

EVON S. EREIFEJ, PhD

Louis Stokes Cleveland Veteran Affairs Medical Center
Neural Engineering Center, Biomedical Engineering Department, Case Western Reserve University
Cleveland, OH 44106

OBJECTIVE: To pursue a challenging career in neural electrodes research and development.

EDUCATION:

PhD/ Biomedical Engineering	Wayne State University, Detroit, MI	2012
M.S./Biomedical Engineering	Wayne State University, Detroit, MI	2007
B.S./Biological Sciences	Wayne State University, Detroit, MI	2005

RESEARCH EXPERIENCE:

Louis Stokes VA Medical Center Cleveland, OH	Biomedical Engineer	2014 – Present
Case Western Reserve University Cleveland, OH	Postdoctoral Associate Biomedical Engineering	2014 - Present
Virginia Tech Blacksburg, VA	Post Doctoral Associate Biomedical Engineering	2012 - 2014
Wayne State University Detroit, MI	Research Assistant Biomedical Engineering	2009 - 2012
John Dingell VA Medical Center Detroit, MI	Research Assistant (non-wage)	2007 - 2012

PROJECTS:

Therapeutic Relief of Neural Inflammation

- Investigate specific anti-oxidants' role to reduce the inflammatory cascade following neural electrode device implantation.
- Determine a dosing concentration and schedule of the anti-oxidant for optimal reduction of inflammation.
- Examine the functionality of the implanted electrodes with anti-oxidant treatment.

Blast Neurotrauma

- Studied cellular mechanisms of traumatic brain injury due to blast exposure *in vitro* and *in vivo*
- Investigated *in vitro* level inflammatory cascades on astrocytes, primary mixed neuronal cell cultures and organotypic brain slice cultures from a pressure wave using a blast simulator as well as a shock wave generator
- Scaled the *in vitro* results to high order translational research by investigating molecular mechanisms of blast neurotrauma using an *in vivo* rodent model and correlating with behavioral deficits

Biological and Topographical Coatings for Neural Electrodes

- Control glial cell reactivity by advanced surface topography modifications mimicking the *in vivo* environment
- Distinguish protein coatings to suppress neural tissue reactions and scar tissue formation
- Coat adhesion peptides from the extracellular matrix of the brain by electrospinning techniques
- Identify mechanism to attract dendritic structures of neurons to enhance the neuron-electrode signaling interface

Biocompatibility of Neural Electrodes

- Examined biocompatibility of silicon, poly(methyl methacrylate) (PMMA), polydimethylsiloxane (PDMS), polystyrene, porous silicon, platinum, iridium oxide, and SU8 photoresist
- Developed *in vitro* experimental methods utilizing monoculture cell lines and primary mixed neuronal cell cultures in order to test the biocompatibility of biomaterials
- Characterized guidelines to distinguish biomaterials as biocompatible for neural electrode devices

Nanotopography

- Optimized biomaterials by altering the surface topography to resemble the texture and size of the *in vivo* environment
- Collaborated with electrical engineers to utilize methods such as nanoimprint lithography and spin coating

- Fabricated nanopatterned PMMA and PDMS samples
- Examined biocompatibility of patterned materials with astrocyte monocultures and organotypic brain tissue cultures
- Minimized the inflammatory response inflicted from the insertion of neural electrodes through surface topography alterations

Alginate-Matrigel Schwann Cell Encapsulation

- Fabricated alginate and alginate/matrigel microcapsules
- Maintained Schwann cell survival and proliferation for one month in microcapsules
- Induced secretion of growth factors from encapsulated cells for aid in peripheral nerve regeneration
- Established protocol for microencapsulating cells through microfluidics design for high throughput screening

TECHNICAL SKILLS:

Cellular and Molecular Biology	Primary and mixed neuronal cell culture, Organotypic brain tissue culture, Immunostaining, Cell and tissue fixation, Proliferation and protein assay, ELISA, Real-Time Polymerase Chain Reaction (RT-PCR), Western Blot
<i>In Vivo</i>	Rodent handling (rat/mouse), Surgical skills (craniotomy, cesarean, sutures), Transcardial perfusion, Bilateral pneumothorax, Cardiac puncture, Cryostat sectioning, Immunohistochemistry (IHC), Bioavailability/Biodistribution
Material Characterization	Energy-dispersive X-ray spectroscopy (EDX), X-ray photoelectron spectroscopy (XPS), Ellipsometry, Inductively coupled plasma mass spectrometry (ICP-MS), Goniometer contact angle measurement, Tensile and compression testing
Material Fabrication	Electrospinning, Nano-imprint lithography (hot embossing), Alginate-matrigel microcapsule fabrication, Spin coating (PDMS)
Microscopy	Atomic force microscopy (AFM), Confocal and fluorescence microscopy, Scanning electron microscopy (SEM) and Environmental SEM
Software	MS Suite, Image J, Velocity, Photoshop, SPSS and JMP statistics software, EndNote

PUBLICATIONS:

Sajja VS, **Ereifej ES**, VandeVord PJ. Hippocampal vulnerability and subacute response following varied blast magnitudes. *Neuroscience Letters*. 2014 June 6, 570: 33-7

VandeVord PJ, Sajja VS, **Ereifej ES**, Hermundstad A, Mao S, Hadden TJ. Chronic hormonal imbalance and adipose re-distribution is associated with hypothalamic dysfunction following blast exposure. *Neuroendocrinology* (under review)

Ereifej ES, Khan S, Newaz G, Zhang J, Auner GW, VandeVord PJ. Comparative Assessment of Iridium Oxide and Platinum Alloy Wires using an in vitro Glial Scar Assay. *Biomedical Microdevices*. 2013

Ereifej ES, Matthew HWT, Newaz GW, Mukhopadhyay A, Auner GW, Salakhutdinov I, VandeVord PJ. Nanopatterning Effects on Astrocyte Reactivity. *Journal of Biomedical Materials Research: Part A*. 2013;101(6):1743-57

Ereifej ES, Mark MC, Guangzhao M, VandeVord PJ. Examining the Inflammatory Response to Nanopatterned Polydimethylsiloxane using Organotypic Brain Slice Methods. *J Neurosci Methods*. 2013;217(1-2):17-25

Ereifej ES, Khan S, Newaz G, Zhang J, Auner GW, VandeVord PJ. Characterization of Astrocyte Reactivity and Gene Expression on Biomaterials for Neural Electrodes. *Journal of Biomedical Materials Research: Part A*. 2011;99(1):141-50

Trivedi V, Doshi A, Kurup GK, **Ereifej ES**, Vandevord PJ, Basu AS. A modular approach for the generation, storage, mixing, and detection of droplet libraries for high throughput screening. *Lab Chip*. 2010;10(18):2433-42.

Trivedi V, **Ereifej ES**, Doshi A, Sehgal P, Vandevord PJ, Basu AS. Microfluidic encapsulation of cells in alginate capsules for high throughput screening. *Conf Proc IEEE Eng Med Biol Soc*. 2009;7037-40

de Guzman R, **Ereifej ES**, Broadrick KM, Rogers RA, VandeVord PJ. Alginate-matrigel microencapsulated Schwann cells for inducible secretion of glial cell line derived neurotrophic factor. *Journal of Microencapsulation*. 2008; 17:1-12

CONFERENCE PRESENTATIONS:

Sraile TW, **Ereifej ES**, Potter-Baker KA, Capadona JR. Complexing blood proteins and resveratrol to increase reactive oxygen species scavenging for intracortical electrode use. *Biomedical Engineering Society National Conference*, October 2014, San Antonio, TX, Poster Presentation.

Bailey Z, Sajja VS, Hubbard WB, **Ereifej ES**, VandeVord PJ. Blast induced neurotrauma leads to changes in the epigenome. Biomedical Engineering Society National Conference, October 2014, San Antonio, TX, Podium Presentation.

Bailey Z, Sajja VS, **Ereifej ES**, Hubbard WB, VandeVord PJ. Blast induced neurotrauma leads to changes in the epigenome. International Brain Injury Association World Congress, March 2014, San Francisco, CA

Ereifej ES, Hampton CE, Thorpe CN, Rzigalinski BA, VandeVord PJ. Cellular Mechanisms of Shock Wave Generated Blast Neurotrauma. Biomedical Engineering Society National Conference, September 2013, Seattle, WA, Poster Presentation.

Hubbard WB, Sajja VS, **Ereifej ES**, VandeVord PJ. Oxidative stress and glial response could lead to anxiety following varied levels of blast overpressure. Biomedical Engineering Society National Conference, September 2013, Seattle, WA, Poster Presentation.

Lemieux L, **Ereifej ES**, Hampton CE, Leonardi A, VandeVord PJ. Effects of Shock Wave Pressures on Astrocyte Reactivity Over Time. Biomedical Engineering Society National Conference, October 2012, Atlanta, GA, Poster Presentation.

Ereifej ES, Khan S, Newaz G, VandeVord PJ. Comparative Assessment of Iridium Oxide and Platinum Wires Using an in vitro Glial Scar Assay. Society for Biomaterials National Conference, April 2011, Orlando, FL, Poster Presentation

Ereifej ES, Yang J, Cheng MC, VandeVord PJ. Astrocyte Reactivity to Neural Implant with Porous Silicon Backbone Support. Society for Biomaterials National Conference, April 2011, Orlando, FL, Poster Presentation

Ereifej ES, Salakhutdinov I, Mukhopadhyay A, Matthew H, VandeVord PJ. Nanopatterning Effects on Protein Adsorption and Glial Cell Response. Biomedical Engineering Society National Conference, October 2009, Pittsburgh, PA, Podium Presentation

Trivedi V, **Ereifej ES**, Doshi A, Sehgal P, VandeVord PJ, Basu A. Microfluidic Encapsulation of Cells in Alginate Capsules for High Throughput Screening. 31st Annual International IEEE EMBS Conference, September 2009, Minneapolis, MN, Podium Presentation

Ereifej ES, Salakhutdinov I, VandeVord PJ. The Effect of Nanopatterning Poly(methyl methacrylate) on Glial Cell Activation and Proliferation. Society for Biomaterials National Conference, April 2009, San Antonio, TX, Podium Presentation

Ereifej ES, Khan S, Newaz G, VandeVord PJ. Astrocyte Response to Various Biomaterials for bioMEMs. Society for Biomaterials National Conference, April 2009, San Antonio, TX, Poster Presentation

Ereifej ES, de Guzman RC, Rogers R, VandeVord PJ. Comparison of Long Term Viability and Mechanical Stability of Alginate versus Alginate-Matrigel Microencapsulated Schwann Cells. World Biomaterials Congress, May 2008, Amsterdam, Netherlands, Podium Presentation

Ereifej ES, de Guzman RC, Rogers R, VandeVord PJ. Long Term Viability and Mechanical Stability of Alginate-Microencapsulated Schwann Cells. Biomedical Engineering Society National Conference, September 2007, Las Angeles, CA, Poster Presentation

Ereifej ES, de Guzman RC, VandeVord PJ. Long Term Viability of Alginate-Microencapsulated Schwann Cell Line RT4-D6P2T. Society for Biomaterials National Conference, April 2007, Chicago, IL, Poster Presentation

AWARDS:

BMES National Conference Seattle, WA 2013	BMES Innovation and Career Development Travel Award	2013
Wayne State University Detroit, MI	Anthony and Joyce Danielski Kales Scholarship	2011
Wayne State University Detroit, MI	Dissertation Research Support Award	2011

GRANTS:

RR&D Career Development Award (CDA-1) RFA (RX-001664-01A1)
Louis Stokes Cleveland Department Veterans Affairs Medical Center – Awarded May 2015

TEACHING EXPERIENCE:

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| <i>Adjunct Faculty</i> | Wayne State University; Detroit, MI | 2011 - 2014 |
| • Graduate level - Introduction to Cell Biology and Physiology for Engineers, undergraduate level - Introduction to Molecular and Cell Biology for Engineers | | |
| <i>Graduate Teaching Assistant (GTA)</i> | Wayne State University; Detroit, MI | 2008- 2009 |
| • Under graduate level- Materials Science, Graduate level - Advanced Biocompatibility and Introduction to Cell Biology and Physiology for Engineers | | |
| <i>Adjunct Faculty – Biology</i> | Macomb Community College; Warren, MI | 2007- 2008 |
| • Undergraduate level Fundamentals of Nutrition and General Biology 1 | | |

MENTORSHIP:

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| Case Western Reserve University
Cleveland, OH | Undergraduate Students | 2014 – Present |
| Virginia Tech
Blacksburg, VA | High School, Undergraduate
and Graduate students | 2012 - 2014 |
| Wayne State University
Detroit, MI | High School, Undergraduate
and Graduate students | 2008 - 2012 |

PROFESSIONAL AFFILIATIONS AND ACTIVITIES:

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| Biomedical Engineering Society | 2005-Present |
| Society for Biomaterials Society | 2011-2012 |
| Journal reviewer for <i>Biomedical Materials</i> | 2013- Present |

ACADEMIC AFFILIATIONS AND ACTIVITIES:

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| Wayne State University
Detroit, MI | President of Biomedical Engineering Society
(BMES) Student Chapter | 2006 - 2008 |
| | Treasurer of BMES Student Chapter | 2005 - 2006 |