrochemical Cells Serpil Tekoglu[1, 2]; [1]Karlsruhe Institute of Technology, Germany; [2]InnovationLab GmbH, Germany.

SM1.3.28
Determining Saline, Canine Blood and Human Blood Composition by Congealing Microliter Drops into Homogeneous Thin Solid Films (HTSFs) via HemaDrop™ Technology Yash Pershad[1, 2]; [1]Arizona State University, United States; [2]BASIS Scottsdale, United States.

SM1.3.29
Cerium Oxide Immobilized on Polymer Nanostructures as Dopamine Biosensor Swetha Barkam; University of Central Florida, United States.

SM1.3.30
Tattoo-Based Wearable Iontophoretic-Biosensing Device for Noninvasive Alcohol Monitoring Jayoung Kim; University of California, San Diego, United States.

SM1.3.31
Molecular Imprinted Graphene Based Portable Gas Sensor to Detect Diabetes and Alcohol Level by Tracking Human Breathing Molecule Md Saleh Akram Bhuiyan; South Dakota State University, United States.

SM1.3.32
Electrical Detecting of Cancer Biomarker on MoS2 Field-Effect Transistor Heekyeong Park; Sungkyunkwan University, Korea (the Republic of).

SESSION SM1.4: Novel Materials and Mixed Conduction
Session Chairs: Rylie Green and Jonathan Rivnay
Wednesday Morning, April 19, 2017
PCC North, 100 Level, Room 121 A

8:00 AM SM1.4.01
Electroactive Silk Based Micropatterns for Flexible Biosensing Applications Ramendra K. Pal; Virginia Commonwealth University, United States.

8:15 AM SM1.4.02
Tailored Materials for Organic Bioelectronics Dan-Tiberiu Sbircea; Imperial College London, United Kingdom.

8:30 AM *SM1.4.03
Bioelectronic Devices with Protons (H+), Ion Channels and Cells Marco Rolandi; University of California, United States.

9:00 AM SM1.4.04
Controlling of (supra)Molecular Structure of Polymers from Natural Sources to Assess Their Electrical Properties Ri Xu; Polytechnique Montreal, Canada.

9:15 AM *SM1.4.05
Development of Semiconducting Polymers for Electrochemical Transistors Iain McCulloch[1, 2]; [1]King Abdullah University of Science and Technology, Saudi Arabia; [2]Imperial College London, United Kingdom.

9:45 AM BREAK

10:15 AM *SM1.4.06
Volumetric Gating in All-Solid-State Bioelectronic Transducers Paul Meredith[1, 2]; [1]University of Queensland, Australia; [2]Swansea University, United Kingdom.

10:45 AM SM1.4.07
Study of Short Channel-Effect and Protonic Transport in H-Bonded Molecules Mihai Irimia-Vladu; Joanneum Research mbH, Austria.

11:00 AM *SM1.4.08
How to Enable Ions to Flow in Bioelectronics Blend Systems Natalie Stingelin; Georgia Institute of Technology, United States.

11:30 AM SM1.4.09
Imaging Ionic Transport in Organic Electrochemical Transistors with Electrochemical Strain Microscopy Rajiv Giridharagopal; University of Washington, United States.

11:45 AM SM1.4.10
Energetic and Spatial Mapping of the Polymer/Electrolyte Interface in Organic Electrochemical Transistors Using Electrochemical Impedance Spectroscopy and Scanning Electrochemical Microscopy Melanie Rudolph; University of Arizona, United States.

SESSION SM1.5: Wearables—Flexible, Stretchable and/or Self-Healing
Session Chairs: Magnus Berggren and Ni Zhao
Wednesday Afternoon, April 19, 2017
PCC North, 100 Level, Room 121 A

1:30 PM *SM1.5.01
Journal of Materials Chemistry Lectureship—Catechol-Based Polymers in Bioelectronics—Biocompatible Energy Storage and Flexible Electronics Christopher J. Bettinger; Carnegie Mellon University, United States.

2:00 PM SM1.5.02
Multiscale, Hierarchical Structuring of Graphene on a Polymer Substrate Using Conformal Wrinkling Won-Kyu Lee; Northwestern University, United States.

2:15 PM SM1.5.03
Stretchable Transistor Arrays Based on Intrinsically Stretchable Polymer Semiconductor Sihong Wang; Stanford University, United States.

2:30 PM BREAK

3:30 PM SM1.5.04
Stretchable and Self-Healed Bioelectronic Devices Based on Novel Materials for Wearable Applications Joseph Wang; University of California, San Diego, United States.

3:45 PM *SM1.5.05
Ultrathin Soft Epidermal Electronics for Ambulatory Physiological Monitoring Roozbeh Ghaffari; MC10, Inc., United States.

4:15 PM SM1.5.06
Wearable Sweat Biosensors for Personalized Health Monitoring Wei Gao; University of California, Berkeley, United States.

4:30 PM SM1.5.07
Soft, Wearable Epidermal Microfluidic Systems Capable of Capture, Storage and Colorimetric Sensing of Sweat Ahyeon Koh; Binghamton University, United States.

4:45 PM SM1.5.08
A Several-Nanometers-Thick Gold Layer on Silver Nanowires Enhancing Migration Durability on Stretchable Electrodes for Long Therapeutic Bio-Applications Teppei Araki; Osaka University, Japan.

SESSION SM1.6: Biosensing Devices and Platforms
Session Chairs: Andreas Offenhaeusser and Feng Yan
Thursday Morning, April 20, 2017
PCC North, 100 Level, Room 121 A

8:00 AM SM1.6.01
Sensitive and Reliable Bio-Detection in Fused Silica Capillary Using Streaming Current Method Apurba Dev[1, 2]; [1]KTH Royal Institute of Technology, Sweden; [2]Uppsala University, Sweden.

8:15 AM SM1.6.02
Patterning of Highly Stretchable Conducting Polymer Transistors Fabio Cicoira; Polytechnique Montreal, Canada.

8:30 AM SM1.6.03
Nanosensing Platform for Drug Screening and Cytokine Detection in Inflammatory Bowel Diseases Using Carbon Nanotube-Based Biosensors Taewan Kim; Korea University, Korea (the Republic of).

8:45 AM SM1.6.04
pH Sensing with Silicon Nanoribbon Field Effect Transistors Incorporating Carbon Nanotube Porins Xi Chen[1, 2]; [1]Lawrence Livermore National Laboratory, United States; [2]University of California, Merced, United States.

9:00 AM SM1.6.05
Functionalized Atomically Thin Membrane as Motion Sensor for Ultrafast, Accurate DNA Sequencing Alex Smolyanitsky; Applied Chemicals and Materials Division, National Institute of Standards and Technology, United States.

9:15 AM SM1.6.06
Using DNA Devices to Track Anticancer Drug Activity Jason Slinker; The University of Texas at Dallas, United States.

9:30 AM BREAK

10:00 AM SM1.6.07
Extracting Kinetics and Thermodynamics of Helicase Binding with DNA Devices Dimithree S. Kahanda; University of Texas at Dallas, United States.

10:15 AM SM1.6.08
Comprehensive Biosensor Integrated with a ZnO Nanorods FET Array for Selective Detection of Glucose, Cholesterol and Urea Rafiq Ahmad; Chonbuk National University, Korea (the Republic of).

10:30 AM SM1.6.09
Non-Enzymatic Glucose Sensor Using Graphene Based Structure Mohamed Serry; The American University in Cairo, Egypt.

10:45 AM *SM1.6.10
Solution-Gated Organic Thin-Film Transistors for High-Performance Biosensors Feng Yan; Hong Kong Polytechnic University, China.

11:15 AM SM1.6.11
Printed Ultrathin Metal Oxide Semiconductor-Based Electrochemical Transistors for Bioelectronics You Seung Rim[1, 3]; [1]University of California, Los Angeles, United States; [3]Sejong University, Korea (the Republic of).

11:30 AM SM1.6.12
Gramicidin A and Alamethicin Bioprotonic Devices for Controlling H^+ Flow Zahra Hemmatian[1, 2]; [1]University of California Santa Cruz, United States; [2]University of Washington, United States.

11:45 AM SM1.6.13
Interface Investigation of 3D-Structured Organic Semiconductors with Electrogenic Cells for Biosensing Applications Francesca Santoro; Stanford University, United States.

SESSION SM1.7: Neural/Cellular Interfacing and Stimulation
Session Chairs: Magnus Berggren, Rylie Green and Nick Melosh
Thursday Afternoon, April 20, 2017
PCC North, 100 Level, Room 121 A

1:30 PM *SM1.7.01
Massively Parallel Electrode Arrays as Neural Interfaces Nick Melosh; Stanford University, United States.

2:00 PM SM1.7.02
Conducting Polymers Thin Films and Nanoparticles for Optical Control of Animal Behavior Maria Rosa Antognazza; Istituto Italiano di Tecnologia, Italy.

2:15 PM SM1.7.03
Magnetothermal Multiplexing with Magnetic Nanoparticles Michael G. Christiansen; Massachusetts Institute of Technology, United States.

2:30 PM SM1.7.04
Can Electroceutical pH Modulation Affect Neuronal Excitability? Xenofon Strakosas; University of California Santa Cruz (UCSC), United States.

2:45 PM SM1.7.05
A Nerve-on-a-Chip Platform to Facilitate the Design of Peripheral Nerve Interfaces Sandra Gribi; Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland.

3:00 PM BREAK

3:30 PM SM1.7.06
Hybrid Nanosheets for Biomimetic Neural Interfaces Sami Nazib; University Of New Mexico, United States.

3:45 PM SM1.7.07
Three-Dimensional Silicon Mesostructures for Bioelectric Interfaces Yuanwen Jiang; University of Chicago, United States.

4:00 PM SM1.7.08
Single Cell Intracellular Changes in Real Time during External Stimulation Amy Gelmi; Imperial College London, United Kingdom.

4:15 PM *SM1.7.09
Materials and Devices for Brain-Machine Interfaces Mohammad Reza Abidian; University of Houston, United States.

4:45 PM SM1.7.10
Whole Organic Electronic Synapses for Dopamine Detection Fabio Biscarini[1,2]; [1]Univ di Modena e Reggio Emilia, Italy; [2]Università di Modena e Reggio Emilia, Italy.