

## Marom Bikson

July 19, 2017

Professor

Department of Biomedical Engineering

THE CITY COLLEGE OF NEW YORK OF THE CITY UNIVERSITY OF NEW YORK

New York Center for Biomedical Engineering

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HOME: bme.ccny.cuny.edu/people/faculty/mbikson

LAB: neuralengr.com

Conference: neuromodec.com

CORPORATE: soterixmedical.com

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|---|------|
| <b><i>Ph.D. in Biomedical Engineering</i></b>   | 2000 |
| Case Western Reserve University, Cleveland, OH<br>Thesis title: Role of non-synaptic mechanisms in the generation and control of epileptiform activity. |      |
| <b><i>B.S. in Biomedical Engineering</i></b> (Electrical Engineering Concentration)   | 1995 |
| Johns Hopkins University, Baltimore, MD   |      |

### Research Experience/Appointments:

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| Professor of Biomedical Engineering<br>The City College of New York of the City University of New York.<br>New York, N.Y.  | 2014-present |
| Associate Professor of Biomedical Engineering<br>The City College of New York of the City University of New York.<br>New York, N.Y.  | 2008-2014    |
| Professor, Programs in Engineering and Biology – Neuroscience<br>The Graduate School of the University Center of the City University of New York<br>New York, N.Y.           | 2008-2014    |
| Founder and Chief Executive Office<br>Soterix Medical Inc. (SMI)<br>New York, NY   | 2009-present |
| Harold Shames Assistant Professor of Biomedical Engineering<br>The City College of New York of the City University of New York.<br>New York, N.Y.                            | 2003-2007    |
| Assistant Professor, Programs in Engineering and Biology - Neuroscience<br>The Graduate School of the University Center of the City University of New York<br>New York, N.Y. | 2003-2007    |
| Post-Doctoral Research Fellow  | 2000 – 2003  |

Prof. J.G.R. Jefferys, Neurophysiology Unit, University of Birmingham  
Birmingham, U.K.

NIH/Whitaker Trainee. 1996-2000  
Prof. D.M. Durand, Neural Engineering Center, Case Western Reserve University  
Cleveland, OH.

Research Associate. 1995-1996  
Sontra Medical, L.P., Cambridge, MA.

Laboratory Technician. 1994-1995  
Microfabrication Laboratory, Prof. N. Sheppard, Johns Hopkins University  
Baltimore, MD.

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### Research Support:

[Small Grants indicated under *Awards/Honors*]

#### *Current:*

“The coupled vascular hypothesis for transcranial direct current stimulation (tDCS)”  
PI: Marom Bikson  
Agency/Mechanism: NIH-NINDS 1R01NS101362-01  
Funding Period/Cost: 4/2017-3/2022 \$1.7m  
Scope: New mechanism of brain stimulation.  
Effort: 1 Month (8%)

“A tool-box to control and enhance tDCS spatial precision”  
PI: Marom Bikson  
Agency/Mechanism: NIH-NIMH 1R01MH111896-01  
Funding Period/Cost: 9/2016-6/2020 \$1.8m  
Scope: Automatic modeling software.  
Effort: 1 Month (8%)

“The Toddler App (TAC) and Cane System”  
PI: Elga Joffee (Toddler Cane Inc.), co-PI (CCNY) Marom Bikson  
Agency/Mechanism: US Department of Education, SBIR, ED-IES-17-C-0041  
Funding Period/Cost: 5/2017-11/2017 \$150k  
Scope: Design a device to assist visually impaired children.  
Effort: None direct (staff only)

“Framework for Non-Invasive Low Voltage Electroporation for Drug and Gene Delivery to Brain Tumors”  
Program PI: Karen Hubbard, Project PI (CCNY) Marom Bikson  
Agency/Mechanism: NIH-NCI U54CA137788/ U54CA132378  
Funding Period/Cost: 9/2016-8/2018 \$485k  
Scope: Enhancing drug delivery to brain tumors.  
Effort: 1 Month (8%)

“Effects of direct-current stimulation on synaptic plasticity”  
PI: Lucas Parra, co-PI Marom Bikson  
Agency/Mechanism: NIH-NINDS 1R01NS095123-01  
Funding Period/Cost: 5/2016-3/2021 \$1.7m

Scope: tDCS on neuronal plasticity in brain slices.  
Effort: 1 Summer Month (8%)

“Temporal dynamics of neurophysiological patterns as treatment targets in Schizophrenia”  
PI: Daniel Javitt (Columbia), co-PI (CCNY) Marom Bikson  
Agency/Mechanism: NIH-NIMH 1R01MH109289-01  
Funding Period/Cost: 1/2016-1/2021 \$4m  
Scope: HD- tDCS and delta frequency tACS on neural oscillatory patterns underlying auditory cognitive impairments in schizophrenia  
Effort: 1 Summer Month (8%)

“Cellular Mechanisms of High-Frequency SCS” (multiple phases)  
PI: Marom Bikson  
Agency/Mechanism: Boston Scientific ISR. ISRNON60014  
Funding Period/Direct cost: 3/2016-9/2017 \$384k  
Scope: This grant supports research on high frequency Spinal Cord Stimulation.  
Effort: 1 Summer Month (8%)

“Repairing the Damaged Corticospinal Tract after Cervical Spinal Cord Injury”  
PI: John Martin. Co-I Marom Bikson  
Agency/Mechanism: NYS DOH, DOH01-C30606GG  
Funding Period/Total Cost 11/2015-10/2018 \$990k  
Scope: This grant supports developing a new treatment for SCI.  
Effort: 5%

“Translational Research Projects (TRP) in Spinal Cord Injury Research”  
PI: John Martin. Co-I Marom Bikson  
Agency/Mechanism: NYS DOH, DOH01-C31291GG  
Funding Period/Total Cost 8/2016-8/2021 \$3.7m  
Scope: This grant supports developing translational models for electrotherapy of SCI.  
Effort: 4%

“Targeted Transcranial Electrotherapy to accelerate Stroke Rehabilitation- Exploratory Trial on Aphasia”  
PI: Lucas Parra, (sub) CCNY PI Marom Bikson  
Agency/Mechanism: NIH FAST-TRACK Phase 1+2 to Soterix Medical Inc. #R44NS092144  
Funding Period /Total cost: 7/2015-9/2018 \$3m  
Scope: This grant supports a clinical trial on tDCS for rehabilitation.  
Effort: 2 Summer Month (16%)

*Past:*

“Wireless Pulse Oximetry (WiPOX) for Diagnosing Intra-Operative Ischemia”  
PI: Marom Bikson. Co-I Prasad Adusumilli  
Agency/Mechanism: NIH-NIBIB (R03) #5R03EB017410-02  
Funding Period/Direct Cost: 4/2014-3/2017 \$100k  
Scope: This grant supports designing a new features on the WiPOX.

“Preclinical Evaluation, Clinical Trial Preparation and a Prospective Clinical Trial of Intra-operative Real-time Tissue Oxygenation Monitoring by Wireless Pulse Oximetry (WiPOX)”  
Project PI: Marom Bikson, Prasad Adusumilli; Program PI Karen Hubbard  
Agency/Mechanism: NIH-NCI (U54) #5U54CA132378-07  
Funding Period/Direct Cost: 10/2013-9/2016 \$750k  
Scope: This grant supports the development of intra-operative medical sensors.

“High resolution anatomical and physics-based biomechanical models of auditory regions for predicting effects of neuromodulation and implantable devices used to restore hearing and balance”  
 PI: Marom Bikson, Co-PI Luis Cardoso  
 Agency/Mechanism: DoD, QUASAR (FA8650-12-D-6280, Task Order 0036)  
 Funding Period/Total Cost 6/1/15-9/30/2016 \$106k  
 Scope: Novel simulations for hearing transduction

“Supplement Phase IIA Griep-Act-Reposition (GAR) platform”  
 PI: Marom Bikson (sub-award).  
 Agency/Mechanism: NSF, sub-award by Actuated Medical Inc. #5042-S01  
 Funding Period/Total Cost (sub-award) 5/2015-2/2016 \$147k  
 Scope: This grant supports design if an intraoperative ablation device.  
 Effort: 1 Academic Month (8.3%).

“Modulation of blood-brain-barrier (BBB) permeability by tDCS relevant electric fields”  
 PI: Marom Bikson. Co-PI John Tarbell, Co-PI Bingmei Fu  
 Agency/Mechanism: NIH-NIBIB (R21) 5R21EB017510-02  
 Funding Period/Direct Cost: 5/2014-4/2016 \$230k

“Cellular Mechanisms of Transcranial Direct Current Stimulation”  
 PI: Marom Bikson  
 Agency/Mechanism: USAF, Air Force Research Lab (AFRL) #FA9550-13-1-0073  
 Funding Period/Cost: 3/2013-2/2016 \$570k  
 Scope: This grant supports the testing the cellular mechanisms of DCS.

“A naturalistic study of transcranial Electrical Stimulation”  
 PI: Marom Bikson. Co-PI Berkan Guleyupoglu”  
 Agency/Mechanism: Thync Inc.  
 Funding Period/Direct Cost: 7/2014-10/2014 \$266k

“Effects of weak applied currents on memory consolidation”  
 PI: Lucas Parra (US), Lisa Marshall (Germany). Co-PI Marom Bikson  
 Agency/Mechanism: NIH/NSF CRCNS (5R01MH092926-05)  
 Funding Period/ Cost: 9/2010-8/2015 \$628k

“High-Density Transcranial Electrical Stimulation”  
 PI: Marom Bikson  
 Agency/Mechanism: Wallace Coulter, Early Career Award in Translational Research-Phase 1,2  
 Funding Period/ Direct Cost (with supplements) 9/2009-12/2014 \$510k

“Computational and 3D-printed reconstruction of head following TBI”  
 PI: Marom Bikson.  
 Agency/Mechanism: Burke Research Institute  
 Funding Period/Direct Cost: 5/2015-6/2015 \$44k

“Sub-mm high-resolution models for rational and advanced neuromodulation: cranial nerve targets and combination with cochlear implants”  
 PI: Marom Bikson  
 Agency/Mechanism: DoD Quick Reaction USAFSAM Assessments, Studies, Analysis, Evaluation, and Research (QUASAR)  
 Funding Period/Cost: 7/2013-6/2014 \$248k

“High Definition Cathodal Transcranial Direct Current for Treatment of Focal Status Epilepticus”

PI: Alexander Rotenberg (Harvard Medical), Co-PI Marom Bikson, Co-PI Abhishek Datta  
 (Soterix Medical Inc.)  
 Agency/Mechanism: Epilepsy Therapy Project/Epilepsy Found: New Therapy Grants Program  
 Funding Period/Cost: 9/2012-8/2014 \$214k

“DoD Computational Center for Rational tDCS”  
 PI: Marom Bikson  
 Agency/Mechanism: Air Force Defense Research Sciences Program: DURIP  
 Funding Period/Cost (direct): 9/2013-8/2014 \$250k

“Development and Validation of Thoracic Endoscopic Surgery Simulators to Conduct a  
 Prospective Randomized Crossover Study of Simulators vs. Didactics for Teaching and  
 Assessing Medical Students and Surgical Trainees Technical Skills”  
 PIs: Marom Bikson and Prasad Adusumilli, Program PI Karen Hubbard  
 Agency/Mechanism: NIH-NCI U54 (Pilot Project)  
 Funding Period/Direct Cost: 8/2011-7/2013 \$220k

“Targeted transcranial electrotherapy device to accelerate stroke rehabilitation”  
 PI: Lucas Parra (Soterix Medical Inc.), PI (CCNY) Marom Bikson  
 Agency/Mechanism: NIH-NINDS STTR  
 Funding Period/Cost: 8/2011-1/2013 \$530k

“A prospective clinical trial to assess the efficacy of real-time intraoperative monitoring of tissue  
 oxygenation by wireless pulse oximetry (WiPOX) in reducing anastomotic complications  
 following esophagogastrectomy”  
 PIs: Marom Bikson and Prasad Adusumilli, Program PI Karen Hubbard  
 Agency/Mechanism: NIH-NCI U54 (Pilot Project)  
 Funding Period/Direct Cost: 9/2010-8/2012 \$200k

“System for Focal Cranial Electrical Stimulation”  
 PI: Lucas Parra; Co-PI Marom Bikson  
 Agency/Mechanism: DARPA/DSO  
 Funding Period/Cost: 6/2009-9/2011 \$450k

“Role of field effects in spike time coherence”  
 Sub Proposal PI: Marom Bikson  
 Agency/Mechanism: NIH SO1 (RO1 level)  
 Funding Period/Direct Cost: 2/2007-1/2011 \$400k

“A national urban model for biomedical engineering undergraduate education”  
 PI: Sheldon Weinbaum, Co-PI Marom Bikson  
 Agency/Mechanism: NIH  
 Funding Period/Direct Cost: 9/2006-8/2011 \$2.5mil

“System for Focal Cranial Electrical Stimulation – Safety and Efficacy Evaluation”  
 PI: Lucas Parra; Co-PI Marom Bikson  
 Agency/Mechanism: DARPA/DSO  
 Funding Period/Cost: 12/2009-6/2011 \$337k

“Indirect mechanisms of DBS: Joule heating and electroporation”  
 PI: Marom Bikson  
 Agency/Mechanisms: NIH R03  
 Funding Period/Direct Cost: 3/2007-2/2009 \$100k

“Technology for improved drug delivery to the brain.”

PI: Marom Bikson		
Agency: Andy Grove Foundation		
Funding Period/Direct Cost:	9/2004-9/2007	\$90k
“CCNY/MSKCC Biomedical Engineering Partnership”		
PI: John Tarbell, Sub-Proposal PI: Marom Bikson		
Sub-proposal title: “Improved electrochemotherapy protocols for the treatment of solid tumors”		
Agency/Mechanism: NIH-NCI P20		
Funding Period/Direct Cost (Sub-Proposal):	12/2005-8/2007	\$118k
“Quantification of neuronal polarization by non-uniform electric fields”		
PI: Marom Bikson		
Agency/Mechanism: CUNY Research Equipment Grant		
Funding Period/Direct Cost:	3/2005-2/2006	\$30k

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**Awards/Honors (\*Small Grants/Contracts <\$35k):**

Ohio State University Contract (\*\$10k)  
PSC-CUNY Award 2004, 2005 (\*\$12k)  
ElectroCore Inc. Research Award 2015/2016 (\$10k)  
NuCalm Inc. Research Award 2015 (\$10k)  
Fenexy Foundation SAB 2015  
PROSE Award, Honorable Mention “The Stimulated Brain” 2015  
American Institute for Medical and Biological Engineering (AIMBE) College of Fellows 2015  
Biomedical Scholarship Fund for New Americans 2014 (\$8k)  
MSKCC Research SubAward “WiPOX Development “ 2013 (\*\$35k)  
PSC-CUNY Grant “Prototype Development of a Rapid-Deployment Brain “Re-Fibrillation” Kit for Status Epilepticus” 2012 (\*\$12k)  
2012 CCNY Mentoring Award in Architecture, Biomedical Education, Engineering and Science  
OneMed Forum, University Technology Selection 2012  
University Research and Entrepreneurship Symposium technology selection 2012  
“UnConference” Cleveland, Invitee 2011  
Memorial Sloan Kettering Cancer Center-CCNY Development Fellowship 2011 (\*\$25k)  
New York City BioAccelerate Award, Finalist 2010  
CUNY selection, NYC Emerging Medical Technologies Summit 2010  
New York City Bioaccelerate Award, Finalist 2009  
Wallace H. Coulter Early Career Award 2009 (see major grants)  
Louis Stokes Alliance, Outstanding Mentor Award 2009  
Catell Fellowship 2008- (\*)  
Conference on Transcranial Magnetic and Direct Current Stimulation Opening Lecture 2008  
COMSOL conference Popular Choice Poster 2008  
Harold Shames Presidential Junior Faculty Professor 2003-2007 (\*)  
PSC-CUNY Award 2004, 2005 (\*\$10k)  
Introduction to BME Student Teaching Award 2005  
Introduction to BME Student Teaching Award 2004  
Brain (Journal) Travel Grant 2002 (\*)  
University of Birmingham, Rowbotham Bequest 2001 (\*)  
The Physiological Society, Affiliate Grant 2001 (\*)

NIH Trainee 1999-2000  
Whitaker Trainee 1996-1998  
Functional Electrical Stimulation Robinson Award 1999  
CWRU BME Research Day Student Presentation 1<sup>st</sup> place 1999  
Johns Hopkins University Physiological Foundation Lab Design Award 1995

**Professional Activities** (academic only, for Industry see consulting)

Member: American Institute for Medical and Biological Engineering, CUNY Academy for the Humanities and Sciences, Society for Neuroscience, Biomedical Engineering Society, Reuters Insight Expert Network, HG Legal Expert Witness

Editor (board): Brain Stimulation (2012, Technology and Modeling Editor 2013-), NeuroImage: Clinical (2012), Scientifica (2012-), Guest Editor (Special Issues): Frontiers in Neuroscience (2013) "Open questions on the mechanisms of neuromodulation with applied and endogenous electric fields", Guest Editor (Special Issues): Frontiers in Neuroscience (2016) Revisiting the Effectiveness of Transcranial Direct Current Brain Stimulation for Cognition: Evidence, Challenges, and Open Question, Current Opinion in Biomedical Engineering (2016-)

*Ad hoc* reviewer: Journal of Obstetrics and Gynaecology Research, Cortex, Neurorehabilitation and Neural Repair, Brain Research, European Journal of Neuroscience, Journal of Clinical Neurophysiology, Journal of Neurophysiology, Epilepsia, IEEE Transactions in Biomedical Engineering, IEEE Transactions of Neural Systems and Rehabilitation Engineering, Journal of Neural Engineering, Medical & Biological Engineering & Computing, Journal of Computational Neuroscience, Annals of Biomedical Engineering, International Journal of Neural Systems, PLOS, Journal of Neuroengineering and Rehabilitation, Brain Stimulation, Science Center programs of the U.S. Department of State, NIH, The Royal Society (UK), Prader-Willi Syndrome Association (USA), Pain, Experimental Neurology. United States-Israel Binational Science Foundation, Action Medical Research, US Air Force Office of Scientific Research, Frontiers, South Carolina's Institutions of Higher Education, Human Brain Mapping, International Journal of Developmental Neuroscience. NIH-NINDS ZNS1 BRAIN Special Emphasis Panel (2014), The Swiss National Science Foundation, Review of Scientific Instruments, Brain Connectivity, European Union, Netherlands Organisation for Scientific Research, NIH Stimulating Peripheral Activity to Relieve Conditions (SPARC) Special Panel (2017).

Co-director, Neural Engineering, New York Center for Biomedical Engineering (2005-)

The City College of New York/City University of New York Medical School Institutional Animal Care and Use Committee (2004-2010)

Co-director, Howard Hughes Medical Institute Program for Undergraduates at CCNY (2005-2009)

Committee Member, Memorial Sloan Kettering Cancer Center/City College of New York Partnership (2008-)

Executive Coordinating Committee, NIH Minority Undergraduate Biomedical Education Program at The City College of New York (2004-2011)

2014 Provost's Faculty Awards Committee (2014)

CCNY Research Ethics Committee (2014-)

Founding Board for an Entrepreneurship Effort leveraging the GSOE (2011-)

Founding Member, CCNY Pathways Project Innovation and Entrepreneurship into the engineering curriculum (2014-)

Advisory Committee, CUNY Hub for Innovation and Entrepreneurship (2012-)

External Advisory Committee meeting for the University of New Mexico - Center for Brain Recovery and Repair (2017-)

Director, Kylie Entrepreneurship Prize (2012-2016) of the CCNY Zahn Center

*Conference organization:*

Potomac Institute for Policy Studies, Conference on Stun Devices (2005):

Moderator: *Health Effects Research Group*

IEEE Engineering in Medicine and Biology Society Conference (2006)

Track Chair: *Neural interfacing and neurorobotics*

IEEE Engineering in Medicine and Biology Society Conference (2006)

Session Chair: *Neural Stimulation and Prostheses 2*

IEEE Engineering in Medicine and Biology Society Conference (2006)

Session Chair: *Neural Stimulation and Prostheses VII*

Design of Medical Device Conference (2010)

*Scientific Program Committee*

Design of Medical Device Conference (2011)

*Scientific Program Committee*

Design of Medical Device Conference (2012)

*Scientific Program Committee, Track Chair*

International Symposium on Biomedical Engineering and Medical Physics, Latvia (2012)

*Program Committee*

Design of Medical Device Conference (2013)

*Scientific Program Committee, Track Chair*

Soterix Medical East Workshop at Burke Rehabilitation Hospital (2013)

*Conference co-Director*

NYC Neuromodulation (2013)

*Conference co-Founder and Chair*

NYC-tDCS Workshop - Neuromodec (2014)

*Organizing Committee*

Neuromodec tDCS Workshop – University of Florida (2014)

*Organizing Committee*

1<sup>st</sup> International Brain Stimulation Conference (2015)

*Scientific Committee*

NYC Neuromodulation (2015)

*Conference co-Founder and Chair*

Air Force, Dosimetry and Mechanisms Mediating Responses to tDCS (2015)

*Moderator*

NYC-tDCS Workshop - Neuromodec (2014)

*Organizing Committee*

Minnesota Neuromodulation Symposium (2015)

*International Program Committee*

Brain and Spinal Cord Stimulation in Chronic Pain Syndromes (2014)

*Program Committee*

NYC Visiting Fellowship in Transcranial Magnetic Stimulation (2015)

*Organizing Committee*

NYC Fellowship in Transcranial Direct Current Stimulation (2015)

*Director*

Updates on tDCS in Clinical Trials (2015)

*Organizer*

6th International Conference on Transcranial Brain Stimulation (2016)



Session Chair  
 NIH Symposium on Transcranial electrical stimulation (tDCS, tACS): Mechanisms, technologies and therapeutic applications (2016)  
 Co-Organizer  
 Minnesota Neuromodulation Symposium (2016)  
 Member International Program Committee  
 NYC Fellowship in Transcranial Direct Current Stimulation (2016)  
 Director  
 Neuromodulation Technology Meeting (2016)  
 Chair  
 NYC Neuromodulation (2017)  
 Chair  
 Minnesota Neuromodulation Symposium (2017)  
 Member International Program Committee  
 International Neuropsychological Society, New Orleans (2017)  
 Session Chair: Electrical brain stimulation and cognitive disorders  
 NIH Transcranial Electrical Stimulation (tES): Mechanisms, Technology and Therapeutic Applications (2017)  
 Co-Organizer  
 International Neuromodulation Society 3rd World Congress, Scotland (2017)  
 Session organizer and moderator  
 Neuromodec tDCS workshop, Barcelona (2017)  
 Co-Organizer  
 NYC Fellowship in Transcranial Direct Current Stimulation (2017)  
 Director  
 North American Neuromodulation Society. Pre-Conference Continuum of Care from Wearables to Non-Invasive Neuromodulation  
 Co-Organizer

INVITED PRESENTATIONS:

University of Birmingham, Department of Pharmacology (2001):  
*"Suppression of spontaneous epileptiform activity in rat brain slices with DC and high frequency (AC) electric fields."*  
 Boston University, Center for BioDynamics (2003):  
*"Modulation of neuronal excitability by low- and high- amplitude electric fields."*  
 City University of New York, NY Center for Biomedical Engineering (2003):  
*"Effects of electric fields on neuronal function: environmental safety and clinical applications."*  
 Albert Einstein College of Medicine, Department of Neuroscience (2003):  
 "Role of non-synaptic interactions in epileptic seizures"  
 City University of New York, Biology Department (2004):  
 "Non-synaptic and synaptic mechanisms in epilepsy"  
 George Mason University, Krasnow Institute (2004):  
*"Modulation of neuronal function by applied DC electric fields"*  
 City College of New York, Frankenstein Exhibit Opening (2004)  
 Keynote speaker  
 Potomac Institute for Policy Studies, Conference on Stun Devices (2005):  
*"Electrical Stimulation: An Overview"*  
 Albert Einstein College of Medicine, Epilepsy Research Group (2005)  
*"Measurements of the neuronal environments"*  
 Life Science Career Development Conference (4<sup>th</sup> annual) session on Hot Trends in Biomedical Engineering (2005)  
*"Neural Engineering and Functional Electrical Stimulation"*

IEEE Engineering in Medicine and Biology Society Conference (2006) Therapeutic Neural Engineering minisymposium  
*"Rational modulation of neuronal processing with applied electric fields"*

Memorial Sloan Kettering Cancer Center/CCNY Symposium (2006)  
*"Design of rational electrochemotherapy protocols"*

University of Maryland, Department of Psychology (2006)  
*"A functional role for extracellular potentials in the brain?"*

Penn State University, Engineering Science and Mechanics (2007)  
*"Amplification of small electric fields through spike timing; implications for brain oscillations."*

Columbia University, BME Neural Seminar (2008)  
*"Rational Design of Electrotherapy Devices"*

Memorial Sloan Kettering Cancer Center/CCNY Translational Research Symposium (2008)  
*"Technology for electrochemotherapy and electro-therapeutic drug delivery through blood barriers"*

Neural Interfaces Conferences, Cleveland, OH (2008)  
*"Rational design of sub-threshold stimulation protocols"*

Third International Conference on Transcranial Magnetic Stimulation and Direct Current Stimulation (2008)  
*"Insights from in vitro studies, designing targeted stimulation protocols"*

Third International Conference on Transcranial Magnetic Stimulation and Direct Current Stimulation (2008) Goettingen, Germany OPENING LECTURE  
*"From TMS to tDCS to Modulated therapies: Biophysics of electrical therapy design"*

Neuropsychology, Queens College and the Graduate Center CUNY (2008)  
*"New technology for non-invasive electrical treatment of brain disorders: High-Density transcranial Direct-Current Stimulation"*

The Mind Research Network (MRN), University of New Mexico (2008)  
*"Targeted brain modulation with functional high-density transcranial electrical stimulation"*

National Institute of Neurological Disorders and Stroke -NIH (2009)  
*"Mechanisms and Optimization of tDCS"*

Design of Medical Device Conference (2009)  
*"High-Density Transcranial Electrical Stimulation (HD-tES)"*

Fourth International Workshop on Seizure Prediction (2009)  
*"Modulating seizure-permissive states with weak electric fields"*

Center for Noninvasive Brain Stimulation, Harvard Medical School, Beth Israel Deaconess Medical Center (2009)  
*"Towards Individualized tDCS Therapy: Biophysical Insights and High-Density Technology"*

Weill Cornell Continuing Medical Education, Cornell Medical College (2009)  
*"New – and not so new- technology to control seizures with electrical stimulation devices."*

Psychiatry Grand Rounds Series at the Medical University of South Carolina (2009)  
*"High-Density Transcranial Electrical Stimulation: Non-invasive and painless targeting of cortical structures for neurological electrotherapy."*

National Institute of Aging – NIH (2009)  
*"A new medical device for non-invasive neuro-modulation and therapy with very low-intensity electrical currents"*

The New York City Investment Fund: BioAccelerate Prize (2010)  
*"Breakthrough in Electrotherapy Technology: High-Density Transcranial Electrical Stimulation (HD-tES)"*

II International Symposium in Neuromodulation (2010)  
*"In vitro studies: designing targeted stimulation protocols."*

II International Symposium in Neuromodulation (2010)

“Computer modeling: what have we learned to design new interventions?”  
 NYC Emerging Medical Technologies Summit (2010)  
 “H-sink technology for medical implant safety.”  
 Clinical, Assessments and Interventions Updates in Neurorehabilitation, Harvard Medical School, Boston (2010)  
 “Modeling the effects of Neuromodulatory tools.”  
 Interdisciplinary Neuroimaging Research Meeting, University of South Carolina (2010)  
 “Next generation non-invasive electrical neuromodulation.”  
 Stroke Rehabilitation Research, Kessler Foundation Research (2011)  
 “Customized and individualized tDCS dose through computational models”  
 Department of Biomedical Engineering, University of Ilmenau, Germany (2011)  
 “High-resolution FEM models for advanced transcranial electrical therapy.”  
 8th Practical Course in Transcranial magnetic and electrical stimulation, German Neuroscience Society (2011)  
 “Optimizing tDCS using computer modeling.”  
 University Medical Innovation Showcase, Javits Convention Center, NYC, NY (2011)  
 “High-Definition Transcranial Electrical Stimulation (HD-tES): Non-invasive, low-intensity, electrical Neurostimulation”  
 New York City Emerging Technologies Summit “Opportunities in Neuroscience” (2011)  
 “Non-invasive electrotherapy”  
 III International Symposium in Neuromodulation (2011)  
 “Computer modeling in neuromodulation: how they can help the clinician.”  
 III International Symposium in Neuromodulation (2011)  
 “High-Definition Transcranial DC Stimulation.”  
 Manhattan Adult Attention Deficit Disorder Support Group (2011)  
 “From technology to treatment: What can we do to expedite progress?”  
 tDCS Symposium, Neuro-Cognitive Rehabilitation Network (NCRRN) University of Pennsylvania (2011)  
 “Physiology of tDCS”  
 Harvard Medical School – tDCS course (2011)  
 “Determining tDCS dose – Electrode montage design for brain targeting.”  
 Neuropsychology and Neuroscience Laboratory, Kessler Foundation (2011)  
 “tDCS mechanisms and dose design for clinical trials”  
 Clinical, Assessments and Interventions Updates in Neurorehabilitation (HMS-CME), Harvard Medical School, Boston (2011)  
 “Modeling the effects of Neuromodulatory tools.”  
 Lawrence N. Field Center for Entrepreneurship Baruch College (2011)  
 Faculty Entrepreneurship Roundtable  
 Photo-Electro-Magnetic Biostimulation of Performance and Protection, Fort Sam Houston (2011)  
 “Deployable and targeted neuromodulation with High-Definition transcranial Direct Current Stimulation.”  
 SUNY Downstate Medical Center (2011)  
 “Deployable and targeted neuromodulation with High-Definition transcranial Direct Current Stimulation.”  
 Neuroscience Center, College of Staten Island, CUNY (2012)  
 “Modulating brain function with transcranial Direct Current Stimulation: Clinical promise and next generation technology.”  
 Cooper Union, Seminars of Biomedical Engineering (2012)  
 “Rapid medical device prototyping: From idea to patient”  
 Harvard Medical School – tDCS practical (2012)  
 “Getting the most out of tDCS – Optimizing dose for targeting.”  
 IV Symposium International on Neuromodulation - Sao Paulo, Brazil (2012)  
 “Cellular mechanisms of tDCS: From classic doctrine to new directions.”  
 IV Symposium International on Neuromodulation - Sao Paulo, Brazil (2012)

*“tDCS dose guidelines across the extremes of age and size, and following stroke.”*

American Society for Neurorehabilitation, Vancouver (2012)  
*Panel: Evidence-based approaches in neuro-rehabilitation*

4<sup>th</sup> Annual CCNY-MSKCC Partnership Translational Research Symposium (2012)  
*“Real-Time Intraoperative Tissue Oximetry”*

Clinical, Assessments and Interventions Updates in Neurorehabilitation (HMS-CME), Harvard Medical School, Boston (2012)  
*“Modeling the effects of Neuromodulatory tools.”*

Alameda County Medical Center (2012)  
*“Fundamentals and mechanisms of tDCS”*

10th Göttingen Meeting of the German Neuroscience Society (2013) – Germany  
*“Targeting of transcranial Direct Current Stimulation”*

Fifth International Conference on Transcranial Magnetic Stimulation and Direct Current Stimulation (2013) Leipzig, Germany LECTURE AND WORKSHOP CHAIR  
*“Optimized design of tDCS with computational models”*

The Leslie and Susan Gonda Multidisciplinary Brain Research Center at Bar-Ilan University, Israel (2013)  
*“Transcranial direct current stimulation: Devices, therapies and clinical trials”*

Department of Biomedical Engineering, Ben-Gurion University of the Negev, Israel (2013)  
*“High-Definition transcranial Direct Current Stimulation: Non-invasive and targeted neuromodulation.”*

Nathan Kline Institute for Psychiatric Research, New York (2013)  
*“High-Definition Stimulations Targeting Approaches for tDCS”*

University of New Mexico, Psychology Department (2013)  
*“Frontiers of neuromodulation technologies for cognitive neuroscience and neuropsychiatric treatment”*

UC Davis Center for Mind and Brain (2013)  
*“High-Definition tDCS”*

University of Wisconsin, Department of Neurology (2013)  
*“Mechanisms and technology of transcranial Direct Current Stimulation”*

Magstim Neuroenhancement Conference, Oxford UK (2013)  
*“Individualized and targeted neuromodulation with High-Definition DCS”*

University of Oxford, Nuffield Dept of Clinical Neurosciences (2013)  
*“Making Sense of Transcranial Direct Current Stimulation: From High-Definition to Individualized Targeting”*

American College of Neuropsychopharmacology Annual Meeting (2013)  
*“At the Crossroads of Physics, Physiology, and Psychiatry: Rational Design of Noninvasive Neuromodulation Therapies.”*

Society for Neuroscience Meeting (2013)  
*“Therapeutic Neuromodulation with Transcranial Current Stimulation: Ready for Rational Design?”*

Cleveland FES Center (2013)  
*“Fundamentals of transcranial Direct Current Stimulation”*

Washington University (2013)  
*“Too good to be true? tDCS applications in cognitive performance, neurology, and psychiatry.”*

V Symposium International on Neuromodulation - Sao Paulo, Brazil (2013)  
*“Making tDCS effective and specific: insights from computational and animals models.”*

V Symposium International on Neuromodulation - Sao Paulo, Brazil (2013)  
*“tDCS in children: dose consideration.”*

National Institute of Health – Medical Center (2013)  
*“Modeling of transcutaneous spinal Direct Current Stimulation (tsDCS)”*

AFOSR Human Performance and Biosystems Program Meeting (2013)  
*“Toward a quantitative understanding of tDCS”*

NYC Neuromodulation (2013) CONFERENCE CHAIR AND KEYNOTE  
     "The next generation of transcranial electrical stimulation technologies."  
 International Congress of Clinical Neurophysiology, Berlin, Germany (2014)  
     "NIBS: cellular and molecular mechanisms"  
 11th Practical Course "Transcranial magnetic and electrical stimulation", Germany (2014)  
     "Network oscillations as a substrate for tACS modulation of learning and  
     plasticity: cellular and quantitative insights from brain slice."  
 Columbia Neurological Institute (2014)  
     "A new paradigm for non-invasive seizure control: the "DSES" trial and adaptive  
     High-Definition tDCS"  
 Adaptive Response in Biology and Medicine, University of Amherst (2014)  
     "Neuromodulation with weak transcranial electrical stimulation: Small things  
     making a big difference"  
 Harvard Medical School Neurorehabilitation Course (2014)  
     "The future of home-based neuromodulation treatments."  
 NYC tDCS Workshop (2014)  
     "Overview of tDCS dose."  
 2nd Annual Minnesota Neuromodulation Symposium (2014)  
     "Frontiers of non-invasive neuromodulation"  
 George Mason University (2014)  
     "Basic principles and practices of transcranial Direct Current Stimulation"  
 9th annual Neurotech Investing and Partnering Conference (2014)  
     "High-Definition transcranial Direct Current Stimulation"  
 IV Symposium International on Neuromodulation - Sao Paulo, Brazil (2014)  
     "*Technical requirement for home-use transcranial Direct Current Stimulation.*"  
 IV Symposium International on Neuromodulation - Sao Paulo, Brazil (2014)  
     "*State-of-the art tDCS protocols, techniques, and optimization.*"  
 Society of Biological Psychiatry Annual Meeting, New York (2014)  
     "*Biophysical Foundations of tDCS: Evidence from Computer Models and Animal  
     Studies*"  
 The Zucker Hillside Hospital, New York (2014)  
     "*transcranial Direct Current Stimulation (tDCS): technology, mechanisms, and  
     applications in mental health*"  
 Mount Sinai, Department of Psychiatry (2014)  
     "*Introduction to neuromodulation with tDCS*"  
 Harvard Medical School: Clinical Assessments and Intervention Updates in  
 Neurorehabilitation (2014)  
     "Principles and Modeling of Transcranial Direct Current Stimulation"  
 University of Florida tDCS Workshop (2014)  
     *Technology and modeling section.*  
 Weill Cornell Medical College (2014)  
     "*transcranial Direct Current Stimulation (tDCS)*"  
 American Epilepsy Society Annual Meeting (2014)  
     "*Transcranial DC stimulation for Seizures*"  
 Medical University of South Carolina (2014)  
     "tDCS"  
 1<sup>st</sup> International Brain Stimulation Conference, Singapore (2015)  
     "*Who, where, what, when, and why: Optimizing transcranial Direct Current  
     Stimulation*"  
 1<sup>st</sup> International Brain Stimulation Conference, Singapore (2015)  
     "*Cellular mechanisms of tDCS: Insights from animal models*"  
 1<sup>st</sup> International Brain Stimulation Conference, Singapore (2015)  
     "*Understanding cellular targets of (HD) tDCS to optimize brain targeting*"  
 3rd North America TMS Montreal, Canada (2015)  
     "*Comparing the focality of TMS and HD-tDCS*"  
 Winter Conference on Brain Research (2015)

*“Shocking old/new world: moving towards the more selective stimulation of the human brain”*

Air Force, Dosimetry and Mechanisms Mediating Responses to tDCS (2015)  
*“tDCS-Introduction and General Principles”*

Albert Einstein College of Medicine (2015)  
*“transcranial Direct Current Stimulation: How can one thing work for everything?”*

Brain and Spinal Cord Stimulation in Chronic Pain Syndromes, NYC (2015)  
*“Overview of neuromodulation approaches for pain”*

Sophie Davis School of Biomedical Education CCNY (2015)  
*“Physics and neurophysiology makes tDCS better”*

State University of New York at Binghamton (2015)  
*“Physical and neuroscience foundations of low-intensity brain stimulation”*

Magstim Neuroenhancement Conference, Oxford UK (2015)  
*“Individualized and targeted neuromodulation with High-Definition DCS”*

A dialogue with the cerebral cortex meeting. Barcelona Pain (2015)  
*“Modulating brain processing and learning with targeted non-invasive electrical stimulation”*

V Symposium International on Neuromodulation - Sao Paulo, Brazil (2015)  
*“How does transcranial Direct Current Stimulation change cortical processing: Insights from animal models.”*

V Symposium International on Neuromodulation - Sao Paulo, Brazil (2015)  
*“Update on the use of High-Definition tDCS in clinical neurophysiology and trials.”*

University College London (2015)  
*“How to cure any disease and get smart: An overview of tDCS mechanisms”*

World Science Festival (2015)  
Panel: Electric Medicine and The Brain

NYC Visiting Fellowship in Transcranial Magnetic Stimulation (2015)  
Fundamentals of electrical stimulation of the brain

Center for Addition and Mental Health, Toronto (2015)  
*Design and optimization of tDCS for clinical trials: perspective from animal and computational studies”*

2015 North American Neuromodulation Society (NANS)  
*“High-definition transcranial direct current stimulation”*

UCLA Neurology (2015)  
*“How does tDCS work for so many different things?”*

NJIT (2015)  
*“The engineering foundations of non-invasive brain stimulation with weak currents”*

Dupont Summit (2015) on Science, Technology, and Environmental Policy  
*“Ethics and technology of personal neuromodulation”*

Columbia University, Teachers College (2016)  
*“Transcranial Direct Current Stimulation in behavioral, cognitive, social and clinical neuroscience.”*

Plenary: 6th International Conference on Transcranial Brain Stimulation (2016)  
How TDCS polarises a highly folded cortex

IEEE ICES TC95, Plantation FL (2016)  
*“Engineering standards for tDCS”*

Keynote: Michael C. Wilson Memorial Lecture, UNM (2016)  
*“Ethics and technology of personal neuromodulation”*

2016 Society for Psychophysiological Research  
Panel: Methods in tDCS

Keynote: 2016 42nd Northeast Bioengineering Conference (NEBEC)  
*“Engineering the Brain with Non-invasive Electrical Stimulation: Applications in cognition and treatment”*

tedX Bushwick 2106  
*“A Tool for the Mind”*

3rd Annual Symposium of Brain Imaging Center (BIC) at the Icahn School of Medicine at Mount Sinai, 2016  
 “Far field effects in Transcranial Direct Current Stimulation and Deep Brain Stimulation.”

Cohen Lab, NIH (2016)  
 “How tDCS works, and works for so many things.”

Late Summer School on Non-Invasive Brain Stimulation, Freiburg, German (2016)  
 “Translation aspects of tDCS: From rodents to humans”

Late Summer School on Non-Invasive Brain Stimulation, Freiburg, German (2016)  
 “Modeling and tDCS current distribution”

National Academies of Sciences, Engineering, and Medicine’s Forum on Neuroscience and Nervous System Disorders. (2016)  
 “Quantification of Dose with Devices”

2016 PACHE Investigators Workshop at the National Institute of Health NCI (2016)  
 “WiPOX for intra-operative monitoring of tissue oxygenation.”, Bethesda

NIH Symposium on Transcranial electrical stimulation (tDCS, tACS): Mechanisms, technologies and therapeutic applications (2016), Bethesda  
 “Computational modeling-assisted design of tDCS protocols”

Tinnitus Neurocognitive Approaches from Diagnostic to Rehabilitation workshop (2016), Brazil.  
 “tDCS for tinnitus”

Hunter College, CUNY (2016)  
 “The hype and reality around transcranial Direct Current Stimulation”

Brain and Mind Centre at Sydney University, Australia (2016)  
 “Zap my Brain”

American College of Neuropsychopharmacology Annual Meeting, Hollywood Florida (2016)  
 “Direct Current Stimulation Accelerates Synaptic Models of Learning in Animals.”

NIH Brain Initiative Investigators Meeting, Bethesda (2016)  
 “A toolbox to models tDCS”

International Neuropsychological Society, New Orleans (2017)  
 “The basics of tDCS: technology and mechanisms”

International Neuropsychological Society, New Orleans (2017)  
 tDCS practical course

Stevens Institute of Technology (2017)  
 Engineering neuromodulation devices.

International Neuromodulation Society 3<sup>rd</sup> World Congress, Scotland (2017)  
 “Introduction to Mechanistic Questions around High-Rate Stimulation and Overview of Methods for Reliable Electrophysiological Recording During High-Rate (10k) Stimulation” (session organizer and chair)

Pre-Conference on NIMBS to International Neuromodulation Society 3<sup>rd</sup> World Congress, Scotland (2017)  
 “Toward Markers of Target Engagement in tDCS”

American Pain Society (2017)  
 “Electroceuticals at home.”

Cumming School of Medicine, University of Calgary, Canada (2017)  
 “Promise and pitfalls of tDCS”

2<sup>nd</sup> International Brain Stimulation Conference (plenary), Barcelona, Spain (2017)  
 “tDCS and the folded, active, plastic brain.”

Neuromodec Barcelona tDCS Workshop, Barcelona, Spain (2017)  
 “Overview of tDCS”

New York University, New York (2017)  
 “Updates on the mechanisms of low-intensity electrical neuromodulation”

The Science of Consciousness, Davis  
 “Non-invasive brain stimulation devices to change thought and behavior”

Northeastern University (2017)

“Translational Neural Engineering: Accelerated medical device design for treatment of neuro- psychiatric disorders and brain injury.”  
Mt Sinai, Department of Neuroscience, New York (2017)  
“Better science makes better neuromodulation: Accelerating the discovery of non-invasive brain stimulation techniques.”  
Mt Sinai, Department of Neurosurgery, New York (2017)  
“Major mechanistic questions and technology opportunities in Spinal Cord and Deep Brain Stimulation.”  
ANT EEG-tDCS & TMS methodology in research and clinical research settings (2017)  
“Technical aspects of tDCS/EEG  
North American Neuromodulation Society (2018). Pre-Conference Continuum of Care from Wearables to Non-Invasive Neuromodulation  
“Principles and Technology of tDCS”

### **Consulting / Technology Transfer:**

#### EXPERT REPORTS/CONTRACTS:

(Utility / Government -excluding reviewing)

*NASA Johnson Space Center: International Space Station EVA shock hazard 2008 subcontract through Wyle Integrated Science and Engineering*  
*Jersey Central Power & Light Company, subsidiary of FirstEnergy Corporation 2005-07*  
“Hazards associated with exposure to ultra-low voltages.”  
*Consolidated Edison of New York, 2004* “A review of hazards associated with exposure to low voltages” submitted to the *New York State Public Service Commission*

(Device Industry, selected)

*Electrocore*, Related to brain stimulation technology  
*NuCalm Inc.*, Related to neuromodulation system  
*Boston Scientific Corp*, Relating to neuromodulation, member Scientific Advisory Board  
*Medtronic Inc.*, Physician Sponsored Agreement relating to DBS system  
*Biophan Technologies*. IP analysis related to MRI compatible implants  
*NevroCorp*, Technical analysis relating to SCS system, proprietary.  
*Ion Channel Innovations*, Gene therapy bio-sensor device  
*Boston Scientific Corp*, Relating to biological fluid pumps, proprietary  
*Memorial Sloan Kettering Cancer Center*, Relating to medical device  
*Nu Skin*, Related to FDA regulation

(Selected litigation related technical analysis, Restricted for confidentiality)

Brown against *The Mount Sinai Medical Center*. Supreme Court of the State of New York No: 306626/08 including *Laserscope (American Medical Systems Inc.)*  
Omand vs. Zabara. Court of Common Pleas of Montgomery County, Pennsylvania No: 84-17202 (*Cyberonics Inc.*)  
Smith vs. *Jersey Central Power & Light Company*. Superior Court of New Jersey, Law Division, Ocean County No: OCN-L-3236-03  
Mackey vs Murray. Supreme Court of State of New York, County of Suffolk No. 23026/05 (*Conair Corp.*)  
Estate of Tarun Mal et al. vs. Advance et al. (*Intermatic*) United States District Court, Northern District, OH NO:1:07-CV-02868  
*Osborn vs. Kiewit Power*. (UNITED HYDROGEN OF TENNESSEE, RIVERPORT INSURANCE COMPANY, AES CORP. INDIANAPOLIS POWER & LIGHT) Circuit Court of Pike County. Cause No. 63C01-1409-CT-0002227



INTELLECTUAL PROPERTY: (From >40, Restricted and redacted)

United States Patent 8,494,627 "Neurocranial electrostimulation models, systems, devices, and methods" City University of New York. 2013  
United States Patent #Pending "Apparatus and Method for Neurocranial Electrostimulation" City University of New York 2013  
United States Patent Application "Wireless pulse oximetry." MSKCC / RF-CUNY  
United States Patent Application "Method to reduce heating at Implantable medical devices including neuroprosthetic devices." RF-CUNY  
United States Patent Application "Apparatus and method for focal transcranial electrostimulation". RF-CUNY  
PCT International Patent Application "Transcranial Stimulation Models with acoustic integration" RF-CUNY  
United States Patent Application "Method and device for combining light and electrical stimulation". RF-CUNY  
United States Patent Application "Brain stimulation device". RF-CUNY  
PCT International Patent Application "Method for reducing discomfort during electrostimulation, and compositions and apparatus therefor." RF-CUNY  
PCT International Patent Application "Transcranial Stimulation" RF-CUNY  
PCT International Application "Neurocranial electrostimulation models, systems, devices, and methods" RF-CUNY  
US Patent "Neurocranial Electrostimulation Models, Systems, Devices, and Methods."  
Mexican Patent Office #302290 "Method for reducing discomfort during electrostimulation, and compositions and apparatus." (August 13, 2012)  
United States Patent Application "Brain stimulation device and methods". RF-CUNY  
United States Patent Application "Method for portable brain stimulation". RF-CUNY  
Australian Patent "Method for reducing discomfort during electrostimulation, and compositions and apparatus therefor." RF-CUNY (August 20, 2013) 2009334503 application number.  
United States Patent Application "Dry electrode for tDCS". RF-CUNY  
PCT International Patent Application "Method for neuromodulation using tongue electrode". RF-CUNY

### **Selected News/Features**

KQED / NPR May 8, 2017 The SF Giants Are Zapping Their Brains With Electricity. Will It Help?  
<https://ww2.kqed.org/futureofyou/2017/05/05/san-francisco-giants-brain-electricity/>

HBO Vice News. March 30, 2017 <https://news.vice.com/story/people-are-zapping-their-brains-with-electricity-hoping-to-enhance-creativity-and-intelligence>

Scientists, entrepreneurs in Chicago area tackle 'brain hacking' Chicago Tribune. March 3, 2017.  
<http://www.chicagotribune.com/lifestyles/health/ct-electric-brain-stimulation-met-20170303-story.html>

Brain-Hackers Vie to Enhance Human Performance. Wall Street Journal. Feb 24, 2017  
<https://www.wsj.com/articles/brain-hackers-vie-to-enhance-human-performance-1487939402>

Zapping Your Brain at Home to Cure Fatigue. The Atlantic. Feb 22, 2016.  
<https://www.theatlantic.com/health/archive/2017/02/zapping-your-brain-at-home-to-cure-fatigue/516972/> (also mentioned on Mass Device <http://www.massdevice.com/study-tdcs-paired-cognitive-video-game-training-can-help-ms-patients/>)

Do DIY Brain-Booster Devices Work? Scientific American. Jan 10, 2017  
<https://www.scientificamerican.com/article/do-diy-brain-booster-devices-work/>

Zapping the brain really does seem to improve depression, New Scientist. Jan 9, 2017  
<https://www.newscientist.com/article/2117398-zapping-the-brain-really-does-seem-to-improve-depression/>

Study is 1st to quantify 'brain hacking' tDCS fields. Oct 4, 2016 MASS Device  
<http://www.massdevice.com/study-1st-quantify-brain-hacking-tdcs-fields/>

Olympic Athletes Are Electrifying Their Brains, and You Can Too. IEEE Spectrum. Aug 23, 2016.  
<http://spectrum.ieee.org/biomedical/bionics/olympic-athletes-are-electrifying-their-brains-and-you-can-too>

Thor's Performance Enhancing Drug of Choice. Inverse Aug 17, 2016  
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<http://www.sciencemag.org/news/2016/04/cadaver-study-casts-doubts-how-zapping-brain-may-boost-mood-relieve-pain>

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South China Morning Post <http://www.scmp.com/news/world/article/1931738/brain-stimulation-devices-promise-make-you-better-you-there-risk>

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<https://medium.com/bright/can-small-doses-of-electricity-make-you-smarter-86c9a909f465#.b2dds3z8z>

New Scientist. "Brain-shocking therapy may work by boosting calcium in the brain" March 29, 2016  
<https://www.newscientist.com/article/2082420-brain-shocking-therapy-may-work-by-boosting-calcium-in-the-brain/>

Washington Post. "Brain-zapping gadgets promise to make you a better you — smarter, stronger, even happier" March 29, 2016  
<https://www.washingtonpost.com/news/to-your-health/wp/2016/03/29/brain-zapping-gadgets-promise-to-make-you-a-better-you-smarter-stronger-even-happier/>

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<http://www.livescience.com/54071-brain-stimulation-speeds-stroke-recovery.html> March 26, 2016

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Brain-Zapping Headphones Could Make You a Better Athlete. MIT Technology Review.  
<https://www.technologyreview.com/s/601054/brain-zapping-headphones-could-make-you-a-better-athlete/> March 21, 2016

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The Hearty Soul "HOW ELECTROCEUTICALS COULD LITERALLY ZAP AWAY DEPRESSION"  
<http://theheartysoul.com/how-electroceuticals-could-literally-zap-away-depression/> Jan 13, 2016

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New Scientist "Brain zaps could boost our minds when computers see us flagging" Nov 18, 2015  
<https://www.newscientist.com/article/mg22830482-600-brain-zaps-could-boost-our-minds-when-computers-see-us-flagging/>

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National Pain Report. Have You Tried to Zap Fibromyalgia Pain Away? Oct 31, 2015  
<http://nationalpainreport.com/have-you-tried-to-zap-fibromyalgia-pain-away-8827926.html>

Neurology Advisor. Transcranial Direct Current Stimulation May Reduce Fibromyalgia Pain. Oct 31, 2015  
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SmartHealth Interview with Marom Bikson Oct 21, 2015  
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<http://www.newstatesman.com/lifestyle/2015/07/hacking-brain-can-diy-neuroscience-make-you-happier-and-smarter>

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Helmets thought reading can be generalized in a decade. 20 minutos.  
<http://www.20minutos.es/noticia/2446210/0/congreso-neurociencia/cascos-pensamiento/aplicaciones-terapeuticas/>

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<http://www.dn.no/d2/2015/08/06/2125/Teknologi/strm-p-hjernen>

Helmets that "read" thoughts, technology could be ready in a decade. Vanguardia. May 3, 2015  
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<http://motherboard.vice.com/read/electroceuticals-the-shocking-future-of-brain-zapping>

Smartphone-connected device to counter stress and change mood Feb 18, 2015 The TeCake  
<http://www.tecake.com/smartphone-connected-device-counter-stress-change-mood/4973/>

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<http://www.nbcnews.com/storyline/ces-2015/10-second-pitch-most-fun-futuristic-gadgets-ces-n281791>

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<http://www.popsci.com/three-body-hacks-you-shouldnt-try-home>

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<http://www.nbcphiladelphia.com/news/local/Brain-Stimulation-Devices-Prepare-to-Go-Mainstream--285600841.html>

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84. D.M. Durand, J. Lian, **M. Bikson**. Suppression of epileptiform activity by high frequency stimulation in-vitro. *American Epilepsy Soc.* 1.074, 2002
85. J.E. Fox, **M. Bikson**, J.G.R. Jefferys. The role of depolarisation block in the low calcium model of epilepsy. *American Epilepsy Soc.* 1.076, 2002
86. **M. Bikson**, C. McIntyre, M. Inoue, H. Akiyama, J.E. Fox, W.M. Grill, H. Miyakawa, J.G.R. Jefferys Effect of uniform DC electric fields on CA1 hippocampal pyramidal neurons. *Soc. Neuroscience Abstr.* 446.1, 2002
87. A. Ruiz Nuno, **M. Bikson**, J.E. Fox, M. Vreugdenhil, J.G.R. Jefferys. Local glutamate application induces high-frequency (>80 Hz) oscillations in the absence of synaptic transmission. *Soc. Neuroscience Abstr.* 187.4, 2002
88. **M. Bikson**, C.C. McIntyre, W.M. Grill, J.E. Fox, J.G.R. Jefferys. Effects of uniform DC electric fields on hippocampal function in-vitro. *Federation of European Neuroscience Societies* 187.3, 2002
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90. J. Lian, **M. Bikson**, J. Shuai, D.M. Durand. Propagation of epileptiform activity across a lesion. *Soc. Neuroscience Abstr.* 2001
91. J.E. Fox, **M. Bikson**, J.G.R. Jefferys. Minimum neuronal aggregate necessary for the generation of epileptiform discharges in the hippocampal slice exposed to low Ca ACSF. *Soc. Neuroscience Abstr.* 2001
92. M. Nakagawa, **M. Bikson**, D.M. Durand. A novel intact preparation for studying patterns of activity in the hippocampus. *Soc. Neuroscience Abstr.* 2000.
93. Durand, D.M. **M. Bikson**. Effects of High Frequency Stimulation on Cortical Neuronal Firing. *Biomedical Engineering Soc.* 2000

94. **M. Bikson**, J. Lian, D.M. Durand. Suppression of Epileptiform Activity by High Frequency Sinusoidal Fields. *World Congress on Medical Physics and Biomed. Eng. Conference Proceedings*. 2000
95. J. Lian, **M. Bikson**, J.W. Shuai, D.M. Durand. Propagation mechanism of epileptiform activity in the non synaptic model. *15<sup>th</sup> Annual Applied Neural Control Research Day*, Cleveland, 2000
96. **M. Bikson**, S.C. Baraban, D.M. Durand. Modulation of non-synaptic epileptiform activity by osmolarity. *Soc. Neuroscience Abstr.* 25:1869, 1999.
97. **M. Bikson**, J. Lian, D.M. Durand. Effect of high frequency stimulation on epileptiform activity in the hippocampus. *Soc. Neuroscience Abstr.* 25:1870, 1999.
98. P.J. Hahn, **M. Bikson**, D.M. Durand. A novel intact preparation for studying patterns of activity in the hippocampus. *Annals of Biomedical Engineering* 26: S-105, 1998
99. **M. Bikson**, R. Ghai, S.C. Baraban, D.M. Durand. Modulation of burst frequency, width, and amplitude in the zero-Ca model of epileptiform activity. *Soc. Neuroscience Abstr.* 24:1213, 1998.
100. R. Ghai, **M. Bikson**, and D.M. Durand. Electric field suppression of low Calcium epileptiform activity in the rat brain. *Soc. Neuroscience Abstr.* 24:1213, 1998.

## **Teaching / Instruction [limited selection]**

City College of New York (Primary Instructor/Course Director)

\*Indicates courses (co)developed and initially offered at CCNY by M. Bikson

BME I5100 Non-linear signal processing in biomedicine (2003). Grad.

BME 506 Biomedical Signal Processing and Instrumentation (2004). Grad/Undergrad.

BME 101 Introduction to Biomedical Engineering (2004, 2005, 2006, 2007, 2011, 2013)  
Undergrad

\*BME 310 Experimental Methods in BME 1 (2005, 2007, 2008, 2009) Undergrad.

\*BME 450 Biomedical Senior Design I (2005, 2006, 2007, 2008, 2009, 2010, 2012, 2014, 2015, 2016, 2017) Undergrad

BME I000 Biomedical Engineering Seminar (2005, 2006, 2007) Seminar Director

\*BME G3000/I3000 (BME 553) Introduction to Neural Engineering (2004, 2006, 2008, 2009, 2011, 2013, 2015) Grad

\*BME 405 Biomedical Transducers and Instrumentation (2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2016, 2017) Undergrad.

City University of New York, Graduate Center (Course module)

Biophysics: Excitable membranes (2006) Grad

Diseases of the Nervous System: Epilepsy (2007, 2008, 2011, 2013) Grad

Albert Einstein College of Medicine (Course module)

Neurological illnesses, module on Epilepsy, basic mechanisms (2006) Grad/Medical  
Translational Neuroscience (2015) Grad

### Additional Innovative Instructional activities

Development of new Neural Engineering course (2006)

Organization, course design, selection of equipment for BME 450/460 (2005)

Design of room architecture for BME 450/460 Biomedical Senior Design Lab, Room B41 (2004-2006)

Consolidation of modules and selection/purchase/installation of equipment for BME 310

Experimental Methods in BME (2003-2004).

Design of room architecture for BME 310 Instrumentation Teaching Lab (2003-2005).

Restructured BME Signal Processing, Instrumentation, Imaging, and Sensors curriculum (with Lucas Parra, 2003)

Presentation to CCNY COURT undergraduates “Engineering solutions to cancer.” 2005

Organized presentation to Eta Kappa Nu (2004) – “What do electrical engineers do in biomedical engineering.”

### **Advising and Mentoring**

#### Doctoral Student Advisor\*:

Datta A (2004-2011) ‘Model of non-invasive Controlled Transcranial Electrical Stimulation’  
Radman T (2005-2010) ‘Effects of electric fields on spike timing’  
Elwassif M (2006-2012) ‘Design of Controlled Transcranial Electrical Stimulation system’  
Reato D (2009-2013) ‘Modulation of oscillations with tACS’  
Rahman A (2011-2016) ‘Cellular mechanisms of tDCS’  
Truong D (2013-) ‘Optimization of tDCS current flow’  
Khadka N (2016-)  
Adair D (2016-)  
Unal G (2017-)

*\*2012 CCNY Mentoring Award in Architecture, Biomedical Education, Engineering and Science*

#### Master’s Thesis/Project Advisor:

Joshua K (2007) ‘Sensitivity of brain tissue to temperature’  
Maani S (2006-2007) ‘Design of stimulation isolation unit’  
Elwassif M (2005-2006) ‘Bio-heat transfer model of Deep Brain Stimulation’  
Shtaiwi F (2005-2006) ‘Experimental measurement of DBS induced temperature changes in model system’  
Bansal C (2007-2009) ‘Electrodes for HD-tDCS’  
Patel J (2007-2009) ‘Hardware for non-invasive brain stimulation’  
Mathias H (2010, co-advisor visiting scholar, Germany) ‘BONSAI interface for tDCS’  
Rahman A (2009-2011) ‘Cellular effects of tDCS’  
Naguib T (2010-2012) ‘Electroporation for cancer devices’  
Hahn C (2012, co-advisor visiting scholar, Germany) ‘Limited Total Energy tDCS’  
Truong D (2011-2013) ‘Role of skin far in tDCS current flow’  
Lietch L (2011-2013) ‘Design, Product Development, and Risk Assessment of Tin (Sn) run electrodes as a substitute to Silver-Silver Chloride (Ag|AgCl) ring electrodes for High-Definition transcranial Direct Current Stimulation (HD-tDCS)’  
Guleyupoglu B (2011-) ‘Electrodes for extended HD-tDCS’  
Minhas P (2013-) ‘Validation of current flow modeling’  
Seibt O (2013-) ‘Design of montages for depression control’  
Kronberg G (2013-) ‘Modulation of plasticity with DCS’  
Nair A (2011-2013) ‘Modeling of tDCS in cancer therapy’  
Thomas C (2013-) ‘Overview of tDCS use and sessions’  
Joowon Jun (2015-2017) ‘Design development and performance study of a novel device to assist toddlers and children with visual impairments to learn walking’

#### Doctoral and Graduate Student Mentoring:

Su Y (2003) ‘High-frequency electrical stimulation of high-K<sup>+</sup> epileptiform activity’  
Wyatt K (2004) ‘Model of neuronal aggregate formation’  
Rosenstein F (2005) ‘Patch-clamp electrophysiological system configuration’

Fan Z (2004-2005) 'Effects of electric fields on spike timing'  
Kong Q (2004-2012) 'Transient bio-heat transfer model of DBS'

Ph.D. Committee Member:

Hahn P (Case Western Reserve University) 2004 'Model of extracellular potassium diffusion'  
Ng Johnny (City University) 2006-2012  
Su Y (City University) 2006-2012  
Huang A (City University) 2009-2016  
Lafon B (City College) 2011-2016  
Steinemann N (City College) 2012-2016  
Liu P (Hunter College) 2015-2017  
Eldib M (City College) -2016  
Sing T (City College) 2015-  
Alzahraa Amer (City College) 2016-  
Judy Alper (2016-)

M.S. Committee Member:

Guadron L (2014)  
Kofi Agyman (2016-)

Undergraduate Research Mentoring:

Chiu J (2007) 'Design of novel system for electro-chemotherapy of solid tumors'  
Bracco J (2007-2008) 'Long term effects of electric fields on hippocampal slices'  
Vaynshteyn J (2007-2009) 'Electric field modulation of motor cortex function'  
Miranda D (2004-2006) 'Role of GABAergic function in the high-K<sup>+</sup> model of epilepsy'  
Stern A (2004-2005) 'Experimental measurement of DBS induced temperature changes in a bath'  
Pierre V (2006-2007) "Measurement of heating near DBS electrode"  
Hordof J (2006) "Effects of electric fields on brain slice function"  
Belisha I (2004-2007) 'Measurement of extracellular potassium transients during high-frequency electrical stimulation'  
An JH (2005-2010) 'Effects of glucose and glutamine concentration in the formulation of the artificial cerebrospinal fluid (ACSF)'  
Banerjee S (2005-2006) Web-site content maintenance  
Davis L (2006) 'Design of system for culture electrical impedance measurement'  
Macuff S (2010) 'Electronics for brain stimulation control'  
Arce D (2010-2013) 'Assembly methods for brain stimulation instrumentation'  
Febles N (2010-2011) 'Pre-treatment to increase tolerability during DCS'  
Xie B (2011) "Spheres simulation environment"  
Ho J (2008-2012) 'Electrodes for High-Definition tDCS'  
Refayat Bhuiyan MD (2011-2012) 'Segmentation for tDCS modeling'  
David A (2012-) 'Modeling of new tDCS montages'  
Alam M (2012-) 'Optimization of HD-tDCS protocols'  
Patel V (2013-) 'Next generation HD-tDCS electrode testing'  
Goh S (2012-) 'Design of HD-tDCS hydrogels'  
Fang Xiao (2013-2014) "Optimization of tDCS gels"  
Hochberg S (2013, JHU student) 'Formulation of hydrogels for tDCS'  
Mourdoukoutas A (2014-) 'New models for electrotherapy'  
Thomas C (2014-) "Meta-analysis of tDCS sessions"  
Chen A (2014-) "Epileptiform threshold for gamma oscillations under DCS"  
Khada N (2012-2014) "Method electrode impedance monitoring during multi-channel tES"  
Grossman P (2014-) "WiPOX stimulation"

Sobur C (2014-) “Neuromodulation trial for enhanced mood”  
Boateng A (2014-) “Simulation system for DBS”  
Zannou A (2014-) “Temperature changes under tDCS”  
Griep D (2015-2016) – “Cranial nerve stimulation”  
Jian J (2015-) “Concentric spheres models”  
Paneri P (2013-) “Toolbox for tDCS”  
Press KP (2016) “Modeling solutions for tDCS”  
Saad RG (2016-) “Increased tolerability electrode”  
Saleh Z (2015-2016) “Biomedical Instrumentation.”  
Abozeria M (2014-2015) “Advanced designed for tES”  
Postolache T (2017) “The toddler cane”  
Islam T (2017) “Data management.”

#### Undergraduate Advising

BME Undergraduate Faculty Advisor: 14 BME students/ year

#### Undergraduate Senior Design Supervision

2005-2006 3 student teams (with Luis Cardoso)  
2006-2007 2 student teams (with Luis Cardoso)  
2007-2008 5 student teams (with Luis Cardoso)  
Fall 2013 6 student teams  
2013-2014 40 students (with Sihong Wang)  
2015-2016 60 students (with Maribel Vazquez)  
2016-2017 55 student (with 2 other faculty)