YEVGENY BERDICHEVSKY
Assistant Professor
Department of Electrical and Computer Engineering and Bioengineering Program
Lehigh University

111 Research Drive D-320
Bethlehem, PA 18015
http://www.lehigh.edu/~yeb211/

(610) 758-6136
yeb211@lehigh.edu

EDUCATION

1995-1999 **University of California, Berkeley**
B.S., Electrical Engineering and Computer Science

2000-2002 **University of California, San Diego**
M.S., Electrical and Computer Engineering

2002-2006 **University of California, San Diego**
Ph.D., Electrical and Computer Engineering. Thesis topic: "Conducting Polymer Nanostructures for Biological Applications," advisor: Dr. Yu-Hwa Lo

INDUSTRIAL EXPERIENCE

1999 - 2000 **LSI Logic Corporation, Milpitas, CA**
Digital Design Engineer. Datapath design methodology for synthesis and layout of VLSI chips; CAD algorithm implementation, design of digital timing circuits.

2000 - 2001 **Syngenta Corporation/Torrey Mesa Research Institute, La Jolla, CA**
Engineering Consultant. DNA electrophoresis in PDMS microfluidic chips, bioinstrumentation.

ACADEMIC EXPERIENCE

2000 - 2006 **Department of Electrical and Computer Engineering, University of California, San Diego**
Graduate Student Research Assistant. Design and fabrication of polymer microfluidic devices, surface coatings, and conducting polymer nanoactuators and nanosensors for biology.

2006 - 2010 **Center for Engineering in Medicine, Massachusetts General Hospital/Harvard Medical School**
Postdoctoral Fellow. Study of brain tissue cultures with microfluidics and microelectrode arrays.

2010 - 2011 **Department of Neurology, Massachusetts General Hospital/Harvard Medical School**
Postdoctoral Fellow. Study of epilepsy in organotypic cultures (hippocampus slices) with microelectrode arrays and functional imaging.

2012 - present **Department of Electrical and Computer Engineering and Bioengineering Program, Lehigh University**
Assistant Professor (P.C. Rossin Assistant Professor 2014 - 2016). Neural engineering, high-throughput electrophysiology and brain-on-a-chip, drug screen chips and signaling pathways in epilepsy, neural circuit analysis and bioelectronics.

AWARDS AND HONORS

2000 LSI Logic Corporation Invention Award
2000 Powell Fellowship, University of California
2006 Institutional NIH Postdoctoral Fellowship (T32)
2008 Individual NIH Fellowship: Ruth L. Kirschtein National Research Service Award (F32, NIMH)

2009	Excellence in Neuroengineering Travel Award (NSF)
2009	Shriners Hospitals for Children Research Fellowship
2010	Massachusetts Biomedical Research Corporation (MBRC) Tosteson Postdoctoral Fellowship
2013	Citizens United for Research in Epilepsy (CURE) Taking Flight Award
2013	National Institute of Neurological Disorders and Stroke (NINDS, NIH) Travel Award to *Curing the Epilepsies 2013: Pathways Forward* meeting.
2014	Awarded P.C. Rossin Assistant Professorship by Lehigh University

PUBLICATIONS AND OTHER WORKS

BOOK CHAPTERS

1. **Y. Berdichevsky** and Y.-H. Lo, "Polypyrrole Nano- and Micro- Sensors and Actuators for Biomedical Applications," in Biomaterials Fabrication and Processing Handbook, eds. P.K. Chu and X. Liu, CRC Press Taylor & Francis Group, LLC, Boca Raton, 367-400, 2008.

2. **Y. Berdichevsky**, J. Glykys, V. Dzhala, K. Lillis, and K. J. Staley, "Organotypic hippocampal slice cultures as a model of post-traumatic epileptogenesis", in Models of Seizures and Epilepsy, ed. A. Pitkanen, 2nd edition, Elsevier, in press.

PATENTS

1. **US Patent** 6611951: **Y. Berdichevsky**, A. Tetelbaum, "Method for estimating cell porosity of hardmacs", 2003.

2. **US Patent** 9070492: M.L. Yarmush, E. Seker, **Y. Berdichevsky**, "Nanoporous Metal Multiple Electrode Array and Method of Making Same", June 30, 2015.

PEER-REVIEWED JOURNAL ARTICLES

1. V. Lien, **Y. Berdichevsky** and Y.-H. Lo, "Microspherical Surfaces with Predefined Focal Lengths Fabricated Using Microfluidic Capillaries," *Applied Physics Letters*, 83, 5563, 2003.

2. V. Lien, Y. Wu, D. Zhang, **Y. Berdichevsky**, J. Choi and Y.-H. Lo, "A Novel Technology for Fabricating Gratings of Any Chirp Characteristics by Design," *IEEE Photonics Technology Letters*, 15(5), 712 – 714, 2003.

3. D.-Y. Zhang, V. Lien, **Y. Berdichevsky**, J. Choi and Y.-H. Lo, "Fluidic Adaptive Lens with High Focal Length Tunability," *Applied Physics Letters*, 82, 3171, 2003.

4. V. Lien, **Y. Berdichevsky** and Y.-H. Lo, "A Prealigned Process of Integrating Optical Waveguides with Microfluidic Devices," *IEEE Photonics Technology Letters* 16(6), 1525 – 1527, 2004.

5. D.-Y. Zhang, N. Justis, V. Lien, **Y. Berdichevsky** and Y.-H. Lo, "High-Performance Fluidic Adaptive Lenses," *Applied Optics*, 43(4):783-787, 2004.

6. **Y. Berdichevsky**, J. Khandurina, A. Guttman and Y.-H. Lo, "UV/ozone Modification of Poly(dimethylsiloxane) Microfluidic Channels," *Sensors and Actuators B* 97, 402-408, 2004.

7. V. Lien, K. Zhao, **Y. Berdichevsky** and Y.-H. Lo, "High-Sensitivity Cytometric Detection Using Fluidic-Photonic Integrated Circuits with Array Waveguides," *IEEE Journal of Selected Topics in Quantum Electronics* 11(4), 827-834, 2005.

8. **Y. Berdichevsky** and Y.-H. Lo, "Polypyrrole Nanowire Actuators," *Advanced Materials* 18, 122-125, 2006.

9. J. B. Levine, E. M. Morrow, **Y. Berdichevsky**, G. E. Martin, "BK_{ca} Channel in Autism and Mental Retardation", *Am J Psychiatry* 164, 977-978, 2007.

10. J. B. Levine, A. D. Leeder, B. Parekkadan, **Y. Berdichevsky**, S. L. Rauch, J. W. Smoller, C. Konradi, F. Berthiaume, M. L. Yarmush, "Isolation Rearing Impairs Wound Healing and is Associated with Increased Locomotion and Decreased Immediate Early Gene Expression in the Medial Prefrontal Cortex of Juvenile Rats", *Neuroscience* 151(2), 589-603, 2008.

11. B. Parekkadan, **Y. Berdichevsky**, D. Irimia, A. Leeder, M. Toner, J.B. Levine, and M.L. Yarmush, "Cell-cell interaction modulates neuroectodermal specification of embryonic stem cells", *Neuroscience Letters* 438(2): 190-5, 2008.

12. **Y. Berdichevsky**, H. Sabolek, JB Levine, KJ Staley, ML Yarmush, "Microfluidics and multielectrode array- compatible organotypic slice culture method," *J Neurosci Methods* 178(1):59-64, 2009.

13. A. Vitalo, J. Fricchione, M. Casali, **Y. Berdichevsky**, S.L. Rauch, F. Berthiaume, M.L. Yarmush, H. Benson, G.L. Fricchione, and J.B. Levine, "Nest making and oxytocin comparably promote wound healing in isolation reared rats", *PloS ONE*, 4(5):e5523, 2009.

14. **Y. Berdichevsky**, K.J. Staley, and Y.L. Yarmush, "Building and manipulating neural pathways with microfluidics", *Lab Chip*, 10(8):999-1004, 2010.

15. J. Dyhrfjeld-Johnsen*, **Y. Berdichevsky***, W. Swiercz, H. Sabolek, K.J. Staley. Interictal spikes precede ictal discharges in an organotypic hippocampal slice culture model of epileptogenesis. *Journal of Clinical Neurophysiology*, 27(6):418-24, 2010.

16. E. Seker*, **Y. Berdichevsky***, M.R. Begley, M.L. Reed, K.J. Staley, and M.L. Yarmush, "Fabrication of low-impedance nanoporous gold multiple electrode arrays for neural electrophysiology studies," *Nanotechnology*, 21(12):125504, 2010.

17. S. Kidambi, J. Yarmush, **Y. Berdichevsky**, S. Kamath, W. Fong, J. SchianodiCola, "Propofol induces MAPK/ERK cascade dependant expression of cFos and Egr-1 in rat hippocampal slices," *BMC Research Notes*, 3:201, 2010.

18. **Y. Berdichevsky***, V. Dzhala*, M. Mail, and K. J. Staley, "Interictal spikes, seizures and ictal cell death are not necessary for post-traumatic epileptogenesis in vitro," *Neurobiology of Disease* 45:774-785, 2012.

19. E. Seker, **Y. Berdichevsky**, K.J. Staley, and M.L. Yarmush, "Microfabrication-Compatible Nanoporous Gold Foams as Biomaterials for Drug Delivery," *Advanced Healthcare Materials*, 1:172-176, 2012.

20. **Y. Berdichevsky**, A.M. Dryer, Y. Saponjian, M.M. Mahoney, C.A. Pimentel, C.A. Lucini, M. Usenovic, K.J. Staley, "PI3K-Akt Signaling Activates mTOR-Mediated Epileptogenesis in Organotypic Hippocampal Culture Model of Post-Traumatic Epilepsy," *Journal of Neuroscience* 33(21):9056-9067, 2013.

21. F. Li, Y. Song, A. Dryer, W. Cogguillo, **Y. Berdichevsky**, and C. Zhou, "Nondestructive evaluation of progressive neuronal changes in organotypic rat hippocampal slice cultures using ultrahigh-resolution optical coherence microscopy," *Neurophotonics* 1(2), 025002, 2014.

22. T. Zhou, S. F. Perry, **Y. Berdichevsky**, S. Petryna, V. Fluck, S. Tatic-Lucic, "Multi-electrode array capable of supporting precisely patterned hippocampal neuronal networks," *Biomed Microdevices* 17(1):9907, 2015.

23. K.P. Lillis, Z. Wang, M. Mail, G.Q. Zhao, **Y. Berdichevsky**, B. Backskai, K.J. Staley, "Evolution of network synchronization during early epileptogenesis parallels synaptic circuit alterations," *Journal of Neuroscience* 35(27):9920-34, 2015.

24. J. Liu, L. Pan, X. Cheng, **Y. Berdichevsky**, "Perfused drop microfluidic device for brain slice culture-based drug discovery," *Biomed Microdevices* 18(3):46, 2016.

25. Y. Song, C. Pimentel, K. Walters, L. Boller, S. Ghiasvand, J. Liu, K. J. Staley, and **Y. Berdichevsky**, "Neuroprotective levels of IGF-1 exacerbate epileptogenesis after brain injury," *Scientific Reports* 6:32095, 2016.

26. Md. F. Hasan and **Y. Berdichevsky**, "Neural circuits on a chip", *Micromachines* 7(9), 157, 2016 (invited).

27. **Y. Berdichevsky**, Y. Saponjian, K.-L. Park, B. Roach, W. Pouliot, K. Lu, W. Swiercz, F. E. Dudek, and K. J. Staley, "Staged anticonvulsant screening for chronic epilepsy", *Annals of Clinical and Translational Neurology*, 3(12): 908-923, 2016.

28. J. Liu, Y. Saponjian, M. M. Mahoney, K. J. Staley, and **Y. Berdichevsky**, "Epileptogenesis in organotypic hippocampal cultures has limited dependence on culture medium composition," *PLOS ONE,* in press.

* these authors contributed equally to the paper

REFEREED CONFERENCE PROCEEDINGS ARTICLES

1. V. Lien, **Y. Berdichevsky** and Y.-H. Lo, "Monolithically Integrating Photonic and Microfluidic Devices Using a Self-aligned Process," *Lasers and Electro-Optics Society*, *The 16th Annual Meeting of the IEEE,* Vol. 2, 525 – 526, 2003.

2. V. Lien, **Y. Berdichevsky** and Y.-H. Lo, "Fabrication of Concave Micro-mirrors with Programmable Focal Lengths Using Microfluidic Capillary," *2003 CLEO Conference on Lasers and Electro Optics*, 293-295, 2003.

3. **Y. Berdichevsky** and Y.-H. Lo, "Integration of conducting polymer micro- and nano-actuators with semiconductor photonic devices," *Lasers and Electro-Optics Society, The 17th Annual Meeting of the IEEE*, Vol. 2, 507 – 508, 2004.

4. **Y. Berdichevsky** and Y.-H. Lo, "Polymer Microvalve Based on Anisotropic Expansion of Polypyrrole," *Mat. Res. Soc. Symp. Proc.* Vol. 782, A4.4.1-A4.4.7, 2004.

5. **Y. Berdichevsky** and Y.-H. Lo, "Fabrication and Evaluation of Conducting Polymer Nanowire Heterostructures," *Mater. Res. Soc. Symp. Proc.* Vol. 872, J13.4.1-J13.4.5, 2005.

6. **Y. Berdichevsky** and Y.-H. Lo, "Fabrication of Polypyrrole Nanowires," *Smart Structures and Materials 2005: Electroactive Polymer Actuators and Devices, Proc. SPIE* Vol. 5759, 268-273, 2005.
7. **Y. Berdichevsky**, K.J. Staley, and M.L. Yarmush, "Microchannel-based platform for study of neural circuit development in vitro", *Proceedings of IEEE EMBS Neural Engineering Conference,* 2009.

8. **Y. Berdichevsky** and K. J. Staley, "Multiple-compartment chip for parallel recordings of epileptic activity from organotypic cultures," *Proceedings of the 5th International IEEE EMBS Conference on Neural Engineering*, 2011.

REFEREED PRESENTATIONS AT CONFERENCES AND TOPICAL MEETINGS

1. V. Lien, **Y. Berdichevsky**, Y.-H. Lo, J. Khandurina and A. Guttman, "Monolithic photonics-microfluidics integration for micrototal analysis systems," *Lasers and Electro-Optics CLEO '03*.

2. **Y. Berdichevsky**, J. Khandurina, Y.-H. Lo and A. Guttman, "UV/Ozone Modification of PDMS Microfluidic Devices," *HPCE 2003*.

3. **Y. Berdichevsky**, J. B. Levine, and M. L. Yarmush, "Multi-Synaptic Interface to Organotypic Brain Circuit," *BMES annual meeting* 2007.

4. **Y. Berdichevsky**, J. B. Levine, and M. L. Yarmush, "Organotypic Neural Circuit on Microfabricated Substrate", *Methods in Bioengineering,* 2007.

5. **Y. Berdichevsky**, H. Sabolek, J.C. Glykys, M. Yarmush, and K. Staley, "Microfabrication-based technique for the study of the development of epileptiform activity and sprouting in hippocampal cultures", *Gordon Research Conference: Mechanisms of Epilepsy & Neuronal Synchronization*, 2008.

6. **Y. Berdichevsky**, H. Sabolek, J.B. Levine, K.J. Staley, and M.L. Yarmush, "A microfluidics-compatible organotypic slice culture method", *Society for Neuroscience Annual Meeting* 2008.

7. **Y. Berdichevsky**, H.R. Sabolek, M.L. Yarmush, and K.J. Staley, "Long-term recording of epileptiform activity in organotypic hippocampus slices," *Epilepsia* 49:338-339, 2008.

8. **Y. Berdichevsky**, M. L. Yarmush, K. J. Staley, "Activity dependence of CA1 sprouting in epileptic hippocampus," *39th Annual Meeting of the Society for Neuroscience*, 2009.

9. **Y. Berdichevsky**, W. Swiercz, M. L. Yarmush, and K.J. Staley, "Partial voltage-gated sodium channel inactivation results in seizures in organotypic culture model of epilepsy," *Epilepsia*, 2009, 50(11):356.

10. **Y. Berdichevsky**, V. Dzhala, and K.J. Staley, "Spontaneous seizures cause neuron death in organotypic hippocampus model of post-traumatic epilepsy," *Gordon Research Conference: Mechanisms of Epilepsy and Neuronal Synchronization*, 2010.

11. **Y. Berdichevsky**, V. Dzhala, and K.J. Staley, "Neuronal death and phenytoin resistance in post-traumatic epileptogenesis," *Society for Neuroscience 40th Annual Meeting*, 2010.

12. **Y. Berdichevsky**, Y. Saponjian, M. Mail, and K. J. Staley, "A moderate-throughput screen for antiepileptogenic compounds," *Annals of Neurology: 136th Annual Meeting of the American Neurological Association*, 2011.

13. **Y. Berdichevsky**, Y. Saponjian, M. Mail, and K.J. Staley, "Organotypic culture model of post-traumatic epileptogenesis as a moderate-throughput screen for antiepileptic drugs," *41st Annual Meeting of the Society for Neuroscience*, 2011.

14. **Y. Berdichevsky**, H. Mullan, Y. Saponjian, and K. J. Staley, "Biphasic roles of insulin and IGF-1 in post-traumatic epileptogenesis in organotypic hippocampal cultures," *American Epilepsy Society 66th Annual Meeting*, 2012.

15. **Y. Berdichevsky**, A. Dryer, M.Mahoney, C. Pimentel, H. Mullan, Y. Saponjian, M. Usenovic, K.J. Staley, "IGF-1 contribution to epileptogenesis through activation of Akt-mTOR signaling is revealed by rapid-throughput screen in organotypic hippocampal culture model of post-traumatic epilepsy," *Curing the Epilepsies 2013: Pathways Forward (NINDS/NIH)*.

16. F. Li, **Y. Berdichevsky**, M.D. Feldman, and C. Zhou, “Non-invasive evaluation of neuronal viability in organotypic brain cultures using optical coherence microscopy,” *BRAIN* 2013.

17. **Y. Berdichevsky**, Y. Song, K. J. Staley, “IGF-1 and insulin contribute to epileptogenesis through activation of Akt-mTOR signaling,” *American Epilepsy Society 67th Annual Meeting*, 2013.

18. J. Liu, **Y. Berdichevsky**, “Toward High-throughput Epileptic Engineering: Microperfusion System for Organotypic Brain Slice Culture”, *IEEE EMBS*, 2014.

19. L. Boller, K. Walters, C. Pimentel, Y. Song, **Y. Berdichevsky**, “Determining the Role of IGF-1 in Post-Traumatic Epileptogenesis”, *BMES Annual Meeting*, 2014.

20. Y. Song, K. J. Staley, **Y. Berdichevsky**, “IGF-1 Promotes Epileptogenesis After Injury Through Activation of Akt-mTOR, but not MAPK (ERK) signaling, *Annual Meeting of the Society for Neuroscience*, 2014.

21. J. Liu, **Y. Berdichevsky**, “Development of Brain-on-a-Chip System Based on Microfluidic Perfusion of Organotypic Hippocampal Cultures,” *IEEE EMBS Micro and Nanotechnology in Medicine Conference*, 2014.

22. J. Liu, **Y.Berdichevsky**, “Toward high-throughput neural engineering: multielectrode arrays-compatible microfluidic perfusion system for organotypic brain slice cultures,” *Biomedical Engineering Society (BMES) Annual Meeting*, 2015.

23. **Y. Berdichevsky**, “Organotypic hippocampal epilepsy-on-a-chip model for drug discovery,” *Biomedical Engineering Society (BMES) Annual Meeting*, 2015.

24. J. Liu, **Y. Berdichevsky**, “Epileptogenesis in organotypic hippocampal cultures has limited dependence on culture medium composition,” *American Epilepsy Society (AES) Annual Meeting*, 2015.

25. J. Solanki, Y. Song, **Y. Berdichevsky**, and C. Zhou, “Space-division multiplexing optical coherence tomography for large-scale, millisecond resolution imaging of neural activity,” *2nd Annual BRAIN Investigators Meeting (NIH)*, 2015.

26. J. Liu, **Y. Berdichevsky**, “Microfluidic-integrated multiple electrode array chip for parallel epilepsy monitoring on 3D brain slice cultures,” *IEEE EMBS*, 2016.

27. J. Liu, **Y. Berdichevsky**, “Epilepsy-on-a-chip system for drug discovery,” *Gordon Research Conference (GRC) on Mechanisms of Epilepsy & Neuronal Synchronization*, 2016.

28. J. Liu, **Y. Berdichevsky**, “Development of epilepsy-on-a-chip system based on microfluidic perfusion of organotypic brain slice cultures,” *Biomedical Engineering Society (BMES) Annual Meeting*, 2016.

29. J. Liu, Y. Saponjian, M. M. Mahoney, K. J. Staley, **Y. Berdichevsky**, “Culture medium composition has limited influence on epileptogenesis in organotypic hippocampal cultures,” *Neuroscience* 2016.

30. Lian Duan, Md. F. Hasan, **Y. Berdichevsky**, C. Zhou, “High-speed optical coherence tomography imaging of neural activity,” *3rd Annual BRAIN Investigators Meeting (NIH)*, 2016.

For multi-authored presentations, presenter was identified by underlining the name.

TEACHING

COURSES TAUGHT

1. *ECE 202 Introduction to Electromagnetics*.
2. *ECE/BioE 366/466 Neural Engineering*.
3. *BioE 226 Ethics in Bioengineering Practice.*
4. Advisor for *ENGR 211/212 Integrated Product Development (IPD) I* and *II*
5. Advisor for *ECE 257/258 Senior Lab I and II*
6. *BioE 132/142/242/197/290 Bioengineering Research/Independent Study/Thesis*