Dear Friends,

The Department of Bioengineering is the newest department in Northeastern’s College of Engineering. Building on the success of its PhD program, BioE added BS and MS degree programs in the 2015 – 2016 academic year. We are now in an era of rapid growth with plans to double our faculty over the next three years and continue to increase as our student body expands.

Our research into the fundamentals of cell and tissue engineering, biomedical imaging and signal processing, biomechanics and biocomputing is providing a foundation on which a vibrant bioengineering community is developing—a community that spans the entire University. With over 80 affiliated faculty, the bioengineering department offers research opportunities that encompass the entire breadth of biological and biomedical engineering. Our co-op program is working with companies across the sector to provide BioE students with the broad range of opportunities within the Boston biotech industry and beyond. Through the co-op program, we identify opportunities that make it possible for our students to work in areas that most excite them.

I invite you to learn more about our new and fast-growing Department of Bioengineering. Our Scholarship Report provides a window into the many activities of our faculty and the energy and breadth of their applications.

Sincerely,

Lee Makowski
Chair of Bioengineering
l.makowski@northeastern.edu
RECENT HIRES:

SAMUEL CHUNG joins the college as an Assistant Professor of Bioengineering. Dr. Chung received his PhD from Harvard University in 2009. His research interests include central nervous system regeneration and low-cost fluorescence microscopy.  
» See page 11

EDUARDO SONTAG joins the college as a University Distinguished Professor, jointly appointed between Electrical and Computer Engineering and Bioengineering. Dr. Sontag received his PhD from the University of Florida in 1977. His research interests include feedback control theory, systems biology, cancer, and biomedicine.  
» See page 37

QUICK FACTS — College of Engineering

13 MULTI-INSTITUTIONAL RESEARCH CENTERS funding by eight federal agencies

DOE EPA HHS NSA NIST NSF

5 ENGINEERING DEPARTMENTS

Bioengineering  
Chemical Engineering  
Civil and Environmental Engineering  
Electrical and Computer Engineering  
Mechanical and Industrial Engineering

3566 UNDERGRADUATE students

665 729

NEW FALL UNDERGRADUATE students 2015 — 2016

3177 GRADUATE students

942 1178

NEW FALL MS students 2015 — 2016

77 YOUNG INVESTIGATOR Awards

40 NSF CAREER Awards

173 TENURED/TENURE-TRACK Faculty
Assistant Professor Ambika Bajpayee was awarded a $310K DoD Peer Reviewed Medical Research Program Discovery Award. Collaborators on the grant include Sunny Zhou, professor of chemistry, and Sandra Shefelbine, associate professor of bioengineering. Bajpayee will design cartilage targeting therapies for the treatment of osteoarthritis (OA), a degenerative joint disease which affects 150 million people around the world but does not have a cure. The work promises to enable clinical translation of potential disease modifying OA drugs, which are currently limited by a lack of tissue targeting drug delivery systems.

Professor Jeff Ruberti was awarded a patent for “Collagen Fibrillar Construction.” Methods and compositions are described for organizing collagen into fibrillar networks, e.g., short- and long-range organization. Collagen produced by the disclosed methods can be used for tissue engineering.

Jaclyn Lock, a PhD candidate in the Department of Bioengineering, advised by Chemical Engineering Professor Rebecca Carrier, was awarded first place in the Materials Engineering & Sciences Division (MESD) poster competition at the annual American Chemical Institute for Chemical Engineers (AIChE) meeting in San Francisco. Lock’s poster “Dextran Sodium Sulfate Exposure Affects Intestinal Mucus Integrity” was selected out of 50 posters in the competition. Lock was also awarded a Travel Award from the Women Initiative’s Committee to attend the conference.

Associate Professor Sandra Shefelbine, jointly appointed between bioengineering and mechanical and industrial engineering, was awarded a $650K National Science Foundation grant for her project entitled, "Mechanobiology of Joint Morphogenesis: Manipulating Salamander Limbs." This project will examine the regenerating limbs of salamanders.

Bioengineering Professor and Chair Lee Makowski’s new research findings on Alzheimer’s progression were published in the journal Scientific Reports. The findings may mean that some strains of fibrils are associated with disease whereas others are not, and distinguishing between them may provide critical insights for developing therapies to slow, halt, or reverse the neurodegeneration associated with Alzheimer’s disease.

Nikolai Slavov, assistant professor, was recognized with a $2.35 million National Institutes of Health Director’s New Innovator Award. The award is part of the NIH Common Fund’s High-Risk, High-Reward Research program, which supports highly creative early-career researchers taking out-of-the-box approaches to major challenges in biomedical research.

Associate Professor Guohao Dai has developed a 3D bioprinter to create tissue cultures for use in disease modeling and drug discovery. Dai’s research focuses on using bioengineering to generate insights into blood vessel regeneration and vascular disease. This research is a step toward fabricating tissue with blood flow, which will help the medical community.

Kritika Singh, E’21, bioengineering, was recognized with a $10,000 Thermo Fisher Scientific Antibody Scholarship based on her research, academics, and letters of recommendation. This top-level award is given annually to only two students nationwide.

Assistant Professor Qianqian Fang was awarded a five-year $1.7M National Institutes of Health grant for “A Versatile High-Performance Optical Mammography Co-Imager.” The research will fundamentally address the current clinical limitations in x-ray mammography by developing a vendor-independent high-performance optical mammography co-imager with which optical measurements can be jointly reconstructed using the structural guidance from a separately acquired 2D or 3D digital x-ray mammogram.
<table>
<thead>
<tr>
<th>Research Area</th>
<th>Faculty Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOIMAGING AND SIGNAL PROCESSING</td>
<td>Dana Brooks, Octavia Camps, Samuel Chung, Charles DiMarzio, Jennifer Dy, Deniz Erdogmus, Qianqian Fang, Ying-Yee Kong, Edwin Marengo, Mark Niedre, Jessica Oakes, Rupal Patel, Carey Rappaport, Purnima Ratilal-Makris, Bahram Shafai, Milica Stojanovic, Gilead Tadmor, Vladmir Torchilin</td>
</tr>
<tr>
<td>BIOCHEMICAL AND BIOENVIRONMENTAL ENGINEERING</td>
<td>Akram N. Alshawabkeh, Ambika Bajpayee, Rebecca Carrier, Edgar Goluch, April Gu, Robert Hanson, Ferdi Hellweger, Barry Karger, Carolyn W.T. Lee-Parsons, Kim Lewis, Shashi Murthy, Mary Jo Ondrechen</td>
</tr>
<tr>
<td>BIOMEMS/BIONANO</td>
<td>Mansoor Amiji, Ahmed Busnaina, Heather Clark, Jack Dennerlein, Adam Ekenseair, Robert Hanson, Nicol McGruer, Hossein Mosallaei, Sanjeev Mukerjee, Shashi Murthy, Mary Jo Ondrechen, Matteo Rinaldi, Jeffrey Ruberti, Srinivas Sridhar, Nian Sun, Thomas Webster, Mark Williams</td>
</tr>
<tr>
<td>CELL AND TISSUE ENGINEERING</td>
<td>Anand Asthagiri, Penny Beuning, Rebecca Carrier, Erin Cram, Guohao Dai, Andrew Gouldstone, Carol Livermore, Donald O’Malley, Hari Parameswaran, Jeffrey Ruberti, Nikolai Slavov, Eduardo Sontag, Kai-Tak Wan</td>
</tr>
<tr>
<td>MOTOR CONTROL</td>
<td>Joseph Ayers, Nader Jalili, Bahram Shafai, Rifat Sipahi, Dagmar Sternad, Mario Sznaiert, Gilead Tadmor</td>
</tr>
<tr>
<td>BIOCOMPUTING</td>
<td>Stefano Basagni, David Kaeli, Miriam Leeser, Waleed Meleis, Jessica Oakes, Hari Parameswaran</td>
</tr>
</tbody>
</table>
AKRAM ALSHAWABKEH

George A. Snell Professor of Engineering, Civil and Environmental Engineering; Associate Dean for Research; Director, PROTECT Superfund Research Center; affiliated faculty, Bioengineering
PhD, Louisiana State University, 1994
civ.neu.edu/people/alshawabkeh-akram

Scholarship focus: geoenvironmental engineering, soil and groundwater remediation; electrokinetic and electrochemical processes; contaminant fate and transport; environmental restoration

Honors and awards: Fellow, American Society of Civil Engineers; National Science Foundation CAREER Award; Soren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

L. Rajic, R. Nazari, N. Fallahpour, A.N. Alshawabkeh

N. Fallahpour, S. Yuan, L. Rajic, A.N. Alshawabkeh
Hydrodechlorination of TCE in a Circulated Electrolytic Column at High Flow Rate, Chemosphere, 144, 2016, 59-64

N. Yang, J. Cui, W. Xiao, A.N. Alshawabkeh, X. Mao

X. Yu, R. Ghasemizadeh, I.Y. Padilla, D. Kaeli, A.N. Alshawabkeh

Phenols and Parabens in Relation to Reproductive and Thyroid Hormones in Pregnant Women, Environmental Research, 151, 2016, 30-37

SELECTED RESEARCH PROJECTS

Puerto Rico Testsite for Exploring Contamination Threats (PROTECT)
Principal Investigator, National Institutes of Health
The Center for Research on Early Childhood Exposure and Development in Puerto Rico (CRECE) Studies How Mixtures of Environmental Exposures and Other Factors Affect the Health and Development of Infants and Children Living in Puerto Rico
Director and Principal Investigator, National Institutes of Health/Environmental Protection Agency

Induced Partial Saturation (IPS) Through Transport and Reactivity for Liquefaction Mitigation
Co-Principal Investigator, National Science Foundation

MANSOOR AMIJI

University Distinguished Professor, Pharmaceutical Sciences; affiliated faculty, Chemical Engineering, Bioengineering
PhD, Purdue University, 1992
che.neu.edu/people/amiji-mansoor

Scholarship focus: polymeric biomaterials, drug delivery systems, nanomedical technologies

Honors and awards: Fellow, American Association of Pharmaceutical Scientists; Fellow, Controlled Release Society; T. Nagai Award, Controlled Release Society

SELECTED PUBLICATIONS

Combination wt-p53 and microRNA-125b Transfection in a Genetically Engineered Lung Cancer Model Using Dual EGFR/CD44 Targeted Nanoparticles, Molecular Therapy, 24(4), 2016, 759-769

A. Singh, J. Xu, G. Mattheolabakis, M.M. Amiji
EGFR-Targeted Gelatin Nanoparticles for Systemic Administration of Gemcitabine in an Orthotopic Pancreatic Cancer Model, Nanomedicine: Nanotechnology, Biology, and Medicine, 12(3), 2016, 589-600

S. Yadav, S.K. Gandham, R. Panicucci, M.M. Amiji
Intranasal Brain Delivery of Cationic Nanoemulsion-Encapsulated TNF siRNA for Prevention of Experimental Neuroinflammation, Nanomedicine: Nanotechnology, Biology, and Medicine, 12(4), 2016, 589-600

D. Deshpande, S. Kethireddy, D.R. Janero, M.M. Amiji
Therapeutic Efficacy of w-3-fatty Acid-containing Estradiol Nano-delivery System Against Experimental Atherosclerosis, PLoS ONE, 11(2), 2016

SELECTED RESEARCH PROJECTS

Combinatorial-designed Nano-platforms to Overcome Tumor Drug Resistance
Principal Investigator, National Institutes of Health
Multi-modal Gene Therapy for Pancreatic Cancer with Targeted Nanovectors
Principal Investigator, National Institutes of Health
IGERT: Nanomedical Science and Technology
Co-Investigator, National Science Foundation
Integrated Image-guided Targeted Therapy for Refractory Ovarian Cancer
Principal Investigator, Nemucore Medical Innovations, Inc.
Impact of Lipids on Compound Absorption: Mechanistic Studies and Modeling
Co-Investigator, National Institutes of Health
Hepatic Insulin Resistance and Metabolic Disease
Principal Investigator, National Institutes of Health
Targeted Platinates/siRNA Combination Therapy for Resistant Lung Cancer
Principal Investigator, National Institutes of Health
ANAND ASTHAGIRI
Associate Professor, Bioengineering; affiliated faculty, Chemical Engineering
PhD, Massachusetts Institute of Technology, 2000
bioe.neu.edu/people/asthagiri-anand

Scholarship focus: cell and tissue engineering, quantitative principles of cancer cell biology and developmental biology

SELECTED PUBLICATIONS
Positive Quantitative Relationship Between EMT and Contact-Initiated Sliding on Fiber-Like Tracks, Biophysical Journal, 111(7), 2016, 1569-1574
Regulators of Metastasis Modulate the Migratory Response to Cell Contact Under Spatial Confinement, Biophysical Journal, 110(8), 2016, 1886-1895
Chemotaxis on Paper for Diagnostics, Analytical Chemistry, 87(11), 2015, 5505-5510
M.L. Lalli, A.R. Asthagiri
Collective Migration Exhibits Greater Sensitivity but Slower Dynamics of Alignment to Applied Electric Fields, Cellular and Molecular Bioengineering, 8(2), 2015, 247-257
K. Blogovic, E.S. Gong, D.F. Milano, R.J. Natividad, A.R. Asthagiri
Engineering Cell-Cell Signaling, Current Opinion in Biotechnology, 24(5), 2013, 940-947
K. Kushiro, A.R. Asthagiri
Modular Design of Micropattern Geometry Achieves Combinatorial Enhancements in Cell Motility, Langmuir, 28(9), 2012, 4357-4362
J.H. Kim, A.R. Asthagiri
Matrix Stiffening Sensitizes Epithelial Cells to EGF and Enables the Loss of Contact Inhibition of Proliferation, Journal of Cell Science, 124, 2011, 1280-1287
J.H. Kim, L.J. Dooling, A.R. Asthagiri
Intercellular Mechanotransduction During Multicellular Morphodynamics, Royal Society Interface, 7(3), 2010, 341-350
C.A. Giurumescu, P.W. Sternberg, A.R. Asthagiri
Predicting Phenotypic Diversity and the Underlying Quantitative Molecular Transitions, PLoS Computational Biology, 5(4), 2009, 1-13
J.H. Kim, K. Kushiro, N.A. Graham, A.R. Asthagiri
Turnable Interplay Between Epidermal Growth Factor and Cell-Cell Contact Governs the Spatial Dynamics of Epithelial Growth, Proceedings of the National Academy of Sciences USA, 106(27), 2009, 11149-11153

JOSEPH AYERS
Professor, Marine and Environmental Sciences; affiliated faculty: Bioengineering, Civil and Environmental Engineering, Electrical and Computer Engineering
PhD, University of California, Santa Cruz, 1975
bioe.neu.edu/people/ayers-joseph

Scholarship focus: development of underwater robots for civil infrastructure and explosive sensing; neurophysiology and behavior biomimetics

SELECTED PUBLICATIONS
L.L. McGrath, S.V. Vollmer, S.T. Kaluziak, J. Ayers
De Novo Transcriptome Assembly for the Lobster Homarus Americanus and Characterization of Differential Gene Expression Across Nervous System Tissues, BMC Genomics, 17, 2016, 3-12
J. Ayers
L. Zhu, A.I. Selverston, J. Ayers
The Role of Ih in Differentiating the Dynamics of the Gastric Mill and Pyloric Neurons in the Stomatogastric Ganglion of the Lobster, Homarus Americanus, Journal of Neurophysiology, 115(5), 2016, 2434-45
J. Lu, J. Yang, Y.-B. Kim, J. Ayers, K.K. Kim
L. Lewis, J. Ayers
J. Ayers, D. Blustein, A. Westphal

SELECTED RESEARCH PROJECTS
Biomimetics of Jellyfish Tentacles
Principal Investigator, Schlumberger Doll, Inc
RoboBees: A Convergence of Body, Brain and Colony
Principal Investigator, National Science Foundation
Modernization and Enhancement of the Seawater System and Research Infrastructure at Northeastern University’s Marine Science Center
Co-Principal Investigator, National Science Foundation
Utilizing Synthetic Biology to Create Programmable Micro-Bio-Robots
Co-Principal Investigator, Office of Naval Research
AMBNIKA BAJPAYEE

Assistant Professor, Bioengineering
PhD, Massachusetts Institute of Technology, 2015
bioe.neu.edu/people/bajpayee-ambika

Scholarship focus: targeted drug delivery to avascular connective tissues; polypeptide and protein based nanocarriers; bio-electrostatics; transport phenomena in biological systems; biomechanics; post-traumatic osteoarthritis

Honors and awards: MIT Post-doc Travel Grant Award; MIT Global Fellow Award; Meredith Kamm Memorial Award for Outstanding Performance, MIT; MIT Graduate Women of Excellence Award

SELECTED PUBLICATIONS
A.G. Bajpayee, M.A. Quadir, P.T. Hammond, A.J. Grodzinsky
Charge Based Intra-Cartilage Delivery of Single Dose Dexamethasone Using Avidin Nano-Carriers Suppresses Cytokine-Induced Catabolism Long Term, Osteoarthritis & Cartilage, 24(1), 2016, 71-81
A.G. Bajpayee, A.M. Sheu, A.J. Grodzinsky, R.M. Porter
A.G. Bajpayee, A.M. Sheu, A.J. Grodzinsky, R.M. Porter
Electrostatic Interactions Enable Rapid Penetration, Enhanced Uptake and Retention of Intra-articular Injected Avidin in Rat Knee Joints, Journal of Orthopaedic Research, 32(8), 2014, 1044-1051
A.G. Bajpayee, C.R. Wong, M.G. Bawendi, E.H. Frank, A.J. Grodzinsky
Avidin as a Model for Charge Driven Transport into Cartilage and Drug Delivery for Treating Early Stage PTOA, Biomaterials, 35(1), 2014, 538-549

STEFANO BASAGNI

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Texas, Dallas, 2001
PhD, University of Milan, Italy, 1998
ece.neu.edu/people/basagni-stefano

Scholarship focus: Wireless networks, ad hoc networks, underwater and terrestrial sensor networking, and protocol design and testing

Honors and awards: Distinguished Scientist of the Association for Computing Machinery

SELECTED PUBLICATIONS
S. Basagni, V. Di Valerio, P. Gjanci, C. Petrioli
M. Girolami, S. Basagni, F. Furfari, S. Chessa
Y. M. Aval, Y. Han, A. Tu, S. Basagni, M. Stojanovic, Y. Fei
S. Basagni, C. Petrioli, D. Spenza
R.G. Cid-Fuentes, M.Y. Naderi, S. Basagni, K.R. Chowdhury, A. Cabellos-Aparicio, E. Alarcon
Reach2-Mote: A Range Extending Passive Wake-up Wireless Sensor Node, ACM Transactions on Sensor Networks 11, 4(64), 2015, 1-64
D. Spenza, M. Magno, S. Basagni, L. Benini, M. Paoli, et al.

SELECTED RESEARCH PROJECTS
Cross Layer Approach to 5G: Models and Protocols
Principal Investigator, MathWorks, Inc.
Development of the Northeastern University Marine Observatory NETwork
Principal Investigator, National Science Foundation
Platforms for Advanced Wireless Research Project Office
Co-Principal Investigator for Platform Implementation, National Science Foundation
CHIARA BELLINI

Assistant Professor, Bioengineering; affiliated faculty, Mechanical and Industrial Engineering
PhD, University of Calgary, 2012
bioe.neu.edu/people/bellini-chiara

Scholarship focus: diseases of the cardiovascular system; effects of cell-mediated growth and remodeling processes on tissue and organ mechanics

SELECTED PUBLICATIONS
M.R. Bersi, C. Bellini, J. Wu, K. Montaniel, D.G. Harrison, J.D. Humphrey Excessive Adventitial Remodeling Leads to Early Aortic Maladaptation in Angiotensin-Induced Hypertension, Hypertension, 67(5), 2016, 890-896
C. Bellini, S. Federico Green-Naghdi Rate of the Kirchhoff Stress and Deformation Rate: the Elasticity Tensor, Zeitschrift fuer Angewandte Mathematik und Physik, 66(3), 2015, 1143-1163

SELECTED RESEARCH PROJECTS
Quantification of Pulmonary and Cardiovascular Structure and Function in Mice Exposed to Cigarettes and E-Cigarette Aerosols
Principal Investigator, Northeastern University

PENNY BEUNING

Associate Professor, Chemistry and Chemical Biology; affiliated faculty, Bioengineering
PhD, University of Minnesota, 2000
bioe.neu.edu/people/beuning-penny

Scholarship focus: chemical biology and biotechnology

Honors and awards: Chemical Research in Toxicology Young Investigator Award, American Chemical Society; National Science Foundation CAREER Award; Cottrell Scholar Award; American Cancer Society Research Scholar Award

SELECTED PUBLICATIONS
L.A. Hawver, M. Tehrani, N. Antczak, D. Kania, S. Muser, J. Sefickova, P.J. Beuning Point Mutations in Escherichia coli DNA pol V that Confer Resistance to Non-Cognate DNA Damage also Alter Protein-protein Interactions, Mutation Research—Fundamental and Molecular Mechanisms of Mutagenesis, 780, 2015, 1-14
K.R. Chaurasiya, C. Ruslie, M.C. Silva, L. Voortman, P. Nevin, S. Lone, P.J. Beuning, M.C. Williams Polymerase Manager Protein UmuD Directly Regulates E. coli DNA Polymerase III Binding to ssDNA, Nucleic Acids Research, 41, 2013, 8959-8968

SELECTED RESEARCH PROJECTS
Molecular Mechanisms of Polymerase Management
Principal Investigator, National Science Foundation
Distal Residues in Enzyme Catalysis and Protein Design
Co-Principal Investigator, National Science Foundation
DANA BROOKS
Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Northeastern University, 1991
ece.neu.edu/people/brooks-dana

Scholarship focus: Biomedical signal and image processing, medical imaging, statistical signal processing, inverse problems, electrocardiography, bio-optical imaging, magnetic resonance imaging, transcranial neuromodulation, estimation of protein conformations from x-ray scattering, regularization, and optimization

Honors and awards: Søren Buus Outstanding Research Award, College of Engineering; Outstanding Mentor Award, College of Engineering

SELECTED PUBLICATIONS
Optimization of Focality and Direction in Dense Electrode Array Transcranial Direct Current Stimulation (tDCS), Journal of Neural Engineering, 13(3), 2016, 36020-36033
Extensions to a Manifold Learning Framework for Time-Series Analysis on Dynamic Manifolds in Bioelectric Signals, Physical Review E, 93, 2016, 042218
Constrained Maximum Likelihood Estimation of Relative Abundances of Protein Conformation in a Heterogeneous Mixture from Small Angle X-Ray Scattering Intensity Measurements, IEEE Transactions on Signal Processing, 63(20), 2015, 5383-5394
S. Kurugol, K. Kose, B. Park, J.G Dy, D.H. Brooks, M. Rajadhyaksha
B. Erem, J. Coll-Font, R. Martinez-Orellana, P. Stovich, D. Brooks

SELECTED RESEARCH PROJECTS
Center for Integrative Biomedical Computing
- Principal Investigator, National Institutes of Health
Automated Image Guidance for Diagnosing Skin Cancer with Confocal Microscopy
- Co-Investigator, National Institutes of Health
Collaborative Research: US-German Research Proposal Optimization of Human Cortical Stimulation
- Principal Investigator, National Science Foundation

AHMED BUSNAINA
William Lincoln Smith and University Distinguished Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering, Electrical and Computer Engineering
PhD, Oklahoma State University, 1983
mie.neu.edu/people/busnaina-ahmed

Scholarship focus: nanomanufacturing, nano and microscale printing of sensors and electronics, nano and micro control, particulate and chemical defects in semiconductor manufacturing, high rate nanomanufacturing, NEMS devices and nanomaterials based nanoelectronics

Honors and awards: Fellow, American Society of Mechanical Engineers; Fellow, the Adhesion Society; Fulbright Senior Scholar, Outstanding Translational Research Award, Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS
C. Yilmaz, A. Sirman, A. Halder, A. Busnaina
High-Rate Assembly of Nanomaterials on Insulating Surfaces Using Electro-Fluidic Directed Assembly, ACS Nano, 11(8), 2017, 7679-7689
C. Yilmaz, C. Sarisozen, V. Torchilin, A. Busnaina
Novel Nanoprinting for Oral Delivery of Poorly Soluble Drugs, Methodist DeBakey Cardiovascular Journal, 12(3), 2016, 157-162
High-rate Nanoscale Offset Printing Process Using Directed Assembly and Transfer of Nanomaterials, Advanced Materials, 27, 2015, 1759-1766
C. Yilmaz, A.E. Cetin, G. Goutzamanidis, J. Huang, S. Somu, H. Altug, D. Wei, A. Busnaina
Three-Dimensional Crystalline and Homogeneous Metallic Nanostructures Using Directed-Assembly of Nanoparticles, ACS Nano, 8(5), 2014, 4547-4558
A High-performance H2S Detection by Redox Reactions in Semiconducting Carbon Nanotube-Based Devices, Analyst, 138(23), 2013, 7206-7211

SELECTED RESEARCH PROJECTS
Advanced Manufacturing Cluster for Smart Sensors and Materials
- Principal Investigator, Massachusetts Technology Collaborative
Novel Nanoprinting for Oral Delivery of Poorly Soluble Drugs
- Principal Investigator, National Science Foundation
Fabrication of Mechanical Metamaterials
- Principal Investigator, Draper Laboratories
Development Work Regarding Biomarker Sensor Systems, Sensor Fabrication and Carbon Nanotube Material Optimization
- Principal Investigator, Nano-Bio Manufacturing Consortium
OCTAVIA CAMPS

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Washington, 1992
ece.neu.edu/people/camps-octavia

Scholarship focus: robust computer vision; image processing; and machine learning

SELECTED PUBLICATIONS

From the Lab to the Real World: Re-Identification in an Airport Camera Network, IEEE Transactions on Circuits and Systems for Video Technology, 27(3), 2017, 540-553

M. Gou, S. Karanam, W. Liu, O. Camps, R.J. Radke
A Large-Scale Multi-Camera Person Re-Identification Dataset, Workshop on Target Re-Identification and Multi-Target Camera Tracking in Conjunction with Computer Vision and Pattern Recognition, 2017

X. Zhang, Y. Wang, M. Sznaier, O. Camps
Efficient Temporal Sequence Comparison and Classification Using Gram Matrix Embeddings on a Riemannian Manifold, IEEE Conference on Computer Vision and Pattern Recognition, 2016, 4498-4507

Y. Wang, O. Camps, M. Sznaier, B. Roig Solvas
Jensen Bregman LogDet Divergence Optimal Filtering in the Manifold of Positive Definite Matrices, 9911, 2016, 221-235

Person Re-Identification in Appearance Impaired Scenarios, British Machine Vision Conference, 2016

C. Dicle, B. Yilmaz, O. Camps, M. Sznaier
Solving Temporal Puzzles, IEEE Conference on Computer Vision and Pattern Recognition, 2016, 5896-5905

Y. Cheng, Y. Wang, M. Sznaier, O. Camps
Subspace Clustering with Priors via Sparse Quadratically Constrained Quadratic Programming, IEEE Conference on Computer Vision and Pattern Recognition, 2016, 5204-5212

SELECTED RESEARCH PROJECTS

Dynamic Invariants for Video Scenes Understanding
Principal Investigator, National Science Foundation

Robust Identification of a Class of Structured Systems with High Dimensional Outputs and Applications
Co-Principal Investigator, National Science Foundation

REBECCA L. CARRIER

Professor and Associate Chair of Research, Chemical Engineering; affiliated faculty, Bioengineering

PhD, Massachusetts Institute of Technology, 2000
che.neu.edu/people/carrier-rebecca

Scholarship focus: interaction between biological systems and materials, with specific applications in drug delivery and regenerative medicine; intestinal and retinal engineering; oral lipid systems

Honors and awards: College of Engineering Faculty Fellow; National Academy of Engineering Frontiers of Engineering and Frontiers of Engineering Education, Selected Attendee; National Science Foundation CAREER Award

SELECTED PUBLICATIONS

Complex, Multi-Scale Small Intestinal Topography Replicated in Cellular Growth Substrates Fabricated via Chemical Vapor Deposition of Parylene C, Biofabrication, 8(3), 2016, 035011

J. Kundu, A. Michaelson, K. Talbot, P. Baranov, M.J. Young, R.L. Carrier

O. Rezhdo, L. Speciner, R.L. Carrier

Food-Associated Stimuli Enhance Barrier Properties of Gastrointestinal Mucus, Biomaterials, 54, 2015, 1-8

H.M. Yildiz, T.L. Carlson, A.M. Goldstein, R.L. Carrier
Mucus Barriers to Microparticles and Microbes are Altered in Hirschsprung's Disease, Macromol Biosci, 5(5), 2015, 712-718

Altered Goblet Cell Differentiation and Surface Mucus Properties in Hirschsprung Disease, PLoS ONE, 9(6), 2014, e99944

P. Baranov, A. Michaelson, J. Kundu, R.L. Carrier, M. Young

SELECTED RESEARCH PROJECTS

GuMi: New In Vitro Platforms to Parse the Human Gut Epithelial-Microbiome-Immune Axis
Principal Investigator, National Institutes of Health

Uncovering Regeneration-Permissive Cues in Lower Vertebrate Retina to Inform Retinal Regenerative Medicine
Principal Investigator, National Science Foundation
PAUL CHAMPION

Professor, Physics; affiliated faculty, Bioengineering
PhD, University of Illinois at Urbana Champaign
bioe.neu.edu/people/champion-paul

Scholarship focus: experimental biological physics; inelastic light scattering; ultrafast pump-probe laser spectroscopy

Honors and awards: NIH Career Development Award; Fellow of the American Physical Society; Fellow, American Association for Advancement of Science; International Advisory Board: Japan Ministry of Education, Culture, Sports, Science and Technology; Board of Directors Telluride Science Research Center (2006-2008); Advisory Board NSF Frontier Center: University of Michigan; National Research Service Award; Fellow, Japanese Society for the Promotion of Science; NSF/CNRS Exchange Fellow; Divisional Editor Physical Review Letters (1994-2000); Visiting Fellow, Institute of Molecular Science (Japan); Editorial Board Journal of Raman Spectroscopy

SELECTED PUBLICATIONS

B. Salna, A. Benabbas, P. M. Champion

Y. Sun, A. Benabbas, W. Zeng, S. Muralidharan, E.M. Boon, P.M. Champion
Kinetic Control of O₂ Reactivity in H-NOX Domains, Journal of Physical Chemistry B, 120, 2016, 5351-5358

B. Salna, A. Benabbas, J.T. Sage, J. van Thor, P.M. Champion

A. Benabbas, B. Salna, J.T. Sage, P.M. Champion
Deep Proton Tunneling in the Electronically Adiabatic and Non-adiabatic Limits: Comparison of the Quantum and Classical Treatment of Donor-Acceptor Motion, Journal of Chemical Physics, 142, 2015, 114101

V. Karunakaran, Y. Sun, A. Benabbas, P.M. Champion

Y. Sun, A. Benabbas, W. Zeng, J.G. Kleingardner, K.L. Bren, P.M. Champion
Investigations of Heme Distortion, Low-Frequency Vibrational Excitations, and Electron Transfer in Cytochrome c, Proceedings of the National Academy of Sciences, 111, 2014, 6570-6575

SELECTED RESEARCH PROJECTS

Femtosecond Stimulated Raman Scattering, Time Resolved Dynamics, and Electron-Nuclear Coupling in Biomolecules
Principal Investigator, National Science Foundation

SAMUEL CHUNG

Assistant Professor, Bioengineering
PhD, Harvard University, 2009
bioe.neu.edu/people/chung-samuel

Scholarship focus: central nervous system regeneration model in C. elegans, femtosecond laser surgery; user-friendly and low-cost fluorescence microscopy

Honors and awards: Harvard GSAS Merit Fellowship, Newport Spectra-Physics Research Excellence Award

SELECTED PUBLICATIONS


Neuronal Regeneration in C. elegans Requires Subcellular Calcium Release by Ryanodine Receptor Channels and Can Be Enhanced by Optogenetic Stimulation, Journal of Neuroscience, 34, 2014, 15947-15956

S.H. Chung, A. Schmalz, R.C.H. Ruiz, C.V. Gabel, E. Mazur
Femtosecond Laser Ablation Reveals Antagonistic Sensory and Neuroendocrine Signaling that Underlie C. elegans Behavior and Development, Cell Reports, 4, 2013, 316-326

S.H. Chung, L. Sun, C.V. Gabel

S.H. Chung, E. Mazur
Surgical Applications of Femtosecond Lasers, Journal of Biophotonics, 2, 2009, 557-572

SELECTED RESEARCH PROJECTS

Transcriptomic, Genetic, and Optogenetic Analysis of a Novel High-Throughput Model for Lesion-Conditioned Regeneration
Principal Investigator, Morton Cure Paralysis
HEATHER CLARK

Professor, Bioengineering; joint appointment in College of Science; affiliated faculty, Chemical Engineering

PhD, University of Michigan, 1999
bioe.neu.edu/people/clark-heather

Scholarship focus: optical nanosensors for biological analysis

SELECTED PUBLICATIONS

G. Rong, S. Corrie, H.A. Clark
In Vivo Biosensing: Progress and Perspectives, ACS Sensors, 2(3), 2017, 327-338

Ion-switchable FRET Rates in Ratiometric Nanocrystal Potassium Sensors, ACS Nano, 10(4), 2016, 4020-4030

W. Di, R.S. Czarny, N.A. Fletcher, M.D. Krebs, H.A. Clark
Comparative Study of Poly(epsilon-caprolactone) and Poly(Lactic-co-Glycolic Acid)-Based Nanofiber Scaffolds for pH-Sensing, Pharmaceutical Research, 2016

A. Sahari, T.T. Ruckh, R. Hutchings, H.A. Clark
Development of an Ultra-Selective Optical Nanosensor for Potassium Imaging, Analytical Chemistry, 87(21), 2015, 10684-10687

Enzyme Linked DNA Dendrimers for the Detection of Acetylcholine, Nature Scientific Reports, 2015

J.M. Morales, C.G. Skipwith, H.A. Clark
Quadruplex Integrated DNA (QuID) Nanosensors for Monitoring Dopamine, Sensors, 15(8), 2015, 19912-19924

K.J. Cash, C. Li, L.V. Wang, H.A. Clark
Photoacoustic Imaging of Nanosensors for Therapeutic Drugs, In Vivo, ACS Nano, 9(2), 2015, 1692-1698

M.K. Balaconis, Y. Luo, H.A. Clark
Glucose-Sensitive Nanofiber Scaffolds Prevent Sensor Diffusion, In Vivo, Analyst, 140, 2015, 716-723 *selected as a HOT article

SELECTED RESEARCH PROJECTS

Polymer-Free Nanosensors to Visualize Biochemical Dynamics in Dendritic Spines
Principal Investigator, National Institutes of Health

ERIN J. CRAM

Professor, Biology; affiliated faculty, Bioengineering
PhD, University of California, Berkeley, 2000
bioe.neu.edu/people/cram-erin

Scholarship focus: cell migration and mechanotransduction in C. elegans; improving production of drug compounds by medicinal plants

SELECTED PUBLICATIONS

A.C. Wirshing, E.J. Cram
Myosin Activity Drives Actomyosin Bundle Formation and Organization in Contractile Cells of the C. elegans Spermatheca, Molecular Biology of the Cell, 28(14), 2017, 1815-1818

A.D. Cecchetelli, J. Hugunin, H. Tannoury, E.J. Cram
CACN-1 is Required in the C. elegans Somatic Gonad for Proper Oocyte Development, Developmental Biology, 414(1), 2016, 58-71

N.F. Rizvi, J. Weaver, E.J. Cram, C.W.T Lee-Parsons
Silencing the Transcriptional Repressor, ZCT1, Illustrates the Tight Regulation of Terpenoid Indole Alkaloid Biosynthesis, PLoS One, 11(7), 2016

M.F. Doherty, G. Adelmant, A.D. Cecchetelli, J.A. Marto, E.J. Cram
Proteomic Analysis Reveals CACN-1 is a Component of the Spliceosome in C. elegans, Genes, Genomes and Genetics: G3, 2014

I. Kovacevic, J.M. Orozco, E.J. Cram
Filamin and Phospholipase C Epsilon are Required for Calcium Signaling in the C. elegans Spermatheca, PLOS Genetics,10, 2013, 1371

SELECTED RESEARCH PROJECTS

In Vivo Analysis of Mechanotransduction
Principal Investigator, National Institutes of Health
Zinc Finger Transcription Factors: Regulators of Growth, Development, and Alkaloid Biosynthesis
Co-Principal Investigator, National Science Foundation
GUOHAO DAI

Associate Professor, Bioengineering
PhD, Harvard—MIT Health Science and Technology, 2001
bioe.neu.edu/people/dai-guohao

Scholarship focus: 3-D bioprinting technology, stem cells technology and vascular bioengineering

Honors and awards: NSF Faculty Early CAREER Award; Rising Star Award, Biomedical Engineering Society Cellular and Molecular Bioengineering; American Heart Association National Scientist Development Award

SELECTED PUBLICATIONS

Endothelial Myocyte Enhancer Factor 2c Inhibits Migration of Smooth Muscle Cells Through Fenestrations in the Internal Elastic Lamina, Arteriosclerosis, Thrombosis, and Vascular Biology, 37(7), 2017, 1380-1390

T.B. Dorsey, A. Grath, A. Wang, C. Xu, Y. Hong, G. Dai
Evaluation of Photochemistry Reaction Kinetics to Pattern Bioactive Proteins on Hydrogels for Biological Applications, Bioactive Materials, 5, 2017

Factors Released from Endothelial Cells Exposed to Flow Impact Adhesion, Proliferation, and Fate Choice in the Adult Neural Stem Cell Lineage, Stem Cells and Development, 2017

SELECTED RESEARCH PROJECTS

Differentiation Arterial and Venous Endothelial Cells from Embryonic Stem Cells
Principal Investigator, National Institutes of Health

CAREER: Engineer a Functional 3-D Vascular Niche to Support Neural Stem Cell Self-Renewal
Principal Investigator, National Science Foundation

Elastic Printable Biomaterials for 3-D Bioprinting of Vascular Conduit
Principal Investigator, National Institutes of Health

Transcriptional Regulation of Arterial Venous Differentiation
Principal Investigator, American Heart Association

JACK DENNERLEIN

Professor, Physical Therapy, Movement, and Rehabilitation Sciences; affiliated faculty, Bioengineering
PhD, University of California, Berkeley, 1996
bioe.neu.edu/people/dennerlein-jack

Scholarship focus: musculoskeletal disorders; work place injury prevention and health; occupational biomechanics

SELECTED PUBLICATIONS

Assessment of Whole Body Vibration Exposure in Heavy Equipment Mining Vehicles, Annals of Work Exposures and Health, 61(6), 2017, 669-680

M.Y. Lin, A. Babir, J.T. Dennerlein
Evaluating Biomechanics of User-Selected Sitting and Standing Computer Workstation, Applied Ergonomics, 2017

Lifting and Exertion Injuries Decrease After Implementation of an Integrated Hospital-Wide Safe Patient Handling and Mobilization Program, Occupational & Environmental Medicine, 74(5), 2017, 336-343

SELECTED RESEARCH PROJECTS

Development and Evaluation of Contractor Safety Pre-Qualification Tool
Principal Investigator, National Institute for Occupational Safety and Health

Enhancing Safety Climate Through Leadership
Principal Investigator, National Institute for Occupational Safety and Health

Randomized Controlled Trial of a Whole Body Vibration Intervention in Truck Drivers
Principal Investigator, National Institute for Occupational Safety and Health
JENNIFER DY

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Purdue University, 2001
ece.neu.edu/people/dy-jennifer

Scholarship focus: machine learning; data mining; statistical pattern recognition; computer vision and image processing

Honors and awards: National Science Foundation CAREER Award

SELECTED PUBLICATIONS

S.M. Brown, A. Webb, R.S. Mangoubi, J.G. Dy
A Sparse Combined Regression-Classification Formulation for Learning a Physiological Alternative to Clinical Post-Traumatic Stress Disorder Scores, Twenty-Ninth AAAI Conference on Artificial Intelligence, 2015

J. Ross, P. Castaldi, M. Cho, J.G. Dy
Dual Beta Process Priors for Latent Cluster Discovery in Chronic Obstructive Pulmonary Disease, ACM SIGKDD Knowledge Discovery and Data Mining, 2014

D. Niu, J.G. Dy, M.I. Jordan
Iterative Discovery of Multiple Alternative Clustering Views, IEEE Transactions on Pattern Analysis and Machine Intelligence, 36(7), 2014, 1340-1353

Y. Yan, R. Rosales, G. Fung, J.G. Dy
Active Learning from Crowds, Proceedings of the 28th International Conference on Machine Learning (ICML), 2011, 1161-1168

Y. Guan, J.G. Dy, M.I. Jordan

M. Masaeli, G. Fung, J.G. Dy
From Transformation-Based Dimensionality Reduction to Feature Selection, Proceedings of the 27th International Conference on Machine Learning (ICML), 2010, 751-758

Modeling Annotator Expertise: Learning When Everybody Knows a Bit of Something, Proceedings of the Thirteenth International Conference on Artificial Intelligence and Statistics (AISTATS), 9, 2010, 932-939

SELECTED RESEARCH PROJECTS

Automated Image Guidance for Diagnosing Skin Cancer With Confocal Microscopy
Principal Investigator, National Institutes of Health

Genetic Epidemiology of COPD
Co-Principal Investigator, National Institutes of Health

Spatio-Temporal Extremes and Associations Marine Adaptation and Survivorship under Climate Change and Rising Ocean Temperatures
Principal Investigator, National Science Foundation

CHARLES DIMARZIO

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering, Mechanical and Industrial Engineering
PhD, Northeastern University, 1996
ece.neu.edu/people/dimarzio-charles

Scholarship focus: optics, microscopy, coherent detection, interaction of light and sound waves, hyperspectral imaging, diffusive optical tomography and ultrasound, landmine detection, magneto-optic sensors, multi-model imaging, and activities include: computer modeling, designing, building and testing of hardware, and processing the resulting data

SELECTED PUBLICATIONS

J.L. Hollmann, R. Horstmeyer, C. Yang, C.A DiMarzio

J.L. Hollmann, R. Horstmeyer, C. Yang, C.A. DiMarzio

Z. Lai, J. Kerimo, Y. Mega, C.A. DiMarzio
Stepwise Multiphoton Activation Fluorescence Reveals a New Method of Melanin Detection, Journal of Biomedical Optics, 18(6), 2013, 061225

Z.R. Hoffman, C. DiMarzio

SELECTED RESEARCH PROJECTS

Coded-Illumination Fourier Ptychography for High-Content Multimodal Imaging
Principal Investigator, National Science Foundation
ENO EBONG
Assistant Professor, Chemical Engineering
affiliated faculty, Bioengineering
PhD, Rensselaer Polytechnic Institute, 2006
che.neu.edu/people/ebong-eno

Scholarship focus: studying the means by which endothelial cell mechanotransduction occurs in order to prevent or promote atherosclerosis

Honors and awards: National Institutes of Health Career Development Award; Gordon Research Conference Board of Trustees Carl Storm Underrepresented Minority Fellowship

SELECTED PUBLICATIONS
Fluid Shear Stress Induces Upregulation of COX-2 and PGI(2) Release in Endothelial Cells via a Pathway Involving PECAM-1, PI3K, FAK, and p38, American Journal of Physiology- Heart and Circulatory Physiology, 312(3), 2017, 485-500
Targeted Delivery of Shear Stress-Inducible Micrornas by Nanoparticles to Prevent Vulnerable Atherosclerotic Lesions, Methodist Debeakey Cardiovascular Journal, 12(3), 2016, 152-156
Endothelial Glyocalyx, Apoptosis and Inflammation in an Atherosclerotic Mouse Model, Atherosclerosis, 252, 2016, 136-146
M.J. Cheng, R. Kumar, S. Sridhar, T.J. Webster, E.E. Ebong
Shear-Induced Endothelial NOS Activation and Remodeling via Heparin Sulfate, Glypican-1, and Syndecan-1, Integrative Biology: Quantitative Biosciences from Nano to Macro, 6(3), 2014, 338-347
M. Thi, E. Ebong, D. Spray, S. Suadicani
E. Ebong, N. Depaola

SELECTED RESEARCH PROJECTS
Atheroprotective vs Atherogenic Glyocalyx Mechanotransduction Mechanisms
Principal Investigator, National Institutes of Health

ADAM EKENSEAIR
Assistant Professor, Chemical Engineering
affiliated faculty, Bioengineering
PhD, University of Texas at Austin, 2010
che.neu.edu/people/ekenseair-adam

Scholarship focus: synthesis and application of novel polymeric biomaterials for tissue engineering and regenerative medicine

SELECTED PUBLICATIONS
O.M. Pehlivaner Kara, A.K. Ekenseair
Free Epoxide Content Mediates Encapsulated Cell Viability and Activity through Protein Interactions in a Thermoresponsive, In Situ Forming Hydrogel, Biomacromolecules, 18(5), 2017, 1473-1481
O.M. Pehlivaner Kara, A.K. Ekenseair
In Vitro and In Vivo Evaluation of Self-Mineralization and Biocompatibility of Injectable, Dual-Gelling Hydrogels for Bone Tissue Engineering, Journal of Controlled Release, 205, 2015, 25-35
A.K. Ekenseair, F.K. Kasper, A.G. Mikos
Structure-Property Evaluation of Thermally and Chemically Gelling Injectable Hydrogels for Tissue Engineering, Biomacromolecules, 13, 2012, 2821-2830

SELECTED RESEARCH PROJECTS
Biomanufactured Nerve Guidance Channels for Complex Nerve Repair
Co-Principal Investigator, Northeastern University
Injectable, Multifunctional Polymeric Nanocomposites for Osteochondral Tissue Repair
Principal Investigator, Northeastern University
Solid Supported Lipase Inhibitors for the Treatment of Acute Pancreatitis
Co-Principal Investigator, Northeastern University
DENIZ ERDOGMUS
Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Florida, 2002
ece.neu.edu/people/erdogmus-deniz

Scholarship focus: brain computer interfaces, cognitive and interactive systems, nonlinear and statistical signal processing, information theory, and machine learning

Honors and awards: National Science Foundation CAREER Award; Søren Buus Outstanding Research Award, College of Engineering; College of Engineering Faculty Fellow

SELECTED PUBLICATIONS
Brain Computer Interface with Language Model EEG Fusion for Locked-in Syndrome, Neurorehabilitation and Neural Repair, 28(4), 2014, 387-394
A. Fowler, B. Roark, U. Orhan, D. Erdogmus, M. Fried-Oken
Improved Inference and Autotyping in EEG-based BCI Typing Systems, ASSETS 2013, Bellevue, WA, Oct 2013
H. Nezamfar, U. Orhan, S. Purwar, K. Hild, B. Oken, D. Erdogmus
Decoding of Multichannel EEG Activity from the Visual Cortex in Response to Pseudorandom Binary Sequences of Visual Stimuli, International Journal of Imaging Systems and Technology, 21(2), 2011, 139-147
Y. Huang, D. Erdogmus, M. Pavel, S. Mathan, K.E. Hild II
D. Erdogmus

SELECTED RESEARCH PROJECTS
CAREER: Signal Models, Channel Capacity, and Information Rate for Noninvasive Brain Interfaces
Principal Investigator, National Science Foundation
Automated Classification of Retinopathy of Prematurity using Machine Learning
Investigator, National Institutes of Health
Strengthening Human Adaptive Reasoning and Problem Solving (SHARP)
Co-Principal Investigator, Intelligence Advanced Research Projects Activity
The Rehabilitation Engineering Research Center on Augmentative and Alternative Communication
Co-Principal Investigator, U.S. Department of Education

QIANQIAN FANG
Assistant Professor, Bioengineering
PhD, Dartmouth College, 2005
bioe.neu.edu/people/fang-qianqian

Scholarship focus: innovations in translational medical imaging devices to better diagnose cancers, low-cost point-of-care diagnostic tools to delivery life-saving medicines to the resource-poor regions, and high performance computing tools to facilitate the development of the next-generation imaging methods

Honors and awards: Leading Innovation in Reimagining Global Health, Innovation Countdown 2030 Initiative

SELECTED PUBLICATIONS
R. Yao, X. Intes, Q. Fang
Generalized Mesh-Based Monte Carlo for Wide-Field Illumination and Detection Via Mesh Retessellation, Biomedical Optics Express, 7(1), 2016, 171-184
Characterization of Structural-Prior Guided Optical Tomography Using Realistic Breast Models Derived from Dual-Energy X-Ray Mammography, Biomedical Optics Express, 6(7), 2015, 2366-2379
Combined Optical and Tomosynthesis Breast Imaging, Radiology, 258(1), 2011, 89-97 *cover article
Q. Fang
Mesh-Based Monte Carlo Method Using Fast Ray-Tracing in Plücker Coordinates, Biomedical Optics Express, 1(1), 2010, 165-175 *top-downloaded paper

SELECTED RESEARCH PROJECTS
A Versatile High-Performance Optical Mammography Co-Imager
Principal Investigator, National Institutes of Health
GPU-Accelerated Monte Carlo Photon Transport Simulation Platform
Principal Investigator, National Institutes of Health
Non-contact Mobile Oximeter for Rapid Birth Asphyxia and Childhood Pneumonia Assessment
Principal Investigator, US Agency for International Development
EDGAR GOLUCH
Associate Professor, Chemical Engineering; affiliated faculty, Bioengineering, Civil and Environmental Engineering
PhD, University of Illinois, 2007
che.neu.edu/people/goluch-edgar

Scholarship focus: detection of biomolecules at the nanoscale, specifically inside micro and nanofluidic channels. This is applied to a broad range of scientific fields including: biophysics, micro and systems biology, ecology, environmental sensing, and analytical instrumentation

SELECTED PUBLICATIONS
H.J. Sismaet, A.J. Pinto, E.D. Goluch
Electrochemical Sensors for Identifying Pyocyanin Production in Clinical Pseudomonas Aeruginosa Isolates, Biosensors and Bioelectronics, 97, 2017, 65–69
T.A. Webster, H.J. Sismaet, I.J. Chan, E.D. Goluch
Electrochemically Monitoring the Antibiotic Susceptibility of Pseudomonas aeruginosa Biofilms, Analyst, 140, 2015, 7195-7201
P.N. Abadian, N. Yildirim, A.Z. Gu, E.D. Goluch
SPRi-Based Adenovirus Detection Using a Surrogate Antibody Method, Biosensors and Bioelectronics, 74, 2015, 808-814
K. Mathwig, T. Albrecht, E.D. Goluch, L. Rassaei
Challenges of Biomarker Detection at the Nanoscale: Nanopores and Microelectrodes, Analytical Chemistry, 87, 2015, 5470-5475
T.A. Webster, H.J. Sismaet, A.F. Sattler, E.D. Goluch
Improved Monitoring of P. aeruginosina on Agar Plates, Analytical Methods, 7, 2015, 7150-7155 * emerging investigator themed issue
P.N. Abadian, E.D. Goluch
Using Surface Plasmon Resonance Imaging (SPRI) to Evaluate Bacterial Adhesion on Surface Coatings, Analytical Methods, 7, 2015, 115-122, * featured as a hot article in Analytical Methods

SELECTED RESEARCH PROJECTS
EAGER: Bio-Inspired Electrochemical Sensing of Small Molecules Using Antibodies
Principal Investigator, National Science Foundation
IDBR: TYPE A Nano-Constriction Devices for Isolation and Cultivation of Environmental Microbes
Principal Investigator, National Science Foundation

ANDREW GOULDSTONE
Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering, Chemical Engineering
PhD, Massachusetts Institute of Technology, 2001
mie.neu.edu/people/gouldstone-andrew

Scholarship focus: biomechanics; material science; engineering mechanics

Honors and awards: College of Engineering Faculty Fellow; National Science Foundation CAREER Award

SELECTED PUBLICATIONS
C.T. Nguyen, H.M. Gonnermann, Y. Chen, A. Gouldstone
Film Drainage and the Lifetime of Bubbles, Geochemistry Geophysics Geosystems, 14(9), 2013, 3616-3631
J.H. Kim, A. Gouldstone, C.S. Korach
Analysis of Spherical Indentation of an Elastic Bilayer Using a Modified Perturbation Approach, MEMS and Nanotechnology, 4, 2011, 53-57
B. Choi, Y. Wu, S. Sampath, A. Gouldstone
Modified Indentation Techniques to Probe Inelasticity in Ni5%Al Coatings from Different Processes, Journal of Thermal Spray Technology, 18(1), 2009, 65-74
L.H. Weng, A. Gouldstone, Y.H. Wu, W.L. Chen
Mechanically Strong Double Network Photocrosslinked Hydrogels from N,N-Dimethylacrylamide and Glycidyl Methacrylated Hyaluronan, Biomaterials, 29(14), 2008, 2153-2163

SELECTED RESEARCH PROJECTS
GARDE: An Interdisciplinary Approach to Accommodate Fine Motor Control Disorders
Co-Principal Investigator, National Science Foundation
APRIL GU

COE Professor and Faculty Scholar, Civil and Environmental Engineering; affiliated faculty, Bioengineering, Marine and Environmental Sciences

PhD, University of Washington, 2003
civ.neu.edu/people/gu-april

Scholarship focus: application of biotechnology for water quality improvement; biological treatment processes and bioremediation; ecotoxicology and toxicity assessment; biosensors for water quality monitoring

Honors and awards: Fellow, Water Environment Federation; College of Engineering Faculty Fellow; National Science Foundation CAREER Award; National Science Foundation Education BRIDGE Award; Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

J. Lan, N. Gou, S. Rahman, C. Gao, M. He, A. Gu
A Quantitative Toxicogenomics Assay for High-Throughput and Mechanistic Genotoxicity Assessment and Screening of Environmental Pollutants, Environmental Science and Technology, 50(6), 2016, 3202-3214

S. Rahman, M. Eckelman, A. Onnis-Hayden, A. Gu
Life Cycle Assessment of Advanced Nutrient Removal Technologies for Wastewater Treatment, Environmental Science and Technology, 50(6), 2016, 3020-3030

D. Li, S. Zeng, M. He, A. Gu
Water Disinfection Byproducts Select for Antibiotic Resistance-Role of Environmental Pollutants in Resistance Phenomena, Environmental Science and Technology, 50(6), 2016, 3193-3201

Y. Li, X. Wang, A. Onnis-Hayden, K.-T. Wan, A. Gu
Universal Quantifier Derived from AFM Analysis Links Cellular Mechanical Properties and Cell-Surface Integration Forces with Microbial Deposition and Transport Behavior, Environmental Science and Technology, 48(3), 2014, 1769-1778

N. Yildirim, F. Long, C. Gao, M. He, H.C. Shi, A. Gu
Aptamer-Based Optical Biosensor for Rapid and Sensitive Detection of 17 β-Estradiol in Water Samples, Environmental Science and Technology, 46(6), 2012, 3288-3294

SELECTED RESEARCH PROJECTS

CRECE-Center for Research on Early Childhood Exposure and Development in Puerto Rico
- Project Principal Investigator, National Institute of Environmental Health Sciences
- Exploring Analysis of Environment and Health Through Multiple Alternative Clustering
  - Co-Principal Investigator, National Science Foundation
- PROTECT-The Puerto Rico Testsite for Exploring Contamination Threats Program
  - Co-Principal Investigator, National Institute of Environmental Health Sciences
- Mechanistic and Predictive Genotoxicity Assessment of Nanomaterials
  - Principal Investigator, National Science Foundation

ROBERT HANSON

Professor, Medicinal Chemistry; affiliated faculty, Bioengineering

PhD, University of California, Berkeley, 1973
bioe.neu.edu/people/hanson-robert

Scholarship focus: bioorganic and medicinal chemistry

Honors and awards: Fellow, National Science Foundation; Fellow, National Institutes of Health

SELECTED PUBLICATIONS

R.N. Hanson, P. Tongcharoensirikul, K. Barnesley, M.J. Ondrechen, A. Hughes, E.R. DeSombre

P.T. Weiser, C.-Y. Chang, D.P. McDonnell, R.N. Hanson
Synthesis and Preliminary Evaluation of 4,4’-Unsymmetrically Substituted 3,3’ Biphenyls as Alpha Helical Proteomimetics, Bioorganic and Medicinal Chemistry, 22, 2014, 917-926

E.B. Corcoran, R.N. Hanson
Imaging EGFR and HER2 by PET and SPECT: A Review, Medicinal Research Reviews, 34(3), 2013, 596-643

SELECTED RESEARCH PROJECTS

CaNCURE: Cancer Nanomedicine Co-ops for Undergraduate Research Experiences
- Co-Principal Investigator, National Institutes of Health
- Combinatorial-Designed Nano-Platforms to Overcome Tumor Drug Resistance
- Co-Principal Investigator, National Institutes of Health
FERDI HELLWEGER

Associate Professor, Civil and Environmental Engineering; affiliated faculty, Bioengineering, Marine and Environmental Sciences
ScD, Columbia University, 2004
civ.neu.edu/people/hellweger-ferdinand

Scholarship focus: surface water quality, microbial ecology and systems bioecology (the combination of systems biology and systems ecology)

Honors and awards: Environmental Merit Award, U.S. Environmental Protection Agency

SELECTED PUBLICATIONS

F.L. Hellweger
75 Years Since Monod: It is Time to Increase the Complexity of Our Predictive Ecosystem Models (opinion), Ecological Modelling, 346, 2017, 77-87
F.L. Hellweger, R.J. Clegg, J. Clark, C.M. Plugge, J.-U. Kreft
Advancing Microbial Research by Simulation: Technologies for Individual-based Modelling, Nature Reviews Microbiology, 14, 2016, 461-471
F.L. Hellweger, N.D. Fredrick, M.J. McCarthy, W.S. Gardner, S. Wilhelm, H.W. Paerl
Dynamic, Mechanistic, Molecular-Level Modeling of Cyanobacteria: *Anabaena* and Nitrogen Interaction, Environmental Microbiology, 18(8), 2016, 2721-2731
Ocean Currents Distort Temperature Selection of Plankton: Insights from an Individual-Based Model, PLoS ONE, 11(12), 2016, e0167010
F.L. Hellweger
100 Years Since Streeter and Phelps: It is Time to Update the Biology in Our Water Quality Models, Environmental Science and Technology, 49(11), 2015, 6372-6373
F.L. Hellweger, N. Fredrick, J.A. Berges
Age-correlated Stress Resistance Improves Fitness of Yeast: Support from Agent-Based Simulations, BMC Systems Biology, 8(18), 2014, 1-10
F.L. Hellweger, E. van Sebille, N.D. Fredrick
Biogeographic Patterns in Ocean Microbes Emerge in a Neutral Agent-Based Model, Science, 345(6202), 2014, 1346-1349

SELECTED RESEARCH PROJECTS

Charles River Swimming Water Quality Monitoring and Assessment
Principal Investigator, Charles River Conservancy
Development of a Next Generation Model for Predicting Cyanobacterial Toxicity: Integrating Molecular, Cellular, and Environmental Dynamics
Principal Investigator, Environmental Protection Agency/Sceince To Achieve Results

NADER JALILI

Professor and Associate Chair for Graduate Studies and Research, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
PhD, University of Connecticut, 1998
mie.neu.edu/people/jalili-nader

Scholarship focus: piezoelectric-based actuators and sensors, dynamic modeling and vibration control of distributed-parameters systems, dynamics and control of MEMS and NEMS sensors and actuators, control and manipulation at the nanoscale

Honors and awards: Fellow, American Society of Mechanical Engineers; National Science Foundation CAREER Award; Northeastern University Excellence in Teaching Award; College of Engineering Translational Research Award; College of Engineering Martin Essigman Outstanding Teaching Award

SELECTED PUBLICATIONS

M. Khabiry, N. Jalili
S. Faegh, N. Jalili, S. Sridhar
S. Faegh, N. Jalili, S. Sridhar
S. Eslami, N. Jalili
Model Development and Boundary Interaction Force Control of A Piezoresistive-based Microcantilever, Robotica, 2014, 1-19
S. Faegh, N. Jalili
Comprehensive Distributed-paramaters Modeling and Experimental Validation of Microcantilever-based Biosensor with Application to Ultrasound Biological Species Detection, Journal of Micromechanics and Microengineering, 23(2), 2013, 025007
N. Jalili

SELECTED RESEARCH PROJECTS

High Temperature and High Acceleration End-effector Pads for Semiconductor Applications – Phases I-III: Carbon Nanotube (CNT)-Based Surface Treatment for Improved Adhesion and Friction Properties
Principal Investigator, Brooks Automation Inc.
Robotic Leg Advancement Device
Principal Investigator, National Science Foundation
The Gear Bearing Drive: A Novel Compact Actuator for Robotic Joints
Principal Investigator, National Science Foundation
DAVID KAELI

COE Distinguished Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering, Computer and Information Science
PhD, Rutgers University, 1992
ece.neu.edu/people/kaeli-david

Scholarship focus: computer architecture; GPUs; heterogeneous computing; performance analysis; security and information assurance; hardware reliability and recovery; Big Data analytics; workload characterization

Honors and awards: Fellow, Institute of Electrical and Electronics Engineers; Distinguished Scientist, Associate of Computing Machinery; Distinguish Professor, Heterogeneous Systems Architecture Foundation; National Science Foundation CAREER Award

SELECTED PUBLICATIONS
A. Jadidi, M. Arjomand, M. Tavana, D. Kaeli, M. Kandemir, C. Das
Exploring the Potential for Collaborative Data Compression and Hard-Error Tolerance in Resistive Memories, 47th IEEE/IFIP International Conference on Dependable Systems and Networks, 2017
X. Gong, Z. Chen, A. K. Ziabari, R. Ubal, David Kaeli
Z.-H. Jiang, Y. Fei, D. Kaeli

SELECTED RESEARCH PROJECTS
Engineering Strong, Highly Conductive Nanotube Fibers via Fusion
Co-Principal Investigator, National Science Foundation
Exploring Analysis of Environment and Health Through Multiple Alternative Clustering
Co-Principal Investigator, National Science Foundation
Leveraging Intra-Chip/Inter-chip Silicon Photonic Networks for Designing Next-Generation Accelerators
Principal Investigator, National Science Foundation
Multi-Agent Modeling Framework for Mitigating Distributed Disruptions in Critical Supply Chains
Co-Principal Investigator, National Science Foundation
Puerto Rico Testsite for Exploring Environmental Contamination Threats
Co-Principal Investigator, National Institutes of Environmental Health Sciences
Side-Channel Analysis and Resiliency Targeting Accelerators
Principal Investigator, National Science Foundation and Semiconductor Research Corporation

ALAIN KARMA

Professor, Physics; affiliated faculty, Bioengineering
PhD, University of California at Santa Barbara, 1985
coe.neu.edu/people/karma-alain

Scholarship focus: computational modeling of cardiac arrhythmia mechanisms from cellular to organ scales including systems biology approaches

Honors and awards: Fellow of the American Physical Society, Northeastern University Robert D. Klein Lecturer, College of Arts and Sciences Distinguished Professor, Northeastern University

SELECTED PUBLICATIONS
Z. Song, A. Karma, J.N. Weiss, Z. Qu
Long-lasting Sparks: Multi-Metastability and Release Competition in the Calcium Release Unit Network, Speech Communication, 12(1), 2016, e1004671
Hyperphosphorylation of RyRs Underlies Triggered Activity in Transgenic Rabbit Model of LQT2 Syndrome, Circulation Research, 115(11), 2014, 919-928
P.S. Skardal, A. Karma, J.G. Restrepo
Spatiotemporal Dynamics of Calcium-Driven Cardiac Alternans, Physical Review E, 89(5), 2014, 052707
A. Karma
Physics of Cardiac Arrhythmogenesis, Annual Review of Condensed Matter Physics, 4, 2013, 313-337
Good Enough Solutions and the Genetics of Complex Diseases, Circulation Research, 111, 2012, 493-504

SELECTED RESEARCH PROJECTS
Systems Approach to Unraveling the Genetic Basis of Heart Failure
Principal Investigator, National Institutes of Health
A Multi-Scale Approach to Cardiac Arrhythmia: from the Molecule to the Organ
Co-Principal Investigator, National Institutes of Health
YING-YEE KONG
Associate Professor, Speech Language Pathology and Audiology; affiliated faculty, Bioengineering
PhD, University of California, Irvine, 2004
bioe.neu.edu/people/kong-ying-yee

Scholarship focus: auditory perception in hearing-impaired and cochlear-implant listeners

SELECTED PUBLICATIONS
Y.-Y. Kong, A. Mullangi, K. Kokkinakis
Classification of Fricative Consonants for Speech Enhancement in Hearing Devices, PLOS One, 9(4), 2014, e95001
R.W. Schlosser, Howard C. Shane, Ying-Yee Kong, et al.
Effects of Environmental Sounds on the Guessability of Animated Graphic Symbols, Augmentative and Alternative Communication, 30(4), 2014, 298-313
T. Lee, S. Yu, M. Yuan, T. Wong, Y.-Y. Kong
The Effect of Enhancing Temporal Periodicity Cues on Cantonese Tone Recognition by Cochlear Implantees, International Journal of Audiology, 53(8), 2014, 546-557
Y.-Y. Kong, A. Mullangi
Using a Vocoder-Based Frequency-Lowering Method and Spectral Enhancement to Improve Place-of-Articulation Perception for Hearing-impaired Listeners, Ear and Hearing, 34, 2013, 300-312
Y.-Y. Kong, A. Mullangi

SELECTED RESEARCH PROJECTS
Hearing Acuity Cognitive Aging and Memory for Speech
Principal Investigator, National Institutes of Health
Speech Perception with Combined Electric and Acoustic Stimulation
Principal Investigator, National Institutes of Health

CAROLYN LEE-PARSONS
Associate Professor, Chemical Engineering; jointly appointed, Chemistry; affiliated faculty, Bioengineering
PhD, Cornell University, 1995
che.neu.edu/people/lee-parsons-carolyn

Scholarship focus: production of valuable pharmaceutical compounds from plant cell cultures, specifically the production of important anti-cancer drug molecules from cell cultures of Catharanthus roseus

Honors and awards: National Science Foundation CAREER Award; College of Engineering Outstanding Teaching Award

SELECTED PUBLICATIONS
L. Kirchner, A. Wirshing, L. Kurt, T. Reinard, J. Glick, E.J. Cram, H.-J. Jacobsen, C.W.T. Lee-Parsons
Identification, Characterization, and Expression of Diacylglycerol Acyltransferase Type-1 from Chlorella vulgaris, Algal Research, 13, 2016, 167-181
N.F. Rizvi, J. Weaver, E.J. Cramp, C.W.T. Lee-Parsons
Silencing the Transcriptional Repressor, ZCT1, Illustrates the Tight Regulation of Terpenoid Indole Alkaloid Biosynthesis, PLoS ONE, 11(7), 2016, e0159712
N. Rizvi, M. Cornejo, K. Stein, J. Weaver, E.J. Cram, C.W.T. Lee-Parsons
An Efficient Transformation Method for Estrogen-inducible Transgene Expression in Catharanthus roseus Hairy Roots, Plant Cell, Tissue and Organ Culture (PCTOC), 120(2), 2015, 475-487
J. Weaver, S. Goklany, N. Rizvi, E.J. Cramp, C.W.T. Lee-Parsons
Optimizing the Transient Fast Agro-mediated Seedling Transformation (FAST) Method in Catharanthus roseus Seedlings, Plant Cell Reports, 33(1), 2014, 89-97
S. Goklany, N. Rizvi, R.H. Loring, E.J. Cramp, C.W.T. Lee-Parsons
Jasmonate-dependent Alkaloid Biosynthesis in Catharanthus roseus is Correlated with the Relative Expression of Orca and Zct Transcription Factors, Biotechnology Progress, 29(6), 2013, 1367-1376
N. Rizvi, S. Goklany, E.J. Cram, C.W.T. Lee-Parsons
Rapid Increases of Key Regulators Precede the Increased Production of Pharmaceutically Valuable Compounds in Catharanthus roseus, Pharmaceutical Engineering, 33(6), 2013, 1-8

SELECTED RESEARCH PROJECTS
Zinc Finger (ZCT) Transcription Factors: Pivotal Regulators of Growth, Development, and Alkaloid Biosynthesis in Catharanthus roseus
Principal Investigator, National Science Foundation
MIRIAM LEESER

Professor and Interim Chair, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Cambridge University, 1988
ece.neu.edu/people/leeser-miriam

Scholarship focus: accelerators for compute intensive applications: reconfigurable hardware and graphics processing units (GPUs); applications including biocomputing, machine learning, software-defined radio; uses and implementations of computer arithmetic

SELECTED PUBLICATIONS

Cardiac MRI Compressed Sensing Image Reconstruction with a Graphics Processing Unit, International Symposium on Medical Information and Communication Technology (ISMICT), 2016

High-Level System Design of IEEE 802.11b Standard-Compliant Link Layer for MATLAB-Based SDR, IEEE Access, 4, 2016, 149-1509

B. Drozdenko, M. Zimmermann, T. Dao, K. Chowdhury, M. Leeser
Modeling Considerations for the Hardware-Software Co-design of Flexible Modern Wireless Transceivers, 22nd International Conference on Field Programmable Logic and Applications (FPL), 2016

X. Fang, M. Leeser

N. Moore, M. Leeser, L. Smith King
Kernel Specialization Provides Adaptable GPU Code for Particle Image Velocimetry, IEEE Transactions on Parallel and Distributed Systems, 26(4), 2015, 1049-1058

M. Leeser, S. Mukherjee, J. Brock
Fast Reconstruction of 3D Volumes from 2D CT Projection Data with GPUs, Biomed Central Research Notes, 7(528), 2014

X. Wang, M. Leeser
VFloat: A Variable Precision Fixed and Floating-Point Library for Reconfigurable Hardware, ACM Transactions on Reconfigurable Technology and Systems, 3(3), 2010, 1-34

X. Wang, M. Leeser

SELECTED RESEARCH PROJECTS

Ensuring Reliability and Portability of Scientific Software for Heterogeneous Architectures
Co-Principal Investigator, National Science Foundation

Hardware/Software Implementations of WiFi and LTE Communications
Principal Investigator, Mathworks

DANIELLE LEVAC

Assistant Professor, Physical Therapy, Movement and Rehabilitation Science; affiliated faculty, Bioengineering

PhD, McMaster University, 2012
bioe.neu.edu/people/levac-danielle

Scholarship focus: virtual reality; video games; motor learning; rehabilitation; physical therapy; cerebral palsy; stroke; knowledge translation

SELECTED PUBLICATIONS

D. Levac, H. Sveistrup, M. Levin, A. McCormack, M. Brien, R. Mills

Development and Reliability Evaluation of the Movement Rating Instrument for Virtual Reality Video Game Play, JMIR Serious Games, 4(1), 2016

C. Dematteo, M. Rubinoff, D. Greenspoon, D. Levac
Evaluating the Contribution of the Nintendo Wii in Assessing Return to Activity Readiness in Youth With Mild Traumatic Brain Injury, Physical and Occupational Therapy in Pediatrics, 34(3), 2014, 229-244

D. Levac, P. Miller
Integrating Virtual Reality Video Games into Therapy: Clinician’s Experiences, Physiotherapy Theory Practice, 29(7), 2013, 504-512

D. Levac, C. Missiuna, L. Wishart, C. DeMatteo, V. Wright

D. Levac, J. Galvin
When is Virtual Reality ‘Therapy’?, Archives of Physical Medicine and Rehabilitation, 94(4), 2013, 795-798

SELECTED RESEARCH PROJECTS

Influence of Virtual Environment Complexity on Motor Learning in Children with Cerebral Palsy: Implications for Virtual Reality Use in Rehabilitation
Principal Investigator, Tufts CTSI Pilot Grant

Is Motor Learning Enhanced by Practice in a Virtual Environment for Children with Cerebral Palsy?
Principal Investigator, Charles H. Hood Foundation

Usability Evaluation of the FitBoard: A Motivating, Movement-based Rehabilitation Tool for Children with Disabilities
Principal Investigator, Deborah C. Noonan Memorial Research Fund
**SELECTED PUBLICATIONS**


*ATP Depletion is Associated with Antibiotic Tolerance in Staphylococcus aureus*, *Nature Microbiology*, 1, 2016, 1-7


*HipAB–promoter Structures Reveal the Basis of Heritable Multidrug Tolerance*, *Nature*, 524, 2015, 59-64

*Lassomycin, a Ribosomally Synthesized Peptide, Kills Mycobacterium Tuberculosis by Targeting the ATP-dependent Protease ClpC1P1P2*, *Chemistry and Biology*, 21, 2014, 509-518

B.P. Conlon, E.S. Nakayasu, L.E. Fleck, M.D. LaFleur, V.M. Isabella, K. Coleman, S.N. Leonard, R.D. Smith, J.N. Adkins, K. Lewis


K. Lewis


I. Keren, Y. Wu, J. Innocencio, L. Mulcahy, K. Lewis


**SELECTED RESEARCH PROJECTS**

The Mechanism of Persister Cell Drug Tolerance
Principal Investigator, National Institutes of Health

Uncultured Bacteria in Drug Discovery and the Human Microbiome

**Honors and awards:** National Science Foundation CAREER Award

**SELECTED PUBLICATIONS**

M. Yu, Y. Lin, J. Breugelmans, X. Wang, G. Gao, X. Tang

*A Spatial-Temporal Trajectory Clustering Algorithm for Eye Fixations Identification*, *International Journal of Intelligent Data Analysis*, 20(2), 2016, 377-393

P. Wan, C. Wu, Y. Lin, X. Ma, Z. Huang

*A Recognition Model of Driving Anger Based on Belief Rule Base, Transportation Systems Engineering and Information*, 15(6), 2015, 1-8

M. Yu, Y. Lin, X. Wang, D. Schmidt, Y. Wang


S. Radhakrishnan, Y. Lin, A. Zeid, S. Kamarthi


H. Cai, Y. Lin


Y. Lin


G. Yang, Y. Lin, P. Bhattacharya

*A Driver Fatigue Recognition Model Based on Information Fixation and Dynamic Bayesian Network, Information Sciences, 180, 2010, 1942-1954

**SELECTED RESEARCH PROJECTS**

CAREER: Bridging Cognitive Science and Sensor Technology: Nonintrusive and Multimodality Sensing in Human Machine Interactions
Principal Investigator, National Science Foundation

Integrated Individualized Modeling towards Cognitive Control of Human-Machine Systems
Principal Investigator, National Science Foundation
CAROL LIVERMORE
Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering, Electrical and Computer Engineering
PhD, Harvard University, 1998
mie.neu.edu/people/livermore-clifford-carol

Scholarship focus: MEMS-enabled systems for assistive technologies, energy harvesting, and microscale vacuum systems, tissue engineering via origami folding, carbon nanomaterials

Honors and awards: College of Engineering Faculty Fellow; National Science Foundation CAREER Award

SELECTED PUBLICATIONS
X. Xie, C. Livermore

C. Yang, X. Xie, S. Liu, C. Livermore

Yang, C., S. Liu, X. Xie, C. Livermore
Compact, Planar, Translational Piezoelectric Bimorph Actuator with Archimedes’ Spiral Actuating Tethers, Journal of Micromechanics and Microengineering, 26(2), 2016,124005

S. Liu, C. Martin, D. Lashmore, M. Schauer, C. Livermore

N.S. Shaar, G. Barbastathis, C. Livermore

T. Liu, R. St. Pierre, C. Livermore
Passively-Switched Energy Harvester for IncreasedOperational Range, Smart Materials and Structures, 23(9), 2014, e095045

X. Xie, Y. Zaitsev, L.F. Velásquez-García, S. Teller, C. Livermore
Scalable, MEMS-enabled, Vibrational Tactile Actuators for High Resolution Tactile Displays, Journal of Micromechanics and Microengineering, 24(12), 2014, 125014

SELECTED RESEARCH PROJECTS
DMREF: Engineering Strong, Highly Conductive Nanotube Fibers Via Fusion
Co-Principal Investigator, National Science Foundation

EFRI-ODISSEI: Origami and Assembly Techniques for Human-Tissue-Engineering (OATH)
Principal Investigator, National Science Foundation

LEE MAKOWSKI
Professor and Chair, Bioengineering; jointly appointed, Chemistry and Chemical Biology; affiliated faculty, Electrical and Computer Engineering
PhD, Massachusetts Institute of Technology, 1976
bio.e.neu.edu/people/makowski-lee

Scholarship focus: image and signal processing as applied to biophysical data designed to answer fundamental questions about the molecular basis of living systems

SELECTED PUBLICATIONS
P.S. Rushton, A.T. Olek, L. Makowski, J. Badger, C.N. Steussy, N.C. Carpita, C.V. Stauffacher
Rice Cellulose SynthaseA8 Plant-Conserved Region is an Anti-Parallel Coiled-Coil Located at the Catalytic Core Entrance, Plant Physiology, 173, 2017, 482-494

J. Liu, I. Costantino, N. Venugopalan, R.F. Fischetti, B.T. Hyman, M.P. Frosch, T. Gomez-Isla, L. Makowski
Amyloid Structure Exhibits Polymorphism on Multiple Length Scales in Human Brain Tissue, Science Reports, 6, 2016, 33079

J. Badger, P. Grover, S.B. Panjarian, J.R. Engen, T.E. Smithgall, L. Makowski
The c-Abl Tyrosine Kinase Adopts Multiple Active Conformational States in Solution, 55, Biochemistry, 2016, 3251-3260

Y. Zhang, H. Inouye, M. Crowley, L. Yu, D. Kaeli, L. Makowski
Diffraction Pattern Simulation of Cellulose Fibrous Molecules Using Distributed and Quantized Pair-Distances, Journal of Applied Crystallography, 49, 2016, 2244-2248

SELECTED RESEARCH PROJECTS
Center for Direct Catalytic Conversion of Biomass to BioFuels (C3Bio)
Co-Investigator, Department of Energy

An Integrated Process for Identifying Lead Compounds for “Non-Druggable” Targets using Biophysical Screening, X-ray Solution Scattering and Singlecrystal Diffraction
Principal Investigator, Zenobia Therapeutics, Inc.
EDWIN MARENGO

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Northeastern University, 1997
ece.neu.edu/people/marengo-fuentes-edwin

Scholarship focus: theoretical and applied electromagnetics, theoretical and applied optics, scattering theory, wave inverse problems, noniterative inverse scattering, physics-based signal processing and imaging, change detection theory and applications, compressive sensing, electromagnetic information theory, analysis and design of optical and quantum holographic detectors

Honors and awards: National Science Foundation CAREER Award

SELECTED PUBLICATIONS
J. Tu, E.A. Marengo
E.A. Marengo, J. Tu
E.A. Marengo, J. Tu
Optical Theorem Detectors for Active Scatterers, Waves in Random and Complex Media, 25, 2015, 682-707
E.A. Marengo
E.A. Marengo
E.A. Marengo, J. Tu
E.A. Marengo

NICOL MCGRUER

Professor, Electrical and Computer Engineering; affiliated faculty, Mechanical and Industrial Engineering, Bioengineering
PhD, Michigan State University, 1983
ece.neu.edu/people/mcgruer-nicol

Scholarship focus: MEMS, NEMS, RF MEMS; nanotechnology; micro/nanofabrication; microsystems; microrelay; nanoswitch; microspectrometer; microfluidics; organic FETs, organic solar cells

Honors and awards: Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS
Simulation of Dielectrophoretic Assembly of Carbon Nanotubes Using 3D Finite Element Analysis, Nanotechnology, 26(15), 2015, 155602
A. Basu, R.P. Hennessy, G.G. Adams, N.E. McGruer
Y.-C. Wu, N. McGruer, G.G. Adams
Hot-switched Lifetime and Damage Characteristics of MEMS Switch Contacts, Journal of Micromechanics and Microengineering, 23, 2013
H. Pan, Y.-C. Wu, G.G. Adams, G.P. Miller, N. McGruer
P. Ryan, Y.-C. Wu, S. Somu, G. Adams, N. McGruer

SELECTED RESEARCH PROJECTS
PLASMID (Plasmonic Microelectromechanical Infrared Digitizer), Zero-Power Sensor
Co-Principal Investigator, Defense Advanced Research Projects Agency
Zero Power Sensors (ZePS), RF Wake-up
Co-Principal Investigator, Defense Advanced Research Projects Agency
WALEED MELEIS
Associate Professor and Associate Chair, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Michigan, 1996
ece.neu.edu/people/meleis-waleed

Scholarship focus: combinatorial optimization; algorithm design and analysis; scheduling; large-scale machine learning; parallel computing

Honors and awards: COE Fostering Engineering Innovation in Education Award; Black Engineering Student Society Professor Appreciation Award; Represented Northeastern at the National Academy of Engineering’s Frontiers of Engineering Education Symposium; College of Engineering Outstanding Teacher Award; Martin W. Essigmann Outstanding Teaching Award, College of Engineering;Eta Kappa Nu Professor of the Year Award; Center for Innovative Course Design Teaching Award, EdTech

SELECTED PUBLICATIONS
W. Li, F. Zhou, W. Meleis, K. Chowdhury
Dynamic Generalization Kanerva Coding in Reinforcement Learning for TCP Congestion Control Design, Proceedings of the 16th International Conference on Autonomous Agents and Multiagent Systems, Sao Paolo, Brazil, 2017

J. Radford, A. Pliny, A. Reichelmann, B. Keegan, B. Welles,

L. Hayward, S. Ventura, M. Mahanna, W. Meleis

C. Wu, W. Li, W. Meleis,

J. Radford, B. Keegan, J. Huye, C. Karbeyaz, K. Ognyanova, B. Foucault Welles, W. Meleis, D. Lazer
Conducting Massively Open Online Social Experiments with Volunteer Science, International AAAI Conference on Web and Social Media, 2015

Detecting Solid Masses in Phantom Breast Using Mechanical Indentation, Experimental Mechanics, 54(6), 2014, 935-942

J. Tai, J. Zhang, J. Li, W. Meleis, N. Mi

HOSSEIN MOSALLAEI
Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of California, Los Angeles, 2001
ece.neu.edu/people/mosallaei-hossein

Scholarship focus: electromagnetics and optics, quantum systems, nanoscale materials and metamaterials, nanoantennas, THz-IR Devices, multiscale computation and mathematical-numerical models

SELECTED PUBLICATIONS
S. Jafar-Zanjani, M.M. Salary, H. Mosallaei
Metafabrics for Thermoregulation and Energy-Harvesting Applications, ACS Photonics, 4(4), 2017, 915-927

A. Forouzmand, H. Mosallaei
Real-Time Controllable and Multi-Functional Metasurfaces Utilizing Indium Tin Oxide Materials: A phased Array Prospective, IEEE Transactions on Nanotechnology, 16(2), 2017, 296-306

A. Forouzmand, H. Mosallaei

M.M. Salary, A. Forouzmand, H. Mosallaei
Model Order Reduction of Large-Scale Metasurfaces Using a Hierarchical Dipole Approximation, ACS Photonics, 4(1), 2016, 63-75

J. Cheng, H. Mosallaei
Truly Achromatic Optical Metasurfaces: A Filter Circuit Theory Based-Design, JOSA B, 32(10), 2015, 2115-2121

J. Cheng, D. Ansari, H. Mosallaei
Wave Manipulation with Designer Dielectric Metasurfaces, Optics Lett, 39(21), 2014, 6285-6288

SELECTED RESEARCH PROJECTS
Designer Solids Nanoantennas and Material
Principal Investigator, Air Force Office of Scientific Research
SİNAN MÜFTÜ
Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering, Civil and Environmental Engineering
PhD, University of Rochester, 1994
mie.neu.edu/people/muftu-sinan

Scholarship focus: mechanics and tribology of axially moving materials, webs; numerical simulation of tissue healing and bone remodeling; high velocity impact of micron scale particles

Honors and awards: Fellow, American Society of Mechanical Engineers; Søren Buus Outstanding Research Award, College of Engineering; Martin W. Essigman Outstanding Teaching Award, College of Engineering

SELECTED PUBLICATIONS
B. Yıldırım, H. Yang, A. Gouldstone, S. Müftü

T. Kaşıkçı, M.-C. Weng, A. Nayak, T. Goker, S. Müftü
Contact Mechanics of a Thin, Tensioned, Translating Tape with a Grooved Roller, Journal of Tribology, 2017

Dynamics and Extreme Plasticity of Metallic Microparticles in Supersonic Collisions, Nature Scientific Reports, 2017

Q. Sheng, A.J. White, S. Müftü
Indentation of Polytetrafluoroethylene (PTFE) Thin-Film: Simulations by Using Continuum Damage Mechanics, Tribology Transactions, 60(1), 2017, 114-120

H. Yang, J.B.C. Engelen, W.A. Haberle, M. Lantz, S. Müftü

Q. Chen, F.C. Meral, S. Müftü, M. Akcakaya, K. Tuncali

SELECTED RESEARCH PROJECTS
Collaborative Research: Mechano-Lipidomics and Mechano-Cytosis of Drug Delivery Liposomes
Co-Principal Investigator, National Science Foundation

Improving Theoretical Models of Advanced Tape Transport Systems
Principal Investigator, Oracle Corporation

Multi-Scale Investigations of Particle Impact in Cold-Spray Technical Point of Contact, Army Research Laboratory

SANJEEV MUKERJEE
College of Science Distinguished Professor, Chemistry and Chemical Biology; affiliated faculty, Bioengineering, Chemical Engineering
PhD, Texas A&M University, 1994
bioe.neu.edu/people/mukerjee-sanjeev

Scholarship focus: physical/materials chemistry

SELECTED PUBLICATIONS

Charge-Transfer Effects in Ni−Fe and Ni−Fe−Co Mixed-Metal Oxides for the Alkaline Oxygen Evolution Reaction, ACS Catalysis, 6, 2016, 155-161

Circumventing Metal Dissolution Induced Degradation of Pt-Alloy Catalysts in Proton Exchange Membrane Fuel Cells: Revealing the Asymmetric Volcano Nature of Redox Catalysis, ACS Catalysis, 6, 2016, 928-938

E. Bayram, G. Yilmaz, S. Mukerjee
A Solution-Based Procedure for Synthesis of Nitrogen Doped Graphene as an Efficient Electrocatalyst for Oxygen Reduction Reactions in Acidic and Alkaline Electrolytes, Applied Catalysis B: Environmental, 192, 2016, 26-34

SELECTED RESEARCH PROJECTS
Innovative Non-PGM Catalysts for CH P Relevant Proton Conducting Membranes
Principal Investigator, US Department of Energy

Solid Acid Fuel Cell Stack for Distributed Generation Applications
Co-Principal Investigator, Advanced Research Projects Agency-Energy

Precious Metal Free Regenerative Hydrogen Electrode
Co-Principal Investigator, Advanced Research Projects Agency-Energy
SHASHI MURTHY

Professor, Chemical Engineering; Director, Sherman Center; affiliated faculty, Bioengineering, Mechanical and Industrial Engineering

PhD, Massachusetts Institute of Technology, 2003
che.neu.edu/people/murthy-shashi

Scholarship focus: microfluidic isolation of stem and progenitor cells, point-of-care diagnostics, cell surface phenomena during microfluidic flow, nanoscale probes for cell stimulation, and biopassive/bioactive coatings for neurological implants

Honors and awards: Fellow, American Institute for Medical and Biological Engineering; College of Engineering Faculty Fellow; National Science Foundation CAREER Award; Soren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

Effects of Early Adolescent Environmental Enrichment on Cognitive Dysfunction, Prefrontal Cortex Development, and Inflammatory Cytokines After Early Life Stress, Developmental Psychobiology, 2016, 58, 482-491

Galectin-3 and Aldosterone as Potential Tandem Biomarkers in Pulmonary Arterial Hypertension, Heart, 102, 2016, 390-396
Editor’s Choice

D. Bavli, E. Ezra, D. Kitsberg, M. Vosk-Artzi, S.K. Murthy, Y. Nahmias
One Step Antibody-Mediated Isolation and Patterning of Multiple Cell Types in Microfluidic Devices, Biomicrofluidics, 10, 2016, 024112

D.I. Walsh, S.K. Murthy, A. Russom

SELECTED RESEARCH PROJECTS

Automated Patient-Specific Dendritic Cell Generation for Transciptomics-Drive Vaccinology
Principal Investigator, National Institutes of Health

Cleavable Surface Coatings for Microfluidic Devices
Principal Investigator, US-Israel Binational Science Foundation

EAGER: Biomanufacturing: Development of a Quantitative Framework of Directed Stem Cell Differentiation in Scalable Bioreactors
Co-Principal Investigator, National Science Foundation

Testing and Characterization of Endovascular Shunt Prototypes
Principal Investigator, CereVasc, LLC

UICHIRO NARUSAWA

Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
PhD, University of Michigan, 1972
mie.neu.edu/people/narusawa-uichiro

Scholarship focus: biomechanics on respiratory systems; turbine blade cooling

SELECTED PUBLICATIONS

F. Forghan, O. Askari, U. Narusawa, H. Metghalchi
Computational Design of Turbine Blade Film Cooling with Expanded Exit Holes, Proceedings of ASME Turbo Expo, 2015

M. Nabian, U. Narusawa

F. Forghan, O. Askari, U. Narusawa, H. Metghalchi

F. Forghan, U. Narusawa, H. Metghalchi
Discharge Coefficient of an Expanded Exit Hole for Film Cooling of Turbine Blades, American Institute of Aeronautics and Astronautics Journal of Propulsion Power, 26, 2010, 1322-1325

H. Liu, P.R. Patil, U. Narusawa

R. Amini, K. Creeden, U. Narusawa

H. Liu, U. Narusawa
HAMD NAYEB-HASHEMI

Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
PhD, Massachusetts Institute of Technology, 1982
mie.neu.edu/people/nayeb-hashemi-hamid

Scholarship focus: biomechanics and mechanics

Honors and awards: Fellow, American Society of Mechanical Engineers

SELECTED PUBLICATIONS

A. Orsi, S. Chakravarthy, P. Canavan, E. Pena, R. Goebel, A. Vaziri, H. Nayeb-Hashemi

Hierarchical Analysis and Multi-Scale Modelling of Rat Cortical and Trabecular Bone, Journal of the Royal Society Interface, 2015

In Situ Strengthening of Thin-Wall Structures Using Pressurized Foam, Construction and Building Materials, 100, 2015, 298-304

Buckling of Regular, Chiral and Hierarchical Honeycombs Under a General Macroscopic Stress State, Proceedings of The Royal Society A, 470(2167), 2014, 1-23


SELECTED RESEARCH PROJECTS

High-Performance Biodegradable Composites from Qatari Date Palm Waste
Principal Investigator, National Priorities Research Program

Knee Injury Prevention and Osteoarthritis Risk in Obesity
Co-Principal Investigator, National Priorities Research Program

Novel Multi Functional Composite Sandwich Panel
Principal Investigator, National Priorities Research Program

MARK NIEDRE

Associate Professor Bioengineering
PhD, University of Toronto, 2004
ece.neu.edu/people/niedre-mark

Scholarship focus: biomedical optics and non-invasive imaging, rare cell detection and tracking in the body, ultrafast time-domain diffuse optical imaging, image reconstruction and biomedical signal processing

Honors and awards: College of Engineering Faculty Fellow; Massachusetts Life Sciences Center New Investigator Award; Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

V. Pera, X. Tan, J. Runnels, N. Sardesai, C.P. Lin, M. Niedre
Diffuse Fluorescence Fiber Probe for In Vivo Detection of Circulating Cells, Journal of Biomedical Optics, 22(3), 2017, 037004

Y. Mu, V. Pera, M. Niedre
Multiplexed Fluorescence Mediated Tomography with Temporal and Spectral Data, Journal of Biomedical Optics, 21(10), 2016, 105001

S. Markovic, S. Li, M. Niedre

V. Pera, D.H. Brooks, M. Niedre

S. Markovic, B. Li, V. Pera, M. Sznaiter, O. Camps, M. Niedre
A Computer Vision Approach to RareCell In Vivo Flow Cytometry, Cytometry A, 83A, 2013, 1113-1123

An Improved Prototype Diffuse Fluorescence Flow Cytometer for High Sensitivity Detection of Rare Circulating Cells In Vivo, Journal of Biomedical Optics, 18(7), 2013, 77002

Y. Mu, N. Valim, M. Niedre

N. Valim, J. Brock, M. Leeser, M. Niedre
The Effect of Temporal Impulse Response on Experimental Reduction of Photon Scatter in Time-Resolved Diffuse Optical Tomography, Physics in Medicine and Biology, 58(2), 2013, 335-349

SELECTED RESEARCH PROJECTS

High Resolution Multiplexed Fluorescence Tomography
Principal Investigator, National Institutes of Health

Ultra-Rare Cell In Vivo Flow Cytometry
Principal Investigator, National Institutes of Health
JESSICA OAKES
Assistant Professor, Bioengineering
PhD, University of San Diego, 2013
bioe.neu.edu/people/oakes-jessica

Scholarship focus: Pulmonary physiology, biofluids and transport phenomenon, computational biomechanics, magnetic resonance imaging, multi-scale modeling

SELECTED PUBLICATIONS
J.M. Oakes, P. Hofemeier, I.E. Vignon-Clementel, J. Sznitman
Aerosols in Healthy and Emphysematous In Silico Pulmonary Acinar Rat Models, Journal of Biomechanics, 49(11), 2016, 2213-2220
J.M. Oakes, A.L. Marsden, C. Grandmont, D. Darquenne, I.E. Vignon-Clementel
Distribution of Aerosolized Particles in Healthy and Emphysematous Rat Lungs: Comparison Between Experimental and Numerical Studies, Journal of Biomechanics, 48(6), 2015, 1147-1157
J.M. Oakes, E. Breen, M. Scadeng, G.S. Tchantchou, C. Darquenne
MRI-Based Measurements of Aerosol Deposition in the Lung of Healthy and Elastase-Treated Rats, Journal of Applied Physiology, 116(12), 2014, 1561-1568
Airflow and Particle Deposition Simulations in Health and Emphysema: From In Vivo to In Silico Animal Experiments, Annals of Biomedical Engineering, 42(4), 2014, 899-914
J.M. Oakes, M. Scadeng, E.C. Breen, G. Kim Prisk, C. Darquenne
Regional Distribution of Aerosol Deposition in Rat Lungs Using Magnetic Resonance Imaging, Annals of Biomedical Engineering, 41(5), 2013, 967-978
Rat Airway Morphometry Measured from In Situ MRI-Based Geometric Models, Journal of Applied Physiology, 112(11), 2012, 1921-1931

DONALD O’MALLEY
Associate Professor, Biology; affiliated faculty, Bioengineering
PhD, Harvard, 1989
bioe.neu.edu/people/omalley-donald

Scholarship focus: cellular and systems neurobiology biological imaging, cognitive neurodynamics, neuroethology

SELECTED PUBLICATIONS
D. O’Malley, M. Orger, F. Engert
Neural Control and Modulation of Swimming Speed in the Larval Zebrafish, Neuron, 83(3), 2014, 692-707
Development of Aggressive Phenotypes: Interactions of Age, Experience, and Social Status, Animal Behaviour, 86(2), 2013, 245-252
R.E. Westphal, D.M. O’Malley
Fusion of Locomotor Maneuvers, and Improving Sensory Capabilities, Give Rise to the Flexible Homing Strikes of Juvenile Zebrafish, Front, Neural Circuits, 7(108), 2013, 1-18
N. Sankrithi, D. O’Malley
Activation of a Multisensory, Multifunctional Nucleus in the Zebrafish Midbrain During Diverse Locomotor Behaviors, Neuroscience, 166(3), 2010, 970-993
MARY JO ONDRECHEN
Professor, Chemistry; affiliated faculty, Bioengineering
PhD, Northwestern University, 1978
bioe.neu.edu/people/ondrechen-mary-jo

Scholarship focus: enzyme catalysis; functional genomics; modeling of enzyme substrate interactions; drug discovery; bioinformatics; protein design

SELECTED PUBLICATIONS
Local Structure Based Method for Prediction of the Biochemical Function of Proteins: Application to Glycose Hydrolases, Methods, 93, 2016, 51-63
C.L. Mills, P.J. Beuning, M.J. Ondrechen
Biochemical Functional Predictions for Protein Structures of Unknown or Uncertain Function, Computational and Structural Biotechnology Journal, 13, 2015, 182-191
Prediction of Distal Residue Participation in Enzyme Catalysis, Protein Science, 24(5), 2015, 762-778
R.N. Hanson, P. Tongcharoensirikul, K. Barnsley, M.J. Ondrechen, A. Hughes, E.R. DeSombre

SELECTED RESEARCH PROJECTS
Chemical Signatures for the Discovery of Protein Function Principal Investigator, National Science Foundation
Distal Residues in Enzyme Catalysis and Protein Design Principal Investigator, National Science Foundation
Lighting the Pathway to Faculty Careers for Natives in STEM Co-Principal Investigator, National Science Foundation
Northeastern University Skills and Capacity for Inclusion: Inclusive Excellence Catalyzed by Experiential Education Principal Investigator, Howard Hughes Medical Institute

HARI PARAMESWARAN
Assistant Professor, Bioengineering
PhD, Boston University, 2009
bioe.neu.edu/people/parameswaran-harikrishnan

Scholarship focus: In-situ interactions of organized cellular structures in tissue with their extracellular matrix (ECM); airway smooth muscle-ECM interactions under static and dynamic stretch conditions

SELECTED PUBLICATIONS
Mitochondrial Iron Chelation Ameliorates Cigarette Smoke-Induced Bronchitis and Emphysema in Mice, Nature Medicine 22, 2016, 163-174
B. Suki, H. Parameswaran, J. Imsirovic, E.B. Suki
Regulatory Roles of Fluctuation-Driven Mechanotransduction in Cell Function, Physiology, 31(5), 2016, 346-358
B. Suki, H. Parameswaran
Computational Modeling Helps Uncover Mechanisms Related to the Progression of Emphysema, Drug Discovery Today, 70(27-28), 2014, 4245-4249
H. Parameswaran, K.R. Lutchen, B. Suki
S.R. Polio, H. Parameswaran, E.P. Canovic, D. Stamenovic, M.L. Smith
Topographical Control of Multiple Cell Adhesion Molecules for Traction Force Microscopy, Integrative Biology, 6(3), 2014, 357-365

SELECTED RESEARCH PROJECTS
Advanced Image-Based Approach to Assess How Fibrillar Collagen Modulates Airway Reactivity Principal Investigator, R21 Award, National Institutes of Health/National Heart, Lung, and Blood Institute
Extracellular Determinants of Airway Smooth Muscle Force: A New Paradigm for Sustained Airway Constriction Principal Investigator, R00 Award, National Institutes of Health/National Heart, Lung, and Blood Institute
**RUPAL PATEL**

Professor, Communication Science and Disorders; jointly appointed, College of Computer and Information Science; affiliated faculty, Bioengineering, Electrical and Computer Engineering

PhD, University of Toronto, 2000
ece.neu.edu/people/patel-rupal

**Scholarship focus:** speech sciences; speech motor control in neuromotor speech disorders; multimodal interfaces for assistive communication; personal health informatics

**SELECTED PUBLICATIONS**

RSVP IconMessenger: Icon-Based Brain-Interfaced Alternative and Augmentative Communication, *Brain-Computer Interfaces*, 1(3-4), 2014, 192-203

R. Patel, H. Kember, S. Natale  

T. Mills, H.T. Bunnell, R. Patel  


K. Wiegand, R. Patel  

K. Wiegand, R. Patel  

**SELECTED RESEARCH PROJECTS**

EAGER: Wireless Sensing of Speech Kinematics and Acoustics for Remediation  
Principal Investigator, National Science Foundation

Minimally Verbal ASD: From Basic Mechanisms to Innovative Interventions  
Co-Principal Investigator, National Institutes of Health

Multimodal Speech Translation for Assistive Communication  
Principal Investigator, National Institutes of Health

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**CAREY RAPPAPORT**

COE Distinguished Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Massachusetts Institute of Technology, 1987
ece.neu.edu/people/rappaport-carey

**Scholarship focus:** bioelectromagnetics, microwave tissue imaging, electromagnetic breast cancer detection and treatment, cardiac ablation therapy, microwave assisted balloon angioplasty, catheter-based sensing. Antennas, electromagnetic computation, subsurface sensing and imaging, explosives detection, security system conceptualization and design

**Honors and awards:** Fellow and Distinguished Lecturer, Institute of Electrical and Electronics Engineers; Søren Buus Outstanding Research Award, College of Engineering

**SELECTED PUBLICATIONS**

G. Ghazi, C. Rappaport, J.A. Martinez-Lorenzo  

B. Gonzalez-Valdes, Y. Alvarez, S. Mantzavinos, C.M. Rappaport, F. Las-Heras, J.A. Martinez-Lorenzo  


**SELECTED RESEARCH PROJECTS**

Awareness and Localization of Explosive-Related Threats (ALERT)  
Co-Principal Investigator, Department of Homeland Security

Improved Millimeter Wave Radar AIT Characterization of Concealed Low-Contrast Body-Bourne Threats  
Principal Investigator, Department of Homeland Security
PU RNIMA RATILAL-MAKRIS

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Massachusetts Institute of Technology, 2002
ece.neu.edu/people/ratilal-makris-purnima

Scholarship focus: remote sensing; underwater acoustics; acoustical oceanography; bioacoustics; ultrasound imaging; nonlinear scattering; wave propagation in random media; signal, image and array processing; statistical inference theory

Honors and awards: Presidential Early Career Award for Scientists and Engineers; Office of Naval Research Young Investigator Award

SELECTED PUBLICATIONS

Z. Gong, A.D. Jain, D. Tran, P. Ratilal, et al.
Ecosystem Scale Acoustic Sensing Reveals Humpback Whale Behavior Synchronous with Herring Spawning Processes and Re-Evaluation Finds No Effect of Sonar on Humpback Song Occurrence in the Gulf of Maine in Fall 2006, PLoS ONE, 9(10), 2014, e104733

D. Tran, W. Huang, A. Bohn, D. Wang, N. Makris, P. Ratilal, et al.
Using a Coherent Hydrophone Array for Observing Sperm Whale Range, Classification, and Shallow-water Dive Profiles, The Journal of the Acoustical Society of America, 135(6), 2014, 3352-3363

Z. Gong, D. Tran, P. Ratilal

Z. Gong, T. Chen, P. Ratilal, N. Makris

D. Tran, M. Andrews, P. Ratilal

M. Andrews, Z. Gong, P. Ratilal
Effects of Multiple Scattering, Attenuation and Dispersion in Waveguide Sensing of Fish, Journal of the Acoustical Society of America, 130, 2011, 1253-1271

MATTEO RINALDI

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Pennsylvania, 2010
ece.neu.edu/people/rinaldi-matteo

Scholarship focus: understanding and exploiting the fundamental properties of micro/nanomechanical structures and advanced nanomaterials to engineer new classes of micro and nanoelectromechanical systems (M/NEMS) with unique and enabling features applied to the areas of chemical, physical and biological sensing and low power reconfigurable radio communication systems

Honors and awards: IEEE Sensors Council Early Career Award; National Science Foundation CAREER Award; Defense Advanced Research Projects Agency Young Faculty Award

SELECTED PUBLICATIONS

Z. Qian, S. Kang, V. Rajaram, C. Cassella, N. McGruer, M. Rinaldi
Zero Power Infrared Digitizers Based on Plasmonically-enhanced Micromechanical Photoswitches, Nature Nanotechnology, 2017

C. Cassella, Y. Hui, Z. Qian, G. Hummel, M. Rinaldi

C. Cassella, G. Chen, Z. Qian, G. Hummel, M. Rinaldi

Y. Hui, J. S. Gomez-Diaz, Z. Qian, A. Alu’, M. Rinaldi
Plasmonic Piezoelectric Nanomechanical Resonator for Spectrally Selective Infrared Sensing, Nature Communications, 7, 2016, 11249

Z. Qian, F. Liu, Y. Hui, S. Kar and M. Rinaldi

SELECTED RESEARCH PROJECTS

Microelectromechanical Resonant Circulator (MIRC)
Principal Investigator, DARPA MTO SPAR program

Plasmonic Microelectromechanical Infrared Digitizer (PLASMID)
Principal Investigator, DARPA MTO N-Zero program

Zero Power Sensors (ZePS)
Principal Investigator, DARPA MTO N-Zero program

CAREER: Nano Electro Mechanical Resonant Sensing Platform for Chip Scale, High Resolution and Ultra-fast Terahertz Spectroscopy and Imaging
Principal Investigator, National Science Foundation

Intrinsically Switchable and Programmable MEMS Filter Array
Principal Investigator, Defense Advanced Research Projects Agency
CARMEN SCEPPA
Professor and Associate Dean for Undergraduate Education, Bouve College of Health Sciences; affiliated faculty, Bioengineering
PhD, Tufts University, 1994
MD, Francisco Marroquin University, 1987
bioe.neu.edu/people/sceppa-carmen

Scholarship focus: aging and gerontology; physical activity, exercise, and nutrition science

SELECTED PUBLICATIONS
Physical Activity or Parents and Children Playing Together and the Effects of Varying Structured Activity, Medicine & Science in Sports & Exercise, 49(5S), 2017, 225
I. Todorova, H. Turner, C. Sceppa-Castaneda, D. Young, A. Bonner
“I Do it with Love”: Engagement in Caring for People with Dementia, Global Qualitative Nursing Research, 3, 2016, 1-14
J. Hoffman, C. Wirth, S. Johnson, S. Carter, M. DuBois, C. Cox, C. Castaneda-Sceppa
Engaging Head Start Families in Childhood Obesity Prevention: School-Home Communication about Children’s Height and Weight Screenings, National Head Start Association Dialog, 18, 2015, 92-99
H. Saksono, A. Ranade, G. Kamarthi, C. Castaneda-Sceppa, J. Hoffman, C. Wirth, A. Parker

SELECTED RESEARCH PROJECTS
Boston Area Roybal Center
Co-Principal Investigator, National Institutes of Health
Development of an Exergame for Caregivers of Family Members with Alzheimer’s Disease
Co-Principal Investigator, National Institutes of Health
Modifying the Workplace to Decrease Sedentary Behavior
Co-Investigator, The National Institute for Occupational Safety and Health
Northeastern Center for Technology Supporting Self Management in Older Adults
Co-Investigator, National Institutes of Health
Improving Outcomes in People with Dementia
Co-Principal Investigator, Senior Link
BAHRAM SHAFAI

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, George Washington University, 1985
ece.neu.edu/people/shafai-bahram

Scholarship focus: control systems; digital signal processing; robust and optimal control

Honors and awards: Associate Editor, Editorial Board and Program Chair of ISIAC-WAC; Senior Member, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

B. Shafai, S. Nazari, A. Oghbaee

B. Shafai, M. Saif

S.M.M. Alavi, M. Saif, B. Shafai
Accurate State Estimation in DC-DC Converters Using a Proportional Integral Observer (PIO), Proceedings of 23rd IEEE International Symposium on Industrial electronics (ISIE), 2014, 1304-1309

R. Ghadami, B. Shafai

P. Brunet, B. Shafai

B. Shafai, A Oghbaee

B. Shafai, A Oghbaee
Positive Quadratic Stabilization of Uncertain Linear System, Proceeding of IEEE Multi-conference on Systems and Control, CAA, Antibes, France, 2014, 1412-1417

B. Shafai, A. Oghbaee, T. Tanaka

R. Ghadami, B. Shafai
Decomposition-Based Distributed Control for Continuous-Time Multi-Agent Systems, IEEE Transactions on Automatic Control, 58(1), 2013, 258-264

SANDRA SHEFELBINE

Associate Professor, Mechanical and Industrial Engineering; joint appointment in Bioengineering
PhD, Stanford University, 2002
mie.neu.edu/people/shefelbine-sandra

Scholarship focus: multi-scale bone biomechanics—how the structure and composition of bone influences its mechanical properties; mechano-adaptation of bone and joint—how tissue responds to mechanical signals

SELECTED PUBLICATIONS

B. Depalle, Z. Qin, S.J. Shefelbine, M.J. Buehler

P. Yadav, S.J. Shefelbine, E.M. Gutierrez-Farewik
Effect of Growth Plate Geometry and Growth Direction on Prediction of Proximal Femoral Morphology, Journal of Biomechanics, 49(9), 2016, 1613-1619

M. Giorgi, A. Carriero, S.J. Shefelbine, N.C. Nowlan

B. Depalle, Z. Qin, S.J. Shefelbine, M.J. Buehler

Phospho 1 Deficiency Transiently Modifies Bone Architecture yet Produces Consistent Modification in Osteocyte Differentiation and Vascular Porosity with Ageing, Bone, 81, 2015, 277-291

A.F. Pereira, B. Javaheri, A.A. Pitsillides, S.J. Shefelbine
Predicting Cortical Bone Adaptation to Axial Loading in the Mouse Tibia, Journal of the Royal Society, Interface, 12(110), 2015


SELECTED RESEARCH PROJECTS

Heterogeneity and Anisotropy in Fracture Toughness
Principal Investigator, National Science Foundation

Keeping Hockey Hips Healthy
Principal Investigator, US Hockey Foundation

Multi-Scale Characteristics of Bone Toughness
Principal Investigator, National Science Foundation
RIFAT SIPAHI

Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering

PhD, University of Connecticut, 2005
mie.neu.edu/people/sipahi-rifat

Scholarship focus: control systems and mechatronics; stability analysis and control synthesis of dynamical systems with delays; interplay between stability, delays, and graphs; control-systems-aided human-machine systems; engineering education research; disability research; systems biology

Honors and awards: Outstanding Young Investigator, Dynamic Systems and Control Division/American Society of Mechanical Engineers; College of Engineering Faculty Fellow; Defense Advanced Research Projects Agency Young Faculty Award; Fellow, American Society of Mechanical Engineers; Senior Member, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS

A. Ramirez, S. Mondie, R. Garrido, R. Sipahi
Design of Maximum Exponential Decay Rate for LTI-SISO Systems via Delay-based Controllers, SIAM Control and Optimization, 55(1), 2017, 397-412

T. Yucelen, Y. Yıldız, R. Sipahi, E. Yousefi, N. Nguyên

S. Nourazari, D.B. Hoch, S. Capawanna, R. Sipahi, J.C. Benneyan
Can Improved Specialty Access Moderate Emergency Department Overuse? Effect of Neurology Appointment Delays on ED Visits, Neurology Clinical Practice, 6(6), 2016, 498-505

M.H. Koh, R. Sipahi
A Consensus Dynamics with Delay-Induced Instability Can Self-Regulate for Stability via Agent Regrouping, Chaos: An Interdisciplinary Journal of Nonlinear Science, 26(11), 2016, 116313

D. Tian, R. Sipahi

SELECTED RESEARCH PROJECTS

Graph-Based Control Design for Network Dynamics with Time Delays
Principal Investigator, National Science Foundation

A Three-Dimensional Model of Spinal Cord Growth and Repair in a Regeneration-Competent Organism
Co-Principal Investigator, National Science Foundation

NIKOLAI SLAVOV

Assistant Professor, Bioengineering

PhD, Princeton University, 2010
bioe.neu.edu/people/slavov-nikolai

Scholarship focus: Ribosome-mediated translational regulation, statistical inference, mass-spectrometry; quantitative systems biology; bioinformatics

Honors and awards: New Innovator Award, National Institutes of Health; Broad Institute SPARC; IRCSET Postgraduate Research Fellowship; Eureka Fellowship for Academic Excellence

SELECTED PUBLICATIONS

A. Franks, E. Airoldi, N. Slavov

N. Slavov, S. Semrau, E. Airoldi, B. Budnik, A. Van Oudenaarden
Differential Stoichiometry Among Core Ribosomal Proteins, Cell Reports, 13(5), 2015, 865-873

N. Slavov, B. Budnik, D. Schwab, E. Airoldi, et al.
Constant Growth Rate Can Be Supported by Decreasing Energy Flux and Increasing Aerobic Glycolysis, Cell Reports, 7(3), 2014, 705-714

D. Malioutov, N. Slavov

SELECTED RESEARCH PROJECTS

Broad Institute SPARC
Co-Principal Investigator, Broad Institute

Characterization of Ribosome Remodeling During Stem Cell Differentiation by Top-Down and Native Mass Spectrometry
Principal Investigator, Northeastern University

Ribosome-Mediated Translational Regulation During Stem Cell Differentiation *National Institutes of Health Director’s New Innovator Award
Principal Investigator, Northeastern University
EDUARDO SONTAG
University Distinguished Professor, Electrical and Computer Engineering; jointly appointed, Bioengineering (starting January 2018)
PhD, University of Florida, 1977
ece.neu.edu/people/sontag-eduardo

Scholarship focus: feedback control theory, systems biology, cancer, and biomedicine

Honors and awards: IEEE Control Systems Field Award; IFAC Fellow; AMS Fellow; SIAM Fellow; IEEE Fellow; Reid Prize in Applied Mathematics, SIAM

SELECTED PUBLICATIONS
E.D. Sontag
A Dynamical Model of Immune Responses to Antigen Presentation Predicts Different Regions of Tumor or Pathogen Elimination, Cell Systems, 4, 2017, 1-11
E.D. Sontag
Dynamic Compensation, Parameter Identifiability, and Equivariances, PLoS Computational Biology, 13, 2017, 1005447
S. Barish, M.F. Ochs, E.D. Sontag, J.L. Gevertz
Evaluating Optimal Therapy Robustness by Virtual Expansion of a Sample Population, with a Case Study in Cancer Immunotherapy, Proceedings of the National Academy of Sciences, 114, 2017, 6277-6286
J. K. Kim, E.D. Sontag
Reduction of Multiscale Stochastic Biochemical Reaction Networks Using Exact Moment Derivation, PLoS Computational Biology, 13(6)m, 2017, 1005571
E.V. Nikolaev, E.D. Sontag
Quorum-Sensing Synchronization of Synthetic Toggle Switches: A Design Based on Monotone Dynamical Systems Theory, PLoS Computational Biology, 12, 2016, e1004881

SELECTED RESEARCH PROJECTS
Theory-Based Engineering of Biomolecular Circuits in Living Cells
Co-Principal Investigator, Air Force Office of Scientific Research
Model-Guided Discovery and Optimization of Navy-Relevant Cell-Based Sensors
Co-Principal Investigator, Office of Naval research
Design Principles of Molecular Computing Using Engineered Enzymes
Co-Principal Investigator, National Science Foundation
Self-Modifying and Fast Analog Molecular Computing with Designed Enzymes
Co-Principal Investigator, DARPA

SRINIVAS SRIDHAR
University Distinguished Professor, Physics; affiliated faculty, Bioengineering, Chemical Engineering
PhD, California Institute of Technology, 1984
che.neu.edu/people/sridhar-srinivas

Scholarship focus: nanomedicine; neurotechnology; drug delivery, MRI imaging

Honors and awards: University Distinguished Professorship; Biomedical Engineering Diversity Award 2016

SELECTED PUBLICATIONS
P. Baldwin, S. Tangutoori, S. Sridhar
Generation of Dose-Response Curves and Improved IC50s for PARP Inhibitor Nanoformulations, Cancer Nanotechnology: Methods and Protocols, 2017, 337-342
J. Barlow, K. Gozzi, C.P. Kelley, B.M. Geilich, T.J. Webster, Y. Chai, S. Sridhar, A.L. van de Ven
Nanoformulation of Olaparib Amplifies PARP Inhibition and Sensitizes PTEN/TP53-deficient Prostate Cancer to Radiation, Molecular Cancer Therapeutics, 16(7), 2017, 1279-1289
J. Belz, N. Castilla-Ojo, S. Sridhar, R. Kumar
Radiosensitizing Silica Nanoparticles Encapsulating Docetaxel for Treatment of Prostate Cancer, Cancer Nanotechnology: Methods and Protocols, 2017, 403-409
M.J. Cheng, R. Kumar, S. Sridhar, T.J. Webster, E.E. Ebong

SELECTED RESEARCH PROJECTS
CaNCURE: Cancer Nanomedicine Co-ops for Undergraduate Research Experiences
Principal Investigator, National Institutes of Health
Nanomedicine Academy of Minority Serving Institutions Principal Investigator, National Science Foundation
Nanoscale Magnetism In Next Generation Magnetic Nanoparticles Sub-Project II: Organically Modified Magnetic Nanoparticles
Principal Investigator, Asian Office of Aerospace Research and Development
PARP Inhibitor Nanotherapy for Ovarian Cancer
Principal Investigator, Department of Defense, Ovarian Cancer Research Program
DAGMAR STERNAD
Professor, Biology; jointly appointed: Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Connecticut, 1995
ece.neu.edu/people/sternad-dagmar

Scholarship focus: motor control and learning, variability and stability, virtual rehabilitation, dynamic modeling, rhythmic and discrete movements as primitives for action

Honors and awards: Klein Lectureship Award; Distinguished Lecturer on Life and the Sciences of Complexity, Center for the Ecological Study of Perception and Action

SELECTED PUBLICATIONS
S.W. Park, H. Marino, S. Charles, D. Sternad, N. Hogan

P. Stein, E.L. Saltzman, K.G. Holt, D. Sternad
Is Failed Predictive Control a Risk Factor for Focal Dystonia?, Motor Disorders, 31(12), 2016, 1772-1777

C.J. Hasson, Z. Zhang, M.O. Abe, D. Sternad
Neuromotor Noise is Malleable by Amplification of Perceived Error, PLoS Computational Biology, 2016

M.E. Huber, N. Kuznetsov, D. Sternad
Persistence of Reduced Neuromotor Noise in Long-Term Motor Skill Learning, Journal of Neurophysiology, 116(6), 2016, 2922-2935

SELECTED RESEARCH PROJECTS
Collaborative Research: Towards Robots with Human Dexterity
Principal Investigator, National Science Foundation

Collaborative Research: Challenging the Cognitive-control Divide
Principal Investigator, National Science Foundation

Predictability in Complex Object Control
Principal Investigator, National Institutes of Health

Quantification of Predictive Motor Impairments in Individuals with ASD
Principal Investigator, National Institutes of Health

CRCNS US-German-Israeli Collaborative Research Proposal: Hierarchical Coordination of Complex Actions.
Principal Investigator, National Science Foundation

Multi-Center Trial of Augmented Sensory Feedback in Children with Dyskinetic CP
Co-Investigator, National Institute of Health

MILICA STOJANOVIC
Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Northeastern University, 1993
ece.neu.edu/people/stojanovic-milica

Scholarship focus: wireless communications and networks, underwater acoustic transmission, statistical system characterization, adaptive signal processing

Honors and awards: distinguished Technical Achievement Award, IEEE Ocean Engineering Society; Fellow, Institute of Electrical and Electronics Engineers

SELECTED PUBLICATIONS
R. Ahmed, M. Stojanovic
Joint Power and Rate Control for Packet Coding Over Fading Channels, IEEE Journal of Oceanic Engineering, 42(3), 2016, 697-710

Y. Aval, S.K. Wilson, M. Stojanovic

Y. Aval, M. Stojanovic

P. Qarabaqi, M. Stojanovic

S. Yerramalli, M. Stojanovic, U. Mitra

J. Heidemann, M. Stojanovic, M. Zorzi

SELECTED RESEARCH PROJECTS
NeTS: Large: Collaborative Research: Exploration and Exploitation in Actuated Communication Networks
Principal Investigator, National Science Foundation

Intelligent Coordination and Adaptive Classification for Naval Autonomous Systems
Principal Investigator, Office of Naval Research

MRI: Development of the Northeastern University Marine Observatory NETwork (NU MONET)
Co-Principal Investigator, National Science Foundation
NIAN SUN

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Stanford University, 2002
ece.neu.edu/people/sun-nian-xiang

Scholarship focus: magnetic, ferroelectric and magnetoelectric materials; RF/microwave magnetic and magnetoelectric devices design, fabrication and testing; materials properties at RF/microwave frequency; range self-assembly of magnetic nanostructures

Honors and awards: Fellow, Institute of Physics; Fellow, Institute of Engineering and Technology; Office of Naval Research Young Investigator Award; National Science Foundation CAREER Award; Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

Z. Zhou, M. Trassin, Y. Gao, Y. Gao, D. Chen,...N.X. Sun
Probing Electric Field Control of Magnetism Using Ferromagnetic Resonance, Nature Communications, 6, 2015, 6082

T. Nan, Y. Hui, M. Rinaldi, N.X. Sun

M. Liu, Z. Zhou, T. Nan, B.M. Howe, G.J. Brown, N.X. Sun
Voltage Tuning of Ferromagnetic Resonance with Bistable Magnetization Switching in Energy-Efficient Magnetoelectric Composites, Advanced Materials, 25(10), 2013, 1435-1439

J. Lou, M. Liu, D. Reed, Y. Ren, N.X. Sun
Giant Electric Field Tuning of Magnetism in Novel Multiferroic FeGaB/Lead Zinc Niobate Lead Titanate Heterostructures, Advanced Materials, 21(46), 2009, 4711-4715

S.X. Wang, N.X. Sun, M. Yamaguchi, S. Yabukami

SELECTED RESEARCH PROJECTS

Integrated Thermoelectric Materials and Devices
Principal Investigator, Analog Devices, Incorporated

Multiferroic Materials for RF Applications
Principal Investigator, Defense Advanced Research Projects Agency

Nanofabricated Neural Probes with Ultra-sensitive Integrated Compact RF NEMS Magnetoelectric Sensors for Electromagneto-brain Activity Mapping
Principal Investigator, Keck Foundation

Novel Multiferroic Heterostructures for Translational Compact and Power Efficient Voltage Tunable Devices
Principal Investigator, National Science Foundation

Power Efficient Voltage Tunable Spin Hall Nano Oscillators with Multiferroic Heterostructures
Principal Investigator, Air Force Research Laboratory

Sensitive and Selective Chemical Sensor Using Molecularly-Imprinted Single Layer Graphene
Principal Investigator, Air Force

MARIO SZNAIER

Dennis Picard Trustee Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Washington, 1989
ece.neu.edu/people/sznaier-mario

Scholarship focus: robust control; reduced order models; video-based control; applications to dynamics in imaging and video processing; information extraction from high volume data streams

Honors and awards: IEEE Control Systems Society Distinguished Member Award

SELECTED PUBLICATIONS

B. Yilmaz, C. Lagoa, M. Sznaier
An Efficient Atomic Norm Minimization Approach to Identification of Low Order Models, 2013 IEEE 52nd Annual Conference on Decision and Control, 2013, 5834-5839

M. Ayazoglu, B. Yilmaz, M. Sznaier, O. Camps

C. Dicle, O. Camps, M. Sznaier
The Way They Move: Tracking Multiple Targets with Similar Appearance, IEEE International Conference on Computer Vision, Sydney, Australia, 2013

K. Bekiroglu, M. Sznaier, C. Lagoa, B. Shafai

Y. Cheng, Y. Wang, M. Sznaier
Worst Case Optimal Estimators for Switched Linear Systems, Proceedings of the 52nd IEEE Conference on Decision and Control, 2013, 4036-4041

SELECTED RESEARCH PROJECTS

Robust Identification and Model (in) Validation of Switched Hammerstein/Wiener Systems and Applications
Principal Investigator, National Science Foundation
GILEAD TAMDOMR

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Weizmann Institute of Science, 1984
ece.neu.edu/people/tadmor-gilead

Scholarship focus: control systems; dynamical systems; low order modeling and estimation in complex systems; medical imaging

SELECTED PUBLICATIONS

V. Troshin, A. Seifert, D. Sidlikover, G. Tadmor

Extensions to a Manifold Learning Framework for Time Series Analysis on Dynamic Manifolds in Bioelectric Signals, Physical Review E, 93, 2016, 042218

On the Need of Nonlinear Control for Efficient Model-based Wake Stabilization, Theoretical and Computational Fluid Dynamics, 28(1), 2014, 23-49

L. Mirkin, T. Shima, G. Tadmor

On the Need of Nonlinear Control for Efficient Model-based Wake Stabilization, Theoretical and Computational Fluid Dynamics, 28(1), 2014, 23-49

S. Laxminarayan, T. Shima, G. Tadmor, et al.
Modeling Habituation in Rat EEG Evoked Responses via a Neural Mass Model with Feedback, Biological Cybernetics, 105, 2011, 371-397


VLADIMIR TORCHILIN

University Distinguished Professor, Pharmaceutical Sciences; affiliated faculty, Bioengineering, Chemical Engineering

PhD, Moscow State University, 1971
DSc, Moscow State University, 1980
bioe.neu.edu/people/torchilin-vladimir

Scholarship focus: nanomedicine, drug delivery, drug targeting, biomedical polymers, experimental oncology, experimental pharmacology

Honors and awards: 2015 Chair, XX International Symposium on Microencapsulation; Best Paper Award 2014, European Journal of Pharmaceutics and Biopharmaceutics; 2016 President and Plenary Speaker, BIONANOTOX; 2016 International Chair of Therapeutic Innovation, LabEx LERMIT; 2016 Highly Cited Researcher from Thomson Reuters; Outstanding Excellence Award, Pharmaceutica 2017 Congress

SELECTED PUBLICATIONS

S. Erdogan, V.P. Torchilin
Gadolinium-Loaded Polychelating Polymer-Containing Tumor-Targeted Liposomes, Methods in Molecular Biology, 1522, 2017, 179-182

S.K. Sriraman, G. Salzano, C. Saroszen, V.P. Torchilin
Anti-Cancer Activity of Doxorubicin-Loaded Liposomes Co-Modified with Transferrin and Folic Acid, European Journal of Pharmaceutics and Biopharmaceutics, 105, 2016, 40-49

R. Riehle, B. Pattini, A. Jhaveri, A. Kulkarni, G. Thakur, A. Degterev, V.P. Torchilin
Combination Nanopreparations of a Novel Proapoptotic Drug-NCL-240, TRAIL and siRNA, Pharmaceutical Research, 33(7), 2016, 1587-1601

T. Wang, B. Narayanaswamy, H. Ren, V.P. Torchilin
Combination Therapy Targeting Both Cancer Stem-Like Cells and Bulk Tumor Cells for Improved Efficacy of Breast Cancer Treatment, Cancer Biology Therapy, 17(6), 2016, 698-707

S.K. Sriraman, J. Pan, C. Saroszen, E. Luther, V.P. Torchilin
Enhanced Cytotoxicity of Folic Acid-Targeted Liposomes Co-Loaded with C6 Ceramide and Doxorubicin: In Vitro Evaluation on HeLa, A2780-ADR and H69-AR Cells, Molecular Pharmaceutics, 13(2), 2016, 428-437

SELECTED RESEARCH PROJECTS

Combination On-Demand Cancer Therapy
Co-Investigator, National Institutes of Health
Dendrimer-Based Nanomedicines
Principal Investigator, National Institutes of Health
Multifunctional Matrix Metalloprotease-2-Sensitive Anti-Cancer Nanopreparations
Principal Investigator, National Institutes of Health
Targeted PEG-PE-Based Polymeric Micelles Co-Loaded with Curcumin and Doxorubicin
Principal Investigator, Immix Biopharma, LLC
EUGENE TUNIK

Associate Professor, Physical Therapy, Movement and Rehabilitation Science; affiliated faculty, Bioengineering

PhD, Rutgers University, 2003
bioe.neu.edu/people/tunik-eugene

Scholarship focus: human motor control/learning, neurorehabilitation neuroscience, brain stimulation, brain imaging, virtual reality

SELECTED PUBLICATIONS

L.F. Schettino, S.V. Adamovich, H. Bagce, M. Yarossi, E. Tunik
Disruption of Activity in the Ventral Premotor but not the Anterior Intraparietal Area Interferes with On-Line Correction to a Haptic Perturbation During Grasping, The Journal of Neuroscience, 35(5), 2014, 2112-2117

M. Yarossi, S. Adamovich, E. Tunik

S. Saleh, S.V. Adamovich, E. Tunik
Mirrored Feedback in Chronic Stroke: Recruitment and Effective Connectivity of Ipsilesional Sensorimotor Networks, Neurorehabilitation and Neural Repair, 28(4), 2014, 344-354

Parkinson’s Disease Patients Show Impaired Corrective Grasp Control and Eye-hand Coupling When Reaching to Grasp Virtual Objects, Neuroscience, 2013, 205-221

E. Tunik, S. Saleh, S.V. Adamovich

H. Bagce, S.V. Adamovich, S. Saleh, J.W. Krakauer, E. Tunik
Corticospinal Excitability is Enhanced After Visuomotor Adaptation and Depends on Learning Rather Than Performance Or Error, Journal of Neurophysiology, 109(4), 2012, 1097-1106

H.F. Bagce, S. Saleh, S.V. Adamovich, E. Tunik

SELECTED RESEARCH PROJECTS

Planning and Updating in Frontoparietal Networks for Grasping
Principal Investigator, National Institutes of Health

ASHKAN VAZIRI

Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering

PhD, Northeastern University, 2004
mie.neu.edu/people/vaziri-ashkan

Scholarship focus: solid mechanics, materials, computational methods, biomechanics, nanotechnology

Honors and awards: Air Force Office of Scientific Research Young Investigator Award; National Science Foundation CAREER Award; Søren Buus Outstanding Research Award, College of Engineering; College of Engineering Faculty Fellow

SELECTED PUBLICATIONS

Bending Behavior of Lightweight Sandwich-Walled Shells with Pyramidal Truss Cores, Composite Structures, 116, 2014, 793-804

Buckling of Regular, Chiral, and Hierarchical Honeycombs Under a General Macroscopic Stress State, Proceedings of the Royal Society A, 470(2167), 2014, 20130856

R. Ghosh, H. Ebrahimi, A. Vaziri


R. Oftadeh, B. Haghpanah, D. Vella, A. Boudaoud, A. Vaziri

H. Abdi, H. Nayeb-Hashemi, A.M.S. Hamouda, A. Vaziri

R. Ghosh, A. Kumar, A. Vaziri
Type-IV Pilus Deformation can Explain Retraction Behavior, PLOS ONE, 2014, 9, 114613

SELECTED RESEARCH PROJECTS

Functional Biomimetic Materials with Extreme Topology
Principal Investigator, National Science Foundation

Mechanics of Carbon Nanotube Surface Decontamination
Principal Investigator, FM Global

Multifunctional Cellular Structures for Energy Harvesting and Energy Management Applications
Principal Investigator, Qatar Foundation
KAI-TAK WAN

Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering, Civil and Environmental Engineering

PhD, University of Maryland at College Park, 1993
mie.neu.edu/people/wan-kai-tak

Scholarship focus: cellular biomechanics; water filtration; thin film adhesion and characterization; subsurface mechano-sensing; shell adhesion; fundamental intersurface forces

Honors and awards: National Science Foundation CAREER Award; College of Engineering Faculty Fellow

SELECTED PUBLICATIONS

T. Zhu, G. Li, S. Müftü, Kai-Tak Wan
Revisiting the Constrained Blister Test to Measure Thin Film Adhesion, Journal of Applied Mechanics, 84, 2017, 071005

X. Wang, B. Li, J. Hao, Y.J. Jung, K.-T. Wan

M. Robitaille, N. Belisle, S. Dang, E. Faigle, C. Morck, P. Uth, K.-T. Wan
An Optical Topographic Technique to Map the 3-D Deformed Profile of a Convex Lens Under External Loading, Experimental Mechanics, 55, 2015, 641-646


Y. Li, X. Wang, A. Onnis-Hayden, K.-T. Wan, A.Z. Gu
Universal Quantifier Derived from AFM Analysis Links Cellular Mechanic Properties and Cell–Surface Integration Forces with Microbial Deposition and Transport Behavior, Environmental Science and Technology, 48, 2014, 1769-1778

SELECTED RESEARCH PROJECTS

Mechanics of Fusion of Dissimilar Lipid BiLayers and Multi-Lamellar Vesicles
Principal Investigator, National Science Foundation

Mechanical Integrity and Long Term Reliability of Photovoltaic Panels
Principal Investigator, National Institute of Standards and Technology/Department of Energy

A Novel Biomechanical Model of Bacterial Adhesion and Aggregation
Principal Investigator, National Science Foundation

MENI WANUNU

Associate Professor, Physics; affiliated faculty, Bioengineering

PhD, Weizmann Institute, 2005
bioe.neu.edu/people/wanunu-meni

Scholarship focus: development of next-generation DNA and RNA sequencing methods; nanopores as molecular sensors; bioinspired sustainability solutions; optical and electrical analysis of biomolecular systems; electron microscopy and electron-beam shaping of nanomaterials

SELECTED PUBLICATIONS

Graphene Symmetry Amplified by Designed Peptide Self-Assembly, Biophysical Journal, 110(11), 2016, 2507-2516

R.Y. Henley, B.A. Ashcroft, I. Farrell, B.S. Cooperman, S. Lindsay, M. Wanunu
Electrophoretic Deformation of Individual Transfer RNA Molecules Reveals Their Identity, Nano Letters, 16(1), 2016, 138-144


SELECTED RESEARCH PROJECTS

Direct Picogram DNA and RNA Sequencing Using Nanopore Zero-Mode
Principal Investigator, National Institutes of Health

Engineering Tunable Portal Hybrid Nanopores for High-Resolution Sequence Mapping
Principal Investigator, National Science Foundation

Nanopores in 2D Materials
Principal Investigator, Oxford Nanopore Technology

Recognition Tunneling for Single Molecule RNA Sequencing
Co-Principal Investigator, National Institutes of Health

Two-Dimensional Nanopores with Electro-Optical Control for Next Generation Biotechnological Applications
Co-Principal Investigator, National Science Foundation

Understanding Transport in Biomimetic Carbon Nanotube Porin Membranes for Water Treatment and Osmotic Energy Harvesting
Co-Principal Investigator, National Science Foundation
THOMAS WEBSTER
Professor and Department Chair, Chemical Engineering; Art Zafiropoulo Chair in Engineering; affiliated faculty, Bioengineering
PhD, Rensselaer Polytechnic Institute, 2000
che.neu.edu/people/webster-thomas

Scholarship focus: design, synthesis, and evaluation of nanomaterials for various medical applications, including self-assembled chemistries, nanoparticles, nanotubes, and nanostructured surfaces

Honors and awards: Fellow, Biomaterials Science and Engineering; Fellow, American Institute for Medical and Biological Engineers; Fellow, American Society for Nanomedicine; Fellow, Biomedical Engineering Society; Fellow, Ernst Strungmann Foundation; Wenzhou 580 Elite Scientist Award, China; Zhejiang Province Talent Program; Acta Biomaterialia Silver (under 45) Award; Hsu Chinese Academy of Sciences Outstanding Lecture Award

SELECTED PUBLICATIONS
G. Mi, D. Shi, W. Herchek, T.J. Webster

B.M. Geilich, I. Gelfat, S. Sridhar, T.J. Webster
Superparamagnetic Iron Oxide-Encapsulating Polymersome Nanocarriers for Biofilm Eradication, Biomaterials, 119, 2017, 78-85

P. Tran, L. Sarin, R. Hurt, T.J. Webster

P. Tran, L. Sarin, R. Hurt, T.J. Webster


SELECTED RESEARCH PROJECTS
Development and Commercialization of Nanostructured Resorbable Urogenital Grafts
Principal Investigator, National Institutes of Health

Developing Injectable Materials for Cartilage Applications: Part 1
Principal Investigator, Audax, Inc.

Long-term Prevention of Peri-Implantitis via Nano-Textured, TiO/Ag Surfaces
Co-Principal Investigator, National Institutes of Health

Nanomedicine Academy of Minority Serving Institutions
Co-Principal Investigator, National Science Foundation

Testing Orthopedic Materials for Ionic Fusion, Inc.
Principal Investigator, Ionic Fusion, Inc.

Testing RTI Materials for Orthopedic Applications
Principal Investigator, RTI, Inc.

MARK C. WILLIAMS
Professor, Physics; affiliated faculty, Bioengineering
PhD, University of Minnesota, 1998
bioe.neu.edu/people/williams-mark

Scholarship focus: biophysics of DNA-protein interactions

Honors and awards: Fellow, American Physical Society

SELECTED PUBLICATIONS
M. Nabuan Naufer, D.A. Murison, I. Rouzina, P.J. Beuning, M.C. Williams

K. Posty, E.D. Olson, M. Nabuan Naufer, R.J. Gorelick, I. Rouzina, M.C. Williams, K. Musier-Forsysth, J.G. Levin
Mechanistic Differences Between HIV-1 and SIV Nucleocapsid Proteins and Cross-Species HIV-1 Genomic RNA Recognition, Retrovirology, 13(89), 2016

A.A. Almaqwashi, T. Paramanathan, I. Rouzina, M.C. Williams

A.A. Almaqwashi, J. Andersson, P. Lincoln, I. Rouzina, F. Westerlund, M.C. Williams
Dissecting the Dynamic Pathways of Stereoselective DNA Threading Intercalation, Biophysical Journal, 110, 2016, 1255-1263

M.J. McCauley, I. Rouzina, K.A. Manthei, R.J. Gorelick, K. Musier-Forsyth, M.C. Williams
Targeted Binding of Nucleocapsid Protein Transforms the Folding Landscape of HIV-1 TAR RNA, Proceedings of the National Academy of Sciences, 112(44), 2015, 13555-13560

Oligomerization Transforms Human APOBEC3G from an Efficient Enzyme to a Slowly Dissociating Nucleic Acid-binding Protein, Nature Chemistry, 6, 2014, 28-33

H. Wu, M. Mitra, K. Musier-Forsyth, M.C. Williams, et al.
Aromatic Residue Mutations Reveal Direct Correlation Between HIV-1 Nucleocapsid Protein’s Nucleic Acid Chaperone Activity and Retroviral Replication, Virus Research, 171, 2013, 263-277

SELECTED RESEARCH PROJECTS
Single Molecule HIV-1 Replication Interactions
Principal Investigator, National Institutes of Health

Quantifying Single Molecule DNA-ligand Interactions
Principal Investigator, National Science Foundation
SUNNY ZHOU

Professor, Chemistry and Chemical Biology; affiliated faculty, Bioengineering

PhD, The Scripps Research Institute, 1997
bioe.neu.edu/people/zhou-sunny

Scholarship focus: protein chemistry and analysis, enzymology, biotherapeutics and biomaterials

SELECTED PUBLICATIONS

W. Qu, K.C. Catcott, K. Zhang, S. Liu, J.J. Guo, J. Ma, M. Pablo, J. Glick, Y. Xiu, N. Kenton, X. Ma, R.I. Duclos, Z.S. Zhou

S. Liu, K.R. Moulton, J.R. Auclair, Z.S. Zhou

When Good Intentions Go Awry: Modification of a Recombinant Monoclonal Antibody in Chemically Defined Cell Culture by Xylosone, an Oxidative Product of Ascorbic Acid, Analytical Chemistry, 87(15), 2015, 7529-7534


Discovery of a Chemical Modification by Citric Acid in a Recombinant Monoclonal Antibody, Analytical Chemistry 86(18), 2014, 8932-8936

J.J. Klaene, W. Ni, J.F. Alfaro, Z.S. Zhou
Detection and Quantitation of Succinimide in Intact Protein via Hydrazine Trapping and Chemical Derivatization, Journal of Pharmaceutical Sciences, 103(10), 2014, 3033-3042

M. Liu, Z. Zhang, J. Cheetham, D. Ren, Z.S. Zhou
Discovery and Characterization of a Novel Photo-Oxidative Histidine-Histidine Crosslink in IgG1 Antibody Utilizing 18O-labeling and Mass Spectrometry, Analytical Chemistry, 86(10), 2014, 4940-4948

Decreased Glutathione and Elevated Hair Mercury Levels are Associated with Nutritional Deficiency-Based Autism in Oman, Experimental Biology and Medicine, 239(6), 2014, 697-706
Jodi Belz
PhD 2017, Bioengineering; Advisor, Srinivas Sridhar

SMART BRACHYTHERAPY SPACERS FOR COMBINED CHEMO-RADIATION THERAPY: LOCAL DELIVERY OF NANOPARTICLES, CHEMOTHERAPEUTICS, AND MOLECULAR INHIBITORS FOR CANCER TREATMENT

In this work, I have developed, characterized, and extensively tested a docetaxel loaded biodegradable implant for the treatment of prostate cancer. Our spacers were fabricated with a docetaxel loaded Poly(lactic-co-glycolic) acid cylindrical implant for intratumoral injection via an 18 gauge applicator needle for local, sustained therapy. Our spacers exhibit diffusion driven release in vitro over 75 days, designed to sensitize I-125 (t1/2= 60 days) brachytherapy seeds most commonly used for treatment of prostate cancer. The spacers were tested for therapeutic efficacy against clinically administered docetaxel and resulted in significant tumor inhibition and improved survival (median survival time (MST) of spacers 52 days versus 26 with IV DTX, p<0.01). Next the docetaxel spacer was combined with fractionated radiation therapy at reduced doses, to determine the radiosensitization and synergistic therapeutic response. Mice treated with local combined chemo-radiation resulted in significant survival improvement (MST 209 days vs. 120 in radiation therapy alone and 85 in spacers alone, p<0.01) and tumor inhibition, with 33% of mice cured. These results combined with a full toxicity study were completed and prove the therapeutic potential for successful clinical translation and impact.

See full dissertation at coe.neu.edu/17/JodiBelz

Adina Draghici
PhD 2017, Bioengineering; Advisor, Sandra Shefelbine

RESCUING OSTEOPOROTIC BONE IN INDIVIDUALS WITH SPINAL CORD INJURY

The central idea behind the work presented in this thesis is the mechanoadaptation of bone to external loading: bone continually remodels in response to the stresses and strains applied. High loads promote bone formation, while unloading results in bone resorption. During my doctoral training, I focused on bone loss in SCI and I investigated the potential of a rehabilitation exercise, namely functional electrical stimulation rowing (FES-rowing) to address disuse osteoporosis. FES-rowing is a whole body exercise, that allows for the simultaneous engagement of both the innervated arms and the non-innervated legs in those with SCI.

Additionally, this thesis presents a custom made device that investigates another contributor to skeletal health and disuse osteoporosis, bone blood perfusion. The custom built near infrared spectroscopy device was effectively used to non-invasively monitor hemoglobin concentration changes in the tibia during exercise in both able-bodied and individuals with SCI. The work presented in this thesis suggests that FES-rowing might be insufficient to promote bone formation, but slows down bone resorption and trabecular microstructure degradation. The results indicate that the magnitude of loading is more important than the frequency of exercise in preventing bone loss and possibly addressing disuse osteoporosis in those with SCI.

See full dissertation at coe.neu.edu/17/AdinaDraghici
Benjamin Geilich
PhD 2016, Bioengineering; Advisor, Thomas J. Webster

DRUG- AND NANOPARTICLE-ENCAPSULATING POLYMERSOME NANOCARRIERS FOR THE TREATMENT OF ANTIBIOTIC-RESISTANT INFECTIONS

The rising prevalence and severity of antibiotic-resistant infections poses an alarming threat to public health worldwide. The rapid pace at which bacteria are evolving resistance, combined with the lack of new antibiotic drugs in development, threatens to return humanity to a “pre-antibiotic” era where even minor infections are life threatening. Thus, there is a dire need for creative solutions which do not rely on the discovery of new chemical agents, and instead aim to restore efficacy to existing drugs. To this end, this dissertation describes the development of a robust, nanomedicine-based platform for the treatment of antibiotic-resistant infections. Here, biocompatible multi-compartment nanocarriers were synthesized to co-encapsulate both hydrophobic metallic nanoparticles and hydrophilic antibiotics, and were tested for antibacterial efficacy against a variety of clinically relevant infections.

For the treatment of Gram-negative acute infections, a polymersome formulation was designed to co-encapsulate silver nanoparticles and the antibiotic ampicillin. Results showed that these silver nanoparticle-encapsulating polymersomes (AgPs) inhibited the growth of ampicillin-resistant Escherichia coli (bla) in a dose-dependent fashion. Free ampicillin, AgPs without ampicillin, and ampicillin polymersomes without silver nanoparticles had no effect on bacterial growth. The relationship between the silver nanoparticles and ampicillin was determined to be synergistic and produced complete growth inhibition at a silver-to-ampicillin ratio of 1:0.64.

See full dissertation at coe.neu.edu/17/BenjaminGeilich

Codi Amir Gharagouzloo
PhD 2016, Bioengineering; Advisor, Srinivas Sridhar

QUANTITATIVE MAGNETIC RESONANCE IMAGING WITH MAGNETIC NANOPARTICLES

In this dissertation we demonstrate a novel technique that can produce CE-MRAs using magnetic nanoparticles including the FDA approved super paramagnetic iron-oxide nanoparticle (SPION) ferumoxytol with very high Contrast to Noise Ratio (CNR) in cardiovascular, cerebral, and tumor imaging in mice and rats. First, the technique is established and shown to measure clinically relevant concentrations of ferumoxytol with high fidelity range in mice. Next, a unique feature of the methodology to produce high-contrast images of purely T1-weighted signal is employed to unambiguously delineate nanoparticle accumulation in a PC3 subcutaneous tumor model with ferumoxytol accumulation 24 hours after just one dose. From this, contrast efficiency was produced compared to standard techniques with the additional benefit that pre-contrast images are not necessitated. Finally, we show unprecedented accuracy in measuring the CBV in absolute terms throughout the whole rat brain. We create a quantitative blood volume atlas and demonstrate that absolute functional measurements of CBV can be assessed by comparing the awake, CO2-challenged and anesthetized states. The method is anchored in theory and is compatible with existing clinical SPION formulations and scanners. Thus QUTE-CE shows high potential for quantitative imaging immediately applicable to human scans.

See full dissertation at coe.neu.edu/17/CodiAmirGharagouzloo
Meghan Huber  
PhD 2016, Bioengineering; Advisor, Dagmar Sternad  

**ASSESSING AND ENHANCING COMPLEX SKILL LEARNING WITH VIRTUAL ENVIRONMENTS : BASIC INSIGHTS FOR MOTOR REHABILITATION**  
Over recent decades, virtual reality (VR) and robotic technologies have demonstrated the potential to enhance physical therapy. Despite their advantages, clinical adoption of these technology-based systems have been slow due to limited evidence that they are more effective than traditional therapy. Currently, VR and robotic technologies are used to automate conventional therapy. Hence, the success of technology-driven rehabilitation relies on the efficacy of conventional therapy. This efficacy, in turn, is limited by our knowledge of motor learning and recovery.  

See full dissertation at [coe.neu.edu/17/MeghanHuber](coe.neu.edu/17/MeghanHuber)

Ryan Myers  
PhD 2017, Bioengineering; Advisor, Joseph Ayers  

**ELECTROHYDRODYNAMIC JET PRINTED MULTI-MATERIAL, MULTI-LAYER ELECTRONICS AND INTERFACIAL LAYERS FOR USE IN BIOELECTRONIC INTERFACES**  
Bioelectronic interfaces and biohybrid technologies have emerged as powerful solutions for sensing and manipulation applications. A unique method of underwater chemical sensing via a combination of engineered microbes and bioelectronic interfaces is discussed here with the goal of reporting to autonomous robotics through an electronic nervous system. The fabrication of these interfaces warrants a deposition method capable of precisely implementing the electronic, interfacial, and biological layers necessary for reliable devices. Electrohydrodynamic jet (e-jet) printing has been shown capable of doing so at a biologically relevant scale of 240 ± 50 nm. An e-jet printing system was fabricated and modified to use additive manufacturing to fabricate heterogeneous interfaces for the biological reporters Nitric Oxide and luminescence. These tasks included the fabrication of electronics that typically have multiple materials and thus multiple layers in their architecture; a potential point of failure in this liquid phase deposition method. The implementation of code based ejection modalities and a heated vacuum chuck allow for controlled volume deposition and rapid solvent evaporation, alleviating dissolution events in the sublayer. By eliminating these events, controlling film thickness to deter pinhole formation, and generating inks with solvents that were incompatible with sublayers, multi-layer electrochemical nitric oxide sensors and photosensors were produced.  

See full dissertation at [coe.neu.edu/17/RyanMyers](coe.neu.edu/17/RyanMyers)
Robert Natividad
PhD 2016, Bioengineering; Advisor, Anand Asthagiri

INVESTIGATING THE ROLE OF SPATIAL PRESENTATION OF PHYSICAL AND CHEMICAL CUES IN REGULATING NORMAL AND CANCER CELL POLARITY

Throughout the body, different cell types are required to move in order to perform their normal physiological functions. Immune cells constantly patrol the body in search of infections. Epidermal cells remain stationary until required to move to heal a nearby wound. Cells in hair follicles or intestinal crypts continuously migrate outward to replace routine losses. These processes all require cells to move at a specific rate and in a given direction appropriate to their task and environment. Sometimes, the cellular programming that dictates these movements malfunctions, leading to disease. Preventing these diseases or enhancing these functions requires a fundamental understanding of cell migration.

Placing cells in flat, plastic dishes and analyzing their movement, has led to a great many discoveries about the mechanics of how cells move. However, the same lack of environmental features that enables studies of unbiased cell movement, makes it challenging to study how cells migrate in response to external mobilizing signals. On the other extreme, watching cells move in an intact organism, such as axon growth in C. elegans or border cell migration in Drosophila, runs the risk of having too many external signals to account for.

To address this gap, we have developed an experimental platform that enables select soluble cues to be presented to cells in a controllable fashion, such as a gradient. The substrate of the platform is modified to present patterns of physical cues at well-defined orientations to the soluble cue. This system allows the application of multiple, physiologically relevant cues to cells while minimizing external influences and maintaining the accessibility and ease of measurement common to traditional cell culture dishes.

See full dissertation at coe.neu.edu/17/RobertNatividad

Michelle Stolzoff
PhD 2017, Bioengineering; Advisor, Thomas J. Webster

DESIGN AND MECHANISM OF SELENIUM NANOPARTICLES FOR TREATMENT OF COMMON SKIN INFECTIONS

With the prevalence of antibiotic resistance increasing at an alarming rate, a new strategy for treatment and the prevention of infections is necessary. According to a recent CDC report, over 2 million people in the US alone are infected by resistant strains per year, with at least 23,000 dying from these infections. Acne vulgaris, is a skin condition that affects nearly all adolescents worldwide and can continue to burden adults well into their 40s. The pathogenesis of acne is largely attributed to the anaerobic, Gram-positive microbes, Propionibacterium acnes, which in the last few decades has grown to resist antibiotic treatment. Selenium is a trace element micronutrient that is associated with antioxidant and metabolic mechanisms in the body. Selenium nanoparticles (SeNP) have been demonstrated to be effective antibacterial treatments, while having a safe toxicity profile to healthy mammalian cells. Here, we have modified the SeNP synthesis process to implement a stabilizing shell consisting of biocompatible chitosan, while also investigating the mechanism of antibacterial action as well as demonstrating the SeNPs ability to fight acne infections.

See full dissertation at coe.neu.edu/17/MichelleStolzoff
Yujing Wang
PhD 2016, Bioengineering; Advisor, Lee Makowski

MOLECULAR DYNAMICS OF ADENYLATE KINASE IN DIFFERENT CONFORMATIONAL TRANSITION STATES

Adenylate kinase (ADK) catalyzes the reversible Mg2+-dependent phosphoryl transfer reaction Mg2+ + 2ADP → Mg2+ + ATP + AMP in essential cellular systems. This reaction is a major player in cellular energy homeostasis and the isoform network of ADK plays an important role in AMP metabolic signaling circuits.[12]

As a well-studied protein, the structures of ADK from various organisms have been solved by x-ray crystallography. ADK has three domains, the LID, NMP and CORE domains. Comparison of crystal structures reveals that the three domains undergo large conformational rearrangement during ADK's catalytic cycle. The LID and NMP domains are directly involved in the dynamics and close over the enzyme's ATP and AMP binding sites on ligand binding. The conformational switching and protein dynamics are recognized to be important for the enzyme functions. In this thesis I explore the molecular motions which connect the simple static crystal structures.

The conformational transitions of ADK are characterized while it undergoes conformational changes required for catalytic cycling in order to understand the contributions of intermediate sub-states to catalysis. As a first step, the intermediate, partially open conformation is divided into sub-states using K-means clustering based on RMS differences. We then characterize the dynamic behavior of each structural domain in the different sub-states using a number of metrics including radius of gyration, dihedral angle fluctuation, interatomic pair fluctuation and others. This allows us to determine whether or not there are correlations between the transitions among sub-states and the conformational fluctuations in the different domains of ADK.

In this research, we use the SMOG model (a structure based model for biomolecular dynamics) to perform long time scale molecular dynamics simulations. In these simulations, the MD parameters are chosen such that ADK transits from an initial open conformation to a closed state.

See full dissertation at coe.neu.edu/17/YujingWang
Bioengineering student Kritika Singh, E’21, does research in a lab. She recently won the top-level award of the Thermo Fisher Scientific Antibody Scholarship, which is given to only two students nationwide annually for their research and academic accomplishments.