Dear Colleagues and Students,

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 device design, 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 50 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 a 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 research and development 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 research.

Sincerely,
Lee Makowski
Department Chair
Bioengineering
l.makowski@northeastern.edu
616 Students

36% BS enrollment growth since 2017

Erel Levine
PhD, Weizmann Institute of Science

Herbert Levine
PhD, Princeton University

Jiahe Li
PhD, Cornell University

Sara Rouhanifard
PhD, Albert Einstein College of Medicine

64 TENURED/TENURE-TRACK
Including T/TT Affiliated Faculty

National Academy Member
Herbert Levine, University Distinguished Professor

4 Young Investigator Awards

Leading-edge Research
New Institute for the Chemical Imaging of Living Systems
Led by Professor Heather Clark.
See page 4

College of Engineering

With 185 tenured/tenure-track faculty and 16 multidisciplinary research centers and institutes with funding by eight federal agencies, the College of Engineering is a leader in experiential education and interdisciplinary research, with a focus on discovering solutions to global challenges to benefit society.

48 NSF CAREER Awards

48 5 Engineering Departments

90 YOUNG INVESTIGATOR Awards

993 Graduate Students
Placed on Co-op (2018-19)

8080 STUDENTS ENROLLED

52% Graduate
1485 New MS (Fall 2018)
48% Undergraduate
675 New BS (Fall 2018)
FACULTY BY RESEARCH AREAS

IMAGING, INSTRUMENTATION, AND SIGNAL PROCESSING
Samuel Chung
Heather Clark
Qianqian Fang
Mark Niedre
Sara Rouhanifard

BIOMECHANICS, BIOTRANSPORT AND MECHANOBIOLOGY
Ambika Bajpayee
Chiara Bellini
Guohao Dai
Jessica Oakes
Harikrishnan Parameswaran
Jeffrey Ruberti
Sandra Shefelbine

COMPUTATIONAL AND SYSTEMS BIOLOGY
Anand Asthagiri
Chiara Bellini
Erel Levine
Herbert Levine
Jessica Oakes
Nikolai Slavov
Eduardo Sontag

Molecular, Cell, and Tissue Engineering
Anand Asthagiri
Ambika Bajpayee
Samuel Chung
Guohao Dai
Jiahe Li
Lee Makowski
Mark Niedre
Harikrishnan Parameswaran
Sara Rouhanifard
Jeffrey Ruberti
Eduardo Sontag
Assistant Professors **Jessica Oakes** and **Chiara Bellini** are principal investigators for a $1.5M collaborative award from the Assistance to Firefighters Grant Program, administered through the Department of Homeland Security (DHS) Federal Emergency Management Agency’s (FEMA) Grant Programs Directorate, for examining the “Health Consequences Following Acute and Chronic Firefighter Exposure to Wildland Fire Smoke.”

Assistant Professors **Ambika Bajpayee** and **Nikolai Slavov** were each recipients of a Sanofi iAward, created to promote scientific breakthroughs. Bajpayee’s project is “Exosomes for oral delivery of Foxo1 SiRNA for treatment of Type 1 diabetes,” and Slavov’s project is “Developing a technology platform for discovering biomarkers and drug targets.”

Assistant Professor **Ambika Bajpayee** (PI) and **Jiahe Li** (co-PI) were awarded a $628K NIH Trailblazer R21 grant for New and Early Stage Investigators from the National Institute of Biomedical Imaging and Bioengineering (NIBIB) for “Anti-Catabolic Drug Anchored Cationic Exosomes For Cartilage Targeting And Repair.”

Professor **Heather Clark** directs Northeastern’s new Institute for Chemical Imaging of Living Systems, which focuses on finding ways to image the chemistry of our bodies. She was also awarded a $1.5M grant from the National Institute of Neurological Disorders and Stroke for “Nanosensors for Chemical Imaging of Acetylcholine Using MRI.”

Assistant Professor **Nikolai Slavov** has developed a data-driven technique to detect more than 2,000 proteins in a single cell. His single cell mass spectroscopy now offers a cheaper and faster technique that allows researchers to analyze a much larger number of single cells and results in much more accurate data. To further the research, Slavov is working collectively with another 200 labs from various countries in the Human Atlas Project, an effort to identify all of the different single cells comprising the human body. His part of the project is supported by the Chan Zuckerberg Initiative.

**Erica Wagner**, E’20, earned the prestigious Barry Goldwater Scholarship, the United States’ premier award for outstanding young researchers in STEM fields.

**Congtin Justin Nguyen**, E’19, received the German Academic Exchange Service (DAAD) Study Scholarship, which will support his Master of Science program in Regenerative Biology and Medicine at Germany’s Technische Universität Dresden (TUD), one of that nation’s finest universities in the sciences and engineering.

**Minhal Ahmed**, E’19, was selected as a George J. Mitchell Scholar, which sends future American leaders to the island of Ireland for a year of graduate study. He was also named the winner of the Harold D. Hodgkinson Achievement Award for 2019, one of the highest honors a senior can receive.

**Kritika Singh**, E’20, was named a 2019 Truman Scholar, a United States’ premier graduate fellowship for those who intend to devote their careers to serving the public good.
MANSOOR AMIJI

University Distinguished Professor, Professor of Pharmaceutical Sciences, Chemical Engineering; affiliate faculty, Bioengineering
PhD, Purdue University, 1992
coe.northeastern.edu/people/amiji-mansoor

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

Honors and awards: Fellow, American Association of Pharmaceutical Scientists (AAPS); Fellow, Controlled Release Society; Charisrate Analytics Highly Cited Author (top 1%); Purdue University School of Pharmacy Distinguished Alumni Award

SELECTED PUBLICATIONS

Y. Cho, L. Milane, M. Amiji
Genetic and Epigenetic Strategies for Advancing Ovarian Cancer Immunotherapy, Expert Opinion on Biological Therapy, 19(6), 2019, 547-560

Long-Acting Intraocular Delivery Strategies for Biological Therapy of Age-Related Macular Degeneration, Journal of Controlled Release, 296, 2019, 140-149

D. Chen, S. Ganesh, W. Wang, M. Amiji
Role of surface Chemistry on Serum Protein Corona-Mediated Cellular Delivery and Gene Silencing with Lipid Nanoparticles, Nanoscale, 11, 2019, 8760-8775

N.N. Parayath, A. Parikh, M. Amiji
Repolarization of Tumor-Associated Macrophages in a Genetically Engineered Non-Small Cell Lung Cancer Model by Intraperitoneal Administration of Hyaluronic Acid-Based Nanoparticles Encapsulating MicroRNA-125b, Nano Letters, 18(6), 2018, 3571-3579

SELECTED RESEARCH PROJECTS

Direct CNS Delivery System for BDNF AntagoNATs Using Heterotopic Mucosal Grafting for the Treatment of Parkinson’s Disease
Principal Investigator, National Institutes of Health
Reprogramming Tumor-Associated Macrophages in PDAC with MicroRNA Nano-Vectors
Principal Investigator, National Cancer Institute of the National Institutes of Health

ANAND ASTHAGIRI

Associate Professor, Bioengineering; affiliated faculty, Chemical Engineering
PhD, Massachusetts Institute of Technology, 2000
coe.northeastern.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

Cell 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
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
coe.northeastern.edu/people/ayers-joseph

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

**SELECTED PUBLICATIONS**

R.T. Myers, J. Ayers

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, 2434-2445

J. Lu, J. Yang, Y.-B. Kim, J. Ayers, K.K. Kim

J. Ayers, D. Blustein, A. Westphal

**SELECTED RESEARCH PROJECTS**

Utilizing Synthetic Biology to Create Programmable Micro Bio-Robots
Co-Principal Investigator, Office of Naval Research

AMBika BAJPAYEE

Assistant Professor, Bioengineering; affiliated faculty, Mechanical Engineering and Global Resilience Institute
PhD, Massachusetts Institute of Technology, 2015
coe.northeastern.edu/people/bajpayee-ambika

**Scholarship focus:** drug delivery; bio-electrostatics; transport phenomena in biological systems; biomechanics; 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**

*Cartilage Penetrating Cationic Peptide Carriers for Applications in Drug Delivery to Avascular Negatively Charged Tissues*, Acta Biomaterialia, 2018

A.G. Bajpayee, A.J. Grodzinsky


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

**SELECTED RESEARCH PROJECTS**

Cartilage Targeting Cationic Nanocarriers for Delivering OA Drugs
Principal Investigator, Congressionally Directed Medical Research Programs - Department of Defense
Exosomes for Oral Delivery for Treatment of Diabetes
Principal Investigator, Sanofi iAwards
CHIARA BELLINI
Assistant Professor, Bioengineering; affiliated faculty, Mechanical and Industrial Engineering
PhD, University of Calgary, 2012
coe.northeastern.edu/people/bellini-chiara

Scholarship focus: diseases of the cardiovascular system; effects of cell-mediated growth and remodeling processes on tissue and organ mechanics; cardiovascular outcomes of chronic exposure to environmental toxins

SELECTED PUBLICATIONS
A. Korneva, L. Zilberberg, D.B. Rifkin, J.D. Humphrey, C. Bellini
Absence of LTBP-3 Attenuates the Aneurysmal Phenotype But Not Spinal Effects on the Aorta in Marfan Syndrome, Biomechanics and Modeling in Mechanobiology, 18(1), 2019, 261-273
C. Bellini, N.J. Kristofik, M.R. Bersi, T.R. Kyriakides, J.D. Humphrey
Comparison of Ten Murine Models Reveals a Distinct Biomechanical Phenotype in Thoracic Aortic Aneurysms, Journal of the Royal Society Interface, 14(130), 2017
M.R. Bersi, C. Bellini, J. Wu, K. Montaniel, D.G. Harrison, J.D. Humphrey
Excessive Adventitial Remodeling Leads to Early Aortic Maladaptation in Angiotsin-Induced Hypertension, Hypertension, 67(5), 2016, 890-896
C. Bellini, S. Wang, D.M. Milewicz, J.D. Humphrey
Myh11 R247C/R247C Mutations Increase Thoracic Aorta Vulnerability to Intramural Damage Despite a General Biomechanical Adaptivity, Journal of Biomechanics, 48(1), 2015, 113-121

SELECTED RESEARCH PROJECTS
Health Consequences Following Acute and Chronic Firefighter Exposure to Wildland Fire Smoke
Principal Investigator, Department of Homeland Security, Federal Emergency Management Agency
Pulmonary and Cardiovascular Health Consequences Following Electronic Cigarette Exposure
Principal Investigator, National Institute of Health

SIDI A. BENCHERIF
Assistant Professor, Chemical Engineering; affiliated faculty, Bioengineering
PhD, Carnegie Mellon University, 2009
coe.northeastern.edu/people/bencherif-sidi

Scholarship focus: polymer chemistry; polymer engineering; material science and engineering; biomedical engineering; drug/cell delivery; 3D scaffolds; tissue engineering; regenerative medicine; biomaterials for immunotherapy; immunoengineering

Honors and awards: National Science Foundation CAREER Award, Thomas Jefferson Award, Burroughs-Wellcome Fund Travel Award, DFCI/Northeastern University Joint Program Award, Acta Biomaterialia Outstanding Reviewer Award

SELECTED PUBLICATIONS
Latest Advances in Cryogel Technology for Biomedical Applications, Advanced Therapeutics, 2019, 1800114
A. Memic, T. Abdula, H. Mohammed, K.J. Navare, T. Colombani, S.A. Bencherif
Latest Progress in Electrospun Nanofibers for Wound Healing Applications, ACS Applied Bio Materials, 2, 2019, 952-969
M. Rezaeeyazdi, T. Colombani, A. Memic, S.A. Bencherif
Injectable Hyaluronic Acid-Co-Gelatin Cryogels for Tissue Engineering Applications, Materials, 2018, 11, 1374
Injectable Scaffold-Based Whole Tumor Cell Vaccines, Nature Communications, 6, 2015, 7556
O. Chaudhuri, L. Gu, D. Klumpers, M. Darnell, S.A. Bencherif, J.C. Weaver, N. Huebsch, D.J. Mooney
Substrate Stress Relaxation Regulates Cell Spreading, Nature Communications, 6, 2015, 6365

SELECTED RESEARCH PROJECTS
Biomaterials for Wound Healing and Diabetic Ulcer Treatment
Co-Investigator, King Abdulaziz University
Cryogel-Supported Liver-On-A-Chip for Ex-vivo Hepatotoxicity and Anticancer Drug Screening
Principal Investigator, Burroughs-Wellcome Fund
Modulating Local Tumor Hypoxia using Cryogel Scaffolds to Regulate Dendritic Cell Function and Activity
Principal Investigator, National Science Foundation
PENNY BEUNING

Professor, Chemistry and Chemical Biology; affiliated faculty, Bioengineering

PhD, University of Minnesota, 2000
coe.northeastern.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

Site-Specific Reversible Protein Modification: Transglutaminase-Catalyzed Glutamine Conjugation and Bioorthogonal Light-Mediated Removal, Bioconjugate Chemistry, 30, 2019, 1617-1621

Characterization of Nine Cancer-Associated Variants in Human DNA Polymerase K, Chemical Research in Toxicology, 31, 2018, 697-711

Functional Classification of Protein Structures by Local Structure Matching in Graph Representation, Protein Science, 27, 2018, 1125-1135

Prediction of Active Site and Distal Residues in E. coli DNA Polymerase III Alpha Polymerase Activity, Biochemistry, 57(7), 2018, 1063–1072

N.M. Antczak, M. Packer, X. Lu, K. Zhang, P.J. Beuning
Human Y-Family DNA Polymerase Kappa is more Tolerant to Changes in its Active Site Loop than its Ortholog E. coli DinB, Chemical Research in Toxicology, 30(11), 2017, 2002–2012

SELECTED RESEARCH PROJECTS

Dynamics of Processivity Clamp Proteins in Bacterial DNA Replication
Principal Investigator, National Institutes of Health

Molecular Mechanisms of Polymerase Management
Principal Investigator, National Science Foundation

AHMED BUSNAINA

William Lincoln Smith and University Distinguished Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering; affiliated faculty, Electrical and Computer Engineering

PhD, Oklahoma State University, 1983
coe.northeastern.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; Fellow, National Academy of Inventors; Fulbright Senior Scholar, Outstanding Translational Research Award, Søren Buus Outstanding Research Award, College of Engineering

SELECTED PUBLICATIONS

Z. Chai, H. Jeong, S.A. Abbasi, A.A. Busnaina

Z. Chai, J. Seo, S.A. Abbasi, A. Busnaina

Z. Chai, J. Seo, S.A. Abbasi, A. Busnaina
Characterization of Nine Cancer-Associated Variants in Human DNA Polymerase K, Chemical Research in Toxicology, 31, 2018, 697-711

Functional Classification of Protein Structures by Local Structure Matching in Graph Representation, Protein Science, 27, 2018, 1125-1135

Prediction of Active Site and Distal Residues in E. coli DNA Polymerase III Alpha Polymerase Activity, Biochemistry, 57(7), 2018, 1063–1072

N.M. Antczak, M. Packer, X. Lu, K. Zhang, P.J. Beuning
Human Y-Family DNA Polymerase Kappa is more Tolerant to Changes in its Active Site Loop than its Ortholog E. coli DinB, Chemical Research in Toxicology, 30(11), 2017, 2002–2012

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
REBECCA L. CARRIER

Professor and Associate Chair of Research, Chemical Engineering; affiliated faculty, Bioengineering
PhD, Massachusetts Institute of Technology, 2000
coe.northeastern.edu/people/carrier-rebecca

Scholarship focus: intestinal tissue engineering, retinal regenerative medicine, oral drug delivery

Honors and awards: Fellow, American Institute for Medical and Biological Engineering; College of Engineering Soren Buus Outstanding Research Award; Society for Biomaterials Member-At-Large (2018-2019); College of Engineering Faculty Fellow; National Science Foundation CAREER Award

SELECTED PUBLICATIONS

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

J.Y. Lock, T.L. Carlson, C.M. Wang, A. Chen, R.L. Carrier
Acute Exposure to Commonly Ingested Emulsifiers Alters Intestinal Mucus Structure and Transport Properties, Scientific Reports, 8(1), 2018, 10008

T.L. Carlson J.Y. Lock R.L. Carrier
Engineering the Mucus Barrier, Annual Reviews in Biomedical Engineering, 20, 2018, 197-220

Integrated Gut/Liver Microphysiological Systems Elucidates Inflammatory Inter-Tissue Crosstalk, Biotechnology and Bioengineering, 114(11), 2017, 2648-2659

Complex, Multi-Scale Small Intestinal Topography Replicated in Cellular Growth Substrates Fabricated via Chemical Vapor Deposition of Parylene C, Biofabrication, 8(3), 2016, 0350110

SELECTED RESEARCH PROJECTS

Impact of Lipids and Food on Oral Compound Absorption: Mechanistic Studies and Modeling
Principal Investigator, National Institutes of Health
GuMi: New In Vitro Platforms to Parse the Human Gut Epithelial-Microbiome-Immune Axis
Principal Investigator, National Institutes of Health

PAUL CHAMPION

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

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

Honors and awards: National Institutes of Health 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)

SELECTED PUBLICATIONS

A. Benabbas, P.M. Champion

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

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

A. Benabbas, Y. Sun, T.L. Poulos, P.M. Champion

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

SELECTED RESEARCH PROJECTS

Electron-Nuclear Coupling, Charge Transport, and Catalysis in Biomolecules: The Role of Vibrational and Conformational Dynamics
Principal Investigator, National Science Foundation
SAMUEL CHUNG
Assistant Professor, Bioengineering
PhD, Harvard University, 2009
ceo.northeastern.edu/people/chung-samuel

Scholarship focus: brain cell regeneration, automated microscopy and laser surgery, user-friendly and low-cost fluorescence microscopy

Honors and awards: Newport Spectra-Physics Research Excellence Award, Edmund Optics Educational Award Finalist

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

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; director, Institute for Chemical Analysis of Living Systems (CILS)
PhD, University of Michigan, 1999
ceo.northeastern.edu/people/clark-heather

Scholarship focus: optical nanosensors for biological analysis

SELECTED PUBLICATIONS
J. Morales, R.H. Pawle, N. Akkilic, Y. Luo, M. Xavierselvan, R. Albokhari
DNA-Based Photoacoustic Nanosensor for Interferon Gamma Detection, ACS sensors 4(5), 2019, 1313-1322
G. Rong, E.E. Tuttle, A.N. Reilly, H.A. Clark
Recent Developments in Nanosensors for Imaging Applications in Biological Systems, Annual Review of Analytical Chemistry 12, 2019, 109-128
Imaging Sodium Flux During Action Potentials in Neurons with Fluorescent Nanosensors and Transparent Microelectrodes, ACS Sensors, 3(12), 2018, 2499-2505
Y. Luo, E. Kim, C.A. Flask, H.A. Clark
Nanosensors for Chemical Imaging of the Neurotransmitter Acetylcholine Using MRI, ACS Nano, 12(6), 2018, 5761–5773

SELECTED RESEARCH PROJECTS
ACHMRNS: Nanosensors for Chemical Imaging of Acetylcholine Using MRI
Principal Investigator, National Institutes of Health
Circulating Red Blood Cell Based Nanosensors for Continuous, Real-Time Drug Monitoring
Principal Investigator, National Institutes of Health
Optical Nanosensors Detect Neurotransmitter Release in the Peripheral Nervous System
Principal Investigator, National Institutes of Health
ERIN J. CRAM
Professor, Biology; affiliated faculty, Bioengineering
PhD, University of California, Berkeley, 2000
coe.northeastern.edu/people/cram-erin

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

SELECTED PUBLICATIONS
S. Mortensen, D. Bernal-Franco, L.F. Cole, S. Sathitloetsakun, E.J. Cram, C.W.T. Lee-Parsons

J. Bouffard, A.D. Cecchetelli, C. Clifford, K. Sethi, R. Zaidel-Bar, E.J. Cram
The RhoGAP SPV-1 Regulates Calcium Signaling to Control the Contractility of the Caenorhabditis Elegans Spermatheca during Embryo Transits, Molecular Biology of the Cell, 30(7), 2019, 907-922

C.A. Kelley, A.C.E. Wirshing, R. Zaidel-Bar, E.J. Cram
The Myosin Light-Chain Kinase MLCK-1 Relocalizes during Caenorhabditis Elegans Ovulation to Promote Actomyosin Bundle Assembly and Drive Contraction, Molecular Biology of the Cell, 29(16), 2018, 1975-1991

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

SELECTED RESEARCH PROJECTS
Elucidating the Role of ERM Proteins in Cytoskeletal Orientation in a Contractile Tissue
Principal Investigator, National Science Foundation
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
coe.northeastern.edu/people/dai-guohao

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

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

SELECTED PUBLICATIONS
L. Niklason, G. Dai
Arterial Venous Differentiation for Vascular Bioengineering, Annual Review of Biomedical Engineering, 2018, 4(20), 431-447

C. Xu, W. Lee, G. Dai, Y. Hong

T.B. Dorsey, D. Kim, A. Grath, D. James, G. Dai
Multivalent Biomaterial Platform to Control the Distinct Arterial Venous Differentiation of Pluripotent Stem Cells, Biomaterials, 2018, 185, 1-12

D. Kim, V. Lee, T.B. Dorsey, L.E. Niklason, L. Gui, G. Dai
Neuropilin-1 Mediated Arterial Differentiation of Murine Pluripotent Stem Cells, Stem Cells and Development, 27(7), 2018, 441-455

V.K. Lee, G. Dai
Printing of Three-Dimensional Tissue Analogs for Regenerative Medicine, Annals Biomedical Engineering, 45(1), 2017, 115-131

SELECTED RESEARCH PROJECTS
CAREER: Engineer a Functional 3-D Vascular Niche to Support Neural Stem Cell Self-Renewal
Principal Investigator, National Science Foundation
Differentiation Arterial and Venous Endothelial Cells from Embryonic Stem Cells
Principal Investigator, National Institutes of Health
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
coe.northeastern.edu/people/dennerlein-jack

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

SELECTED PUBLICATIONS
P.C. Dixon, L. Stirling, X. Xu, C.C. Chang, J.T. Dennerlein
J.M. Schiffman
Aging May Negatively Impact Movement Smoothness During Stair Negotiation, Human Movement Science, 60, 2018, 78-86
J.H. Kim, L.S. Marin, J.T. Dennerlein
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. Barbir, J.T. Dennerlein
Evaluating Biomechanics of User-Selected Sitting and Standing Computer Workstation, Applied Ergonomics, 2017
D.S. Asakawa, J.T. Dennerlein, D.L. Jundrich
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

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

Scholarship focus: Optics, microscopy, coherent detection, interaction of light and sound waves, hyperspectral imaging, diffusive optical tomography and ultrasound, lidar and remote sensing, multi-model imaging, Activities include: computer modeling, designing, building and testing of hardware, and processing the resulting data

SELECTED PUBLICATIONS
Z.R. Hoffman, C.A. DiMarzio
Z. R. Hoffman, C.A. DiMarzio
Super-Resolution Structured Illumination in Optically Thick Specimens Without Fluorescent Tagging, Journal of Biomedical Optics, 22(11), 2017, 1–11
A. Vakili, J.L. Hollmann, R.G. Holt, C.A. DiMarzio
Enhanced Tagging of Light Utilizing Acoustic Radiation Force with Speckle Pattern Analysis, Journal of Biomedical optics, 22(10), 2017, 106004
J.L. Hollmann, R. Horstmeyer, C. Yang, C.A DiMarzio
J.L. Hollmann, R. Horstmeyer, C. Yang, C.A. DiMarzio

SELECTED RESEARCH PROJECTS
Coded-Illumination Fourier Ptychography for High-Content MultiModal Imaging
Principal Investigator, National Science Foundation
Light Scattering Research
Principal Investigator, Draper Labs
ENO EBONG

Assistant Professor, Chemical Engineering
affiliated faculty, Bioengineering
PhD, Rensselaer Polytechnic Institute, 2006
coe.northeastern.edu/people/ebong-en

Scholarship focus: studying the means by which endothelial cell mechanotransduction occurs in order to prevent or promote diseases related to blood vessel dysfunction

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

SELECTED PUBLICATIONS
J. Nagatomi, E.E. Ebong (co-editors)
Endothelial Barrier Reinforcement Relies on Flow-Regulated Glycocalyx, a Potential Therapeutic Target, Biohyperology, 2019, 1-19
M.J. Cheng, N.N. Bal, P. Prabakaran, R. Kumar, T.J. Webster, S. Sridhar, E.E. Ebong
I. Harding, R. Mitra, S.A. Mensah, I.M. Herman, E.E. Ebong
The Comparative Effects of High Fat Diet or Disturbed Blood Flow on Glycocalyx Integrity and Vascular Inflammation, Translational Medicine Communications, 3(10), 2018

SELECTED RESEARCH PROJECTS
Atheroprotective vs Atherogenic Glycocalyx Mechanotransduction Mechanisms
Principal Investigator, National Institutes of Health
EMBRACE STEM (Endothelial MechanoBiology Research and multiCultural Education in STEM)
Principal Investigator, National Science Foundation

DENIZ ERDOGMUS

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Florida, 2002
coe.northeastern.edu/people/erdogmus-deniz

Scholarship focus: machine learning, signal and image analytics, cyber-human systems

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

SELECTED PUBLICATIONS
P. Gonzalez-Navarro, Y.M. Marghi, B. Azari, M. Akcakaya, D. Erdogmus
An Event-Driven AR-process Model with Rapid Trial Sequences for EEG-based BCIs, IEEE Transactions on Neural Systems and Rehabilitation Engineering, 2019, 1-1
O. Ozdenizci, D. Erdogmus
Information Theoretic Feature Transformation Learning for Brain Interfaces, IEEE Transactions on Neural Systems and Rehabilitation Engineering, 2019
S. Salehi, S. Khan, D. Erdogmus, A. Gholipour
A. Kocanaogullari, Y.M. Marghi, M. Akcakaya, D. Erdogmus

SELECTED RESEARCH PROJECTS
Autism Inpatient Collection Phase III
Co-Investigator, Simons Foundation Autism Research Initiative
Collaborative Research: Assistive Integrative Support Tool for Retinopathy of Prematurity
Principal Investigator, National Science Foundation
Collaborative Research: EEG-guided Electrical Stimulation for Immersive Virtual Reality
Co-Principal Investigator, National Science Foundation
Collaborative Research: Nested Control of Assistive Robots Through Human Intent Inference
Principal Investigator, National Science Foundation
Collaborative Research: Understanding Motor Cortical Organization Through Engineering Innovation to TMS-based Brain Mapping
Co-Principal Investigator, National Science Foundation
**HUI FANG**  
Assistant Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering and Mechanical and Industrial Engineering  
PhD, University of California, Berkeley, 2014  
coe.northeastern.edu/people/fang-hui

**Scholarship focus:** nano-electronics, bio-electronics, materials surfaces and interfaces  

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

**SELECTED PUBLICATIONS**


Capacitively Coupled Arrays of Multiplexed Flexible Silicon Transistors for Long-Term Cardiac Electrophysiology, *Nature Biomedical Engineering*, 1, 2017, 0038


**SELECTED RESEARCH PROJECTS**

Transforming Neural Interfaces Using Stretchable, Transparent, Multifunctional Nanomesh Microelectrodes  
Principal Investigator, National Science Foundation  
Transfer Printed, Single-Crystalline Si Nanomesh Thin Films  
Principal Investigator, National Science Foundation

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**QIANQIAN FANG**  
Assistant Professor, Bioengineering; affiliated faculty, Electrical and Computer Engineering  
PhD, Dartmouth College, 2005  
coe.northeastern.edu/people/fang-qianqian

**Scholarship focus:** innovations in translational medical imaging devices to better diagnose cancers and understand the human brain, 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**

S. Yan, A.P. Tran, Q. Fang  
A Dual-Grid Mesh-Based Monte Carlo Algorithm for Efficient Photon Transport Simulations in Complex 3-D Media, *Journal of Biomedical Optics*, 24(2), 2019, 020503

P. Cassano, A.P. Tran, H. Katnani, B.S. Bleier, M.R. Hamblin, Y. Yuan, Q. Fang  
Selective Photobiomodulation for Emotion Regulation: Model-Based Dosimetry Study, *Neurophotonics*, 6(1), 2019, 015004

R. Yao, X. Intes, Q. Fang  
Direct Approach to Compute Jacobians for Diffuse Optical Tomography Using Perturbation Monte Carlo-Based Photon “Replay”, *Biomedical Optics Express*, 9, 2018, 4588-4603

L. Yu, F. Nina-Paravecino, D. Kaeli, Q. Fang  
Scalable and Massively Parallel Monte Carlo Photon Transport Simulations For Heterogeneous Computing Platforms, *Journal Biomedical Optics Letters*, 23(1), 2018, 010504

Y. Yuan, L. Yu, Z. Doğan, Q. Fang  

**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  
Next-Generation Optical Brain Functional Imaging Platform  
Principal Investigator, National Institutes of Health
CRAIG FERRIS
Professor, Psychology; affiliated faculty, Bioengineering
PhD, New York Medical College, 1979
coe.northeastern.edu/people/ferris-craig

Scholarship focus: magnetic resonance imaging and neurodegenerative disease

SELECTED PUBLICATIONS
C.F. Ferris, P. Kulkarni, J.R. Yee, M. Nedelman, I.E.M. de Jong
The Serotonin Receptor 6 Antagonist Idalopirdine and Acetylcholinesterase Inhibitor Donepezil Have Synergistic Effects on Brain Activity-A Functional MRI Study in the Awake Rat, Front Pharmacol, 12(8), 2017, 279
BOLD fMRI in Awake Prairie Voles: A Platform for Translational Social and Affective Neuroscience, NeuroImage, 8, 2016, 221-232
Functional Magnetic Resonance Imaging in Awake Transgenic Fragile X Rats: Evidence of Dysregulation in Reward Processing in the Mesolimbic/Habenular Neural Circuit, Translational Psychiatry, 6, 2016, 763
Use of Anisotropy, 3D Segmented Atlas, and Computational Analysis to Identify Gray Matter Subcortical Lesions Common to Concussive Injury from Different Sites on the Cortexd Odor, PLoS One, 10(5), 2015
Distinct BOLD Activation Profiles Following Central and Peripheral Oxytocin Administration in Awake Rats, Front Behavioral Neuroscience, 9, 2015, 245

EDGAR GOLUCH
Associate Professor, Chemical Engineering; affiliated faculty, Bioengineering, Biology, Civil and Environmental Engineering
PhD, University of Illinois, 2007
coe.northeastern.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
M.K. Kimani, J. Mwagi, E.D. Goluch
Bacterial Sample Concentration and Culture Monitoring using a PEG-Based Osmotic System with Inline Impedance and Voltammetry Measurements, Journal of Analysis and Testing, 3(2), 2019, 166-174
M.K. Kimani, R. Loo, E.D. Goluch
 Biosample Concentration Using Microscale Forward Osmosis with Electrochemical Monitoring, Analytical Chemistry, 91, 2019, 7487-7494
P.J. Buch, Y. Chai, E.D. Goluch
Treating Polymicrobial Infections in Chronic Diabetic Wounds, Clinical Microbiology Reviews, 32(2), 2019, e00091-18
Quantification of Colloidal Filtration of Polystyrene Micro-Particles on Glass Substrate Using a Microfluidic Device, Colloids and Surfaces B: Biointerfaces 165, 2018, 381-387
C.R. Santiveri, H.J. Sismaet, M. Kimani, E.D. Goluch
Electrochemical Detection of Pseudomonas Aeruginosa in Polymicrobial Environments, ChemistrySelect, 3(11), 2018 2926-2930
H.J. Sismaet, E.D. Goluch
Electrochemical Probes of Microbial Community Behavior, Annual Review of Analytical Chemistry, 2018
P.N. Abadian, P.J. Buch, E.D. Goluch, J. Li, Z. Zhang
Real-Time Monitoring of Urinary Encrustation Using a Quartz Crystal Microbalance, Analytical Chemistry, 90(3), 2018, 1531-1535

SELECTED RESEARCH PROJECTS
Point-of-Care Test for Identifying Gram-Negative Urinary Tract Infections in Companion Animals
Principal Investigator, National Science Foundation
CHRISTOPHER HASSON

Assistant Professor, Physical Therapy; affiliated faculty, Bioengineering
PhD, UMass Amherst, 2009
coe.northeastern.edu/people/hasson-christopher

Scholarship focus: to understand how the complex interactions between the nervous system, musculoskeletal system and the environment affect movement, control, and learning in humans

SELECTED PUBLICATIONS

C.J. Hasson, S.E. Goodman
Learning to Shape Virtual Patient Locomotor Patterns: Internal Representations Adapt to Exploit Interactive Dynamics, Journal of Neurophysiology, 121(1), 2019, 321-335

C.J. Hasson
An Interactive Simulator for Imposing Virtual Musculoskeletal Dynamics, IEEE Transactions on Biomedical Engineering, 65(3), 2018, 539-549

S.E. Goodman, C.J. Hasson
Elucidating Sensorimotor Control Principles with Myoelectric Musculoskeletal Models, Frontiers in Human Neuroscience, 11, 2017, 531

C.J. Hasson, O. Gelina, G. Woo
Neural Control Adaptation to Motor Noise Manipulation, Frontiers in Human Neuroscience, 10, 2016, 59

C.J. Hasson, J. Manczurowsky
Effects of Kinematic Vibrotactile Feedback on Learning to Control a Virtual Prosthetic Arm, Journal of NeuroEngineering and Rehabilitation, 12(1), 2016, 31

DAVID KAELI

COE Distinguished Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Rutgers University, 1992
coe.northeastern.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

Analyzing and Increasing the Reliability of Convolutional Neural Networks on GPUs, IEEE Transactions on Reliability, 68(2), 2019, 663-677

L. Wang, X. Zhao, D. Kaeli, Z. Wang, L. Eeckhout
Intra-Cluster Coalescing and Distributed-Block Scheduling to Reduce GPU NoC Pressure, IEEE Transactions on Computers, 68(7), 2019, 1064-1076


SELECTED RESEARCH PROJECTS

A Framework of Simultaneous Acceleration and Storage Reduction on Deep Neural Networks Using Structured Matrices
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

TA2: Dynamic Hardware/Software Compilers for High-Level Languages
Principal Investigator, Defense Advanced Research Projects Agency Software-Defined Hardware Program
ALAIN KARMA

Professor, Physics; affiliated faculty, Bioengineering
PhD, University of California at Santa Barbara, 1985
tal.menoset.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
A Multi-Scale Approach to Cardiac Arrhythmia: from the Molecule to the Organ
Co-Principal Investigator, National Institutes of Health Systems Approach to Unraveling the Genetic Basis of Heart Failure
Principal Investigator, National Institutes of Health

TALI KONRY

Affiliated faculty, Bioengineering; assistant professor, Pharmaceutical Sciences
PhD, Ben Gurion University of Negev, 2007
tal.menoset.edu/people/konry-tali

Scholarship focus: Single cell functional multi-omic analysis, Phenotypic drug profiling in droplet microfluidics for better targeting of drug-resistant tumors, Live single cell functional phenotyping and cell-cell communication in droplet nano-liter reactors

Honors and awards: Tufts Clinical and Translational Science Institute Pilot Award, Schumacher Faculty Award

SELECTED PUBLICATIONS
S. Sarkar, P. Sabhachandani, R. Dashnamoorthy, S. Potdar, S. Purvey, A. Beheshti, A. M. Evens, T. Konry
Dynamic Analysis of Human Natural Killer Cell Response at Single-Cell Resolution in B-cell Non-Hodgkin Lymphoma, Frontiers in Immunology, 8, 2017, 1736

Integrated Microfluidic Platform for Rapid Antimicrobial Susceptibility Testing and Bacterial Growth Analysis using Bead Based Biosensor via Fluorescence Imaging, Microchimica Acta, 184(12), 2017, 4619-4628

N. Cohen, S. Sarkar, E. Hondroulis, P. Sabhachandani, T. Konry
Quantification of Intercellular Adhesion Forces Measured by Fluid Force Microscopy, Talanta, 2017

N. Cohen, P. Sabhachandani, S. Sarkar, L. Kahanovitz, N. Lautsch, S. Russell, T. Konry
Microsphere Based Continuous-Flow Immunoassay in a Microfluidic Device for Determination of Clinically Relevant Insulin Levels, Microchimica Acta, 184(3), 2017, 835-841

S. Sarkar, P. Sabhachandani, T. Konry
Ultrasonic Isothermal Detection of Protein Analytes Using Rolling Circle Amplification in Microscale Platforms, Rolling Circle Amplification (RCA), 2016, 85-97

Dynamic Analysis of Immune and Cancer Cell Interactions at Single Cell Level in Microfluidic Droplets, Biomicrofluidics, 11(10), 2016, 704-709
ABIGAIL KOPPES
Assistant Professor, Chemical Engineering, Affiliated Faculty, Bioengineering
PhD, Rensselaer Polytechnic Institute, 2013
coe.northeastern.edu/people/koppes-abigail

Scholarship focus: bioelectric medicine, development of novel interventions and tissue engineered platforms for nerve regeneration and repair, body-on-a-chip for enteric-gut interactions

SELECTED PUBLICATIONS
M.L. Puzan, B. Legesse, R.A. Koppes, H. Fenniri, A.N. Koppes
M. Puzan, S. Hosic, C. Ghio, A.N. Koppes
Enteric Nervous System Regulation of Intestinal Stem Cell Differentiation and Epithelial Monolayer Function, Scientific Reports, 8(1), 2018, 6313
D. Ventre, M. Puzan, E. Ashbolt, A.N. Koppes
Photocrosslinkable Gelatin/Tropoelastin Hydrogel Adhesives for Peripheral Nerve Repair, Tissue Engineering Part A, 2018

SELECTED RESEARCH PROJECTS
Biomanufactured Nerve Guidance Channels for Complex Nerve Repair
Co-Principal Investigator, Northeastern University
GUMI: New in Vitro Platforms to Parse the Human Gut-Epithelial-Microbiome-Immune Axis
Principal Investigator, National Institutes of Health
Trailblazer: Engineering a Humanized Gut-Enteric-Axis
Principal Investigator, National Institutes of Health

CAROLYN LEE-PASONS
Associate Professor, Chemical Engineering; Jointly appointed, Chemistry; affiliated faculty, Bioengineering
PhD, Cornell University, 1995
coe.northeastern.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, University Excellence in 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. 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, 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. Cram, C.W.T. Lee-Parsons

SELECTED RESEARCH PROJECTS
Zinc Finger (ZCT) Transcription Factors: Pivotal Regulators of Growth, Development, and Alkaloid Biosynthesis in Catharanthus Roseus
Principal Investigator, National Science Foundation
DANIELLE LEVAC
Assistant Professor, Physical Therapy, Movement and Rehabilitation Science; affiliated faculty, Bioengineering
PhD, McMaster University, 2012
coe.northeastern.edu/people/levac-danielle

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

Honors and awards: Early Career Investigator Award, International Society for Virtual Rehabilitation

SELECTED PUBLICATIONS
R. Proffitt, S. Glegg, D.E. Levac, B. Lange
End-User Involvement in Rehabilitation Virtual Reality Implementation Research: Benefits, Challenges and Lessons Learned, Journal of Enabling Technologies, 2019

N. Rohrbach, E. Chicklis, D.E. Levac
What is the Impact of User Affect on Motor Learning in Virtual Environments After Stroke? A scoping review, Journal of NeuroEngineering and Rehabilitation, 16(79), 2019

D.E. Levac, H. Dumas, W. Meleis
Development and Preliminary Usability Evaluation of a Tablet-Based Interactive Movement Tool for Pediatric Rehabilitation, JMIR: Rehabilitation and Assistive Technology, 5(2), 2018, e10307

R. Mills, D. Levac, H. Sveistrup
Kinematics and Postural Muscular Activity During Continuous Oscillating Platform Movement in Children and Adolescents with Cerebral Palsy, Gait & Posture, 66, 2018, 13-20

R. Mills, D.E. Levac, H. Sveistrup
The Effects of a 5-Day Intensive Virtual-Reality Based Exercise Programme on Kinematics and Postural Muscle Activity in Children and Adolescents with Cerebral Palsy – Preliminary Findings, Physical & Occupational Therapy in Pediatrics, 39(4), 2018, 1-16

SELECTED RESEARCH PROJECTS
Enhancing Transfer of Motor Skill Learning from Virtual to Physical Environments in Children with Cerebral Palsy
Principal Investigator, National Institutes of Health K01

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

EREL LEVINE
Associate Professor, Bioengineering
PhD, Weizmann Institute of Science, 2005
coe.northeastern.edu/people/levine-erel

Scholarship focus: systems and synthetic biology of the Brain-Immune-Gut super-system; Interactions among hosts and microbes; Deep learning approaches to interpreting biological data and designing biomedical solutions

Honors and awards: National Science Foundation Postdoctoral Fellowship, Center for Theoretical Biological Physics

SELECTED PUBLICATIONS
K.S. Lee, E. Levine

E. Korkmazhan, H. Teimouri, N. Peterman, E. Levine
The Dynamics of Translation can Determine the Spatial Organization of Membrane-Bound Proteins and their mRNA, National Academy of Sciences, 114(51), 2017, 13424-13429

M. Scholtz, A. Diner, D. Biron, E. Levine
Feeding Dynamics are Controlled by the Need for Energy and for Information, National Academy of Sciences, 114(35), 2017, 9261-9266

H. Teimouri, E. Korkmazhan, J. Stavans, E. Levine
ESub-Cellular mRNA Localization Modulates the Regulation of Gene Expression by Small RNAs in Bacteria, Physical Biology, 14(5), 2017, 056001

A. Bitran, W.Y. Chiang, E. Levine, M. Prentiss

K.S. Lee, S. Iwanir, R. Kopito, D. Biron, E. Levine
Regulation of Food Uptake by Serotonin-Dependent Balance Between Two Modes of Feeding, Nature Communications, 8, 2017, 1422

SELECTED RESEARCH PROJECTS
Sub-Cellular Localization and Small RNA and Regulation of the Outer Membrane
Principal Investigator, National Science Foundation
HERBERT LEVINE

University Distinguished Professor, Physics, jointly appointed in Bioengineering
PhD, Princeton University, 1979
coe.northeastern.edu/people/levine-herbert

Scholarship focus: eukaryotic chemotaxis, using Dictyostelium as a model system; mechanics of cell motility, being studied both at the single cell and multicellular levels; Spatial organization of bacterial colonies, including coupling to genetic decision-making circuits, a new effort on the physics of cancer

Honors and awards: Member, National Academy of Sciences, Member, American Academy of Arts and Sciences, Fellow, American Physical Society, Alfred P. Sloan Foundation Research Fellowship (1988)

SELECTED PUBLICATIONS

M.K. Jolly, S.A. Mani, H. Levine
Hybrid Epithelial/Mesenchymal Phenotype(s): The ‘Fittest’ for Metastasis?, Biochimica et Biophysica Acta Reviews on Cancer (BBA), 2018

Elucidating the Metabolic Plasticity of Cancer: Mitochondrial Reprogramming and Hybrid Metabolic States, Cells, 7(3), 2018, 21

Stress-Induced Plasticity of Dynamic Collagen Networks, Nature Communications, 8(1), 2017, 842

J.T. George, D.A. Kessler, H. Levine
Effects of Thymic Selection on T Cell Recognition of Foreign and Tumor Antigenic Peptides, Proceedings of the National Academy of Sciences, 114 (38), 2017, E7875-E7881

M.K. Jolly, K.E. Ware, S. Gilja, J.A. Somarelli, H. Levine
EMT and MET: Necessary or Permissive for Metastasis?, Molecular Oncology, 11 (7), 2017, 755-769

M.K. Jolly, M. Boareto, B. Huang, D. Jia, M. Lu, E. Ben-Jacob, J.N. Onuchic
Implications of the Hybrid Epithelial/Mesenchymal Phenotype in Metastasis, Frontiers in Oncology, 5, 2015, 155

SELECTED RESEARCH PROJECTS

The Cancer-Immune Interaction
Principal Investigator, Stand Up to Cancer and the Breast Cancer Foundation

The Role of Epithelial Plasticity in Cancer Metastasis
Principal Investigator, National Science Foundation

KIM LEWIS

Professor, Biology; affiliated faculty, Bioengineering
PhD, Moscow University, 1980
coe.northeastern.edu/people/lewis-kim

Scholarship focus: molecular microbiology; antimicrobial drug tolerance; drug discovery

SELECTED PUBLICATIONS

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


B. Sharma, A.V. Brown, N.E. Matluck, L.T. Hu, K. Lewis
Borrelia Burgdorferi, the Causative Agent of Lyme Disease, Forms Drug-Tolerant Persister Cells, Antimicrob Agents Chemother, 59, 2015, 4616-4624


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
JIAHE LI
Assistant Professor, Bioengineering
PhD, Cornell University, 2015
coe.northeastern.edu/people/li-jiahe

Scholarship focus: oral vaccine, host and oral microbiome interactions, microbiome engineering, and protein engineering-based cancer immunotherapy

Honors and awards: David Koch Institute Quinquennial Postdoctoral Fellowship

SELECTED PUBLICATIONS
J. Li, Y. He, W. Wang, C. Wu, C. Hong, P.T. Hammond
Polyamine-Mediated Stoichiometric Assembly of Ribonucleoproteins for Enhanced mRNA Delivery, Angewandte Chemie, 2017
Regulation of ATP Utilization During Metastatic Cell Migration by Collagen Architecture, Molecular Biology of the Cell, 2017
J. Li, W. Wang, Y. He, Y. Li, E. Yan, D.J. Irvine, P.T. Hammond
Structurally Programmed Assembly of Translation Initiation Nanoplex for Superior mRNA Delivery, CS Nano, 11(3), 2017, 2531-2544
J. Li, C.C. Sharkey, J. Liesveld, M.R. King.
Genetic Engineering of Platelets to Neutralize Circulating Tumor Cells, J Control Release, 228, 2016, 38-47
Platelet Membrane-Functionalized Particles to Target Tumor Cell-Associated Micro-Thrombi, Biomaterials, 76, 2016, 52-65
S. Chandrasekaran, M.F. Chan, J. Li, M.R. King
Super Natural Killer Cells that Target Metastases In The Tumor Draining Lymph Nodes, Biomaterials, 77, 2016, 66-76
C.C. Sharkey, J. Li, S. Roy, Q. Wu, M.R. King
Two-Stage Nanoparticle Delivery of Piperlongumine and Tumor Necrosis Factor-Related Apoptosis-Inducing Ligand (TRAIL) Anti-Cancer Therapy, Technology, 2016

SELECTED RESEARCH PROJECTS
Nanobiotech Center Training Grant
Principal Investigator, Cornell Nanobiotech Center

YINGZI LIN
Professor, Mechanical and Industrial Engineering; affiliated faculty appointed in: Bioengineering
PhD, University of Saskatchewan, 2004
coe.northeastern.edu/people/lin-yingzi

Scholarship focus: human-machine interactions, interface design and user experiences, system integration and evaluation; smart systems and nonintrusive sensors, human friendly mechatronics, human state detection and information fusion; human factors in transportation and healthcare

Honors and awards: National Science Foundation CAREER Award

SELECTED PUBLICATIONS
Influence of Mental Workload on Detecting Information Varieties Revealed by Mismatch Negativity During Flight Simulation, International Journal of Industrial Ergonomics, 64, 2018, 1–7
B. Liang, Y. Lin
Using Physiological and Behavioral Measurements in a Picture-Based Road Hazard Perception Experiment to Classify Risky and Safe Drivers, Transportation Research Part F: Psychology and Behaviour, 58, 2018, 93-105
Y. Lin, J. Breugelmans, M. Iverson, D. Schmidt
H. Cai, Y. Lin
Y. Lin

SELECTED RESEARCH PROJECTS
CAREER: Bridging Cognitive Science and Sensor Technology: Nonintrusive and Multimodality Sensing in Human Machine Interactions
Principal Investigator, National Science Foundation
Novel Computational Methods for Continuous Objective Multimodal Pain Assessment Sensing System (COMPASS)
Principal Investigator, National Science Foundation
CAROL LIVERMORE
Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering, Electrical and Computer Engineering
PhD, Harvard University, 1998
coe.northeastern.edu/people/livermore-clifford-carol

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

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

SELECTED PUBLICATIONS
X. Xie, M. Bigdeli Karimi, S. Liu, B. Myanganbayar, C. Livermore
Micro Motion Amplifiers for Compact Out-of-Plane Actuation, Micromachines, 9(7), 2018, 365
X. Xie, C. Kelly, T. Liu, R.J. Lang, S. Gandolfo, Y. Boukataya, C. Livermore
X. Xie, C. Livermore
C. Yang, X. Xie, S. Liu, C. Livermore
C. Yang, 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

SELECTED RESEARCH PROJECTS
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
coe.northeastern.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 Synthase A8 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
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
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, Biochemistry, 55, 2016, 3251-3260
J. Liu, J.I. Kim, J.C. Cusumano, C. Chapple, N. Venugopalan, R.F. Fischetti, L. Makowski
The Impact of Alterations in the Lignin Biosynthetic Pathway on Molecular Architecture of the Plant Cell Wall, Biotechnology For Biofuels, 9, 2016, 126-143

SELECTED RESEARCH PROJECTS
An Integrated Process for Identifying Lead Compounds for “Non-Druggable” Targets using Biophysical Screening, X-ray Solution Scattering and Single Crystal Diffraction
Principal Investigator, Zenobia Therapeutics, Inc
Center for Direct Catalytic Conversion of Biomass to BioFuels (C3Bio)
Co-Investigator, Department of Energy
WALEED MELEIS

Interim Associate Dean of Graduate Education, Associate Professor and Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Michigan, 1996
coe.northeastern.edu/people/meleis-waleed

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

Honors and awards: COE Outstanding Faculty Service Award in, COE Fostering Engineering Innovation in Education Award; Black Engineering Student Society Professor Appreciation Award; Invited to represent 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, W. Meleis
Adaptive Adjacency Kanerva Coding for Memory-Constrained Reinforcement Learning, In International Conference on Machine Learning and Data Mining in Pattern Recognition (MLDM), Springer, New York, 2018

D. Levac, H. Dumas, W. Meleis
Development and Preliminary Usability Evaluation of a Tablet-Based Interactive Movement Tool for Pediatric Rehabilitation, JMIR Rehabilitation Assistive Technologies 25(2), 2018, e1030

W. Li, F. Zhou, K. Chowdhury, W. Meleis

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


MARK NIEDRE

Associate Professor and Associate Chair for Research, Bioengineering

PhD, University of Toronto, 2004
coe.northeastern.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

X. Tan, R. Patil, P. Bartosik, J. Runnels, C.P. Lin, M. Niedre
Ultra-Rare In Vivo Flow Cytometry, Scientific Reports, 9(1), 2019, 3366

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

C. Hartmann, R. Patil, C.P. Lin, M. Niedre
Fluorescence Detection, Enumeration and Characterization of Single Circulating Cells In Vivo: Technology, Applications and Future Prospects, Physics in Medicine and Biology, 63 (1), 2017, 01TR01

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. Sznaier, O. Camps, M. Niedre
A Computer Vision Approach to RareCell In Vivo Flow Cytometry, Cytometry A, 83A, 2013, 1113-1123

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; affiliated faculty, Mechanical and Industrial Engineering
PhD, University of San Diego, 2013
doe.northeastern.edu/people/oakes-jessica

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

SELECTED PUBLICATIONS
Patient-Specific Computational Simulations of Hyperpolarized $^3$He MRI Ventilation Defects in Healthy and Asthmatic Subjects, IEEE Transactions of Biomedical Engineering, 66, 2019, 1318-1327
K. Poorbahrami, J.M. Oakes
Regional Flow and Deposition Variability in Adult Female Lungs: A Numerical Simulation Pilot Study, Clinical Biomechanics, 66, 2019, 66: 40-49
J.M. Oakes, S.C. Roth, S.C. Shadden
Airflow Simulations in Infant, Child, and Adult Pulmonary Conducting Airways, Annals of Biomedical Engineering, 46, 2018, 498-512
J.M. Oakes, P. Hofemeier, I.E. Vignon-Clementel, J. Szmitman
Aerosols in Healthy and Emphysematous In Silico Pulmonary Acinar Rat Models, Journal of Biomechanics, 49(11), 2016, 2213-2220

SELECTED RESEARCH PROJECTS
Coupling MRI with Modeling to Assess Treatment Feasibility in Asthma
Principal Investigator, National Institutes of Health
Health Consequences Following Firefighter Exposure to Wildland Fire Smoke
Principal Investigator, Department of Homeland Security, Federal Emergency Management Agency, Assistance to Firefighters Grants Program
Pulmonary Health Consequences Following E-Cigarette Exposure
Principal Investigator, National Institutes of Health

DONALD O’MALLEY

Associate Professor, Biology; affiliated faculty, Bioengineering
PhD, Harvard, 1989
doe.northeastern.edu/people/omalley-donald

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

SELECTED PUBLICATIONS
D.M. 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.M. 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 and Chemical Biology; affiliated faculty, Bioengineering
PhD, Northwestern University, 1978
coe.northeastern.edu/people/ondrechen-mary-jo

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

SELECTED PUBLICATIONS
R.N. Hanson, E. McCaskill, E. Hua, P. Tongcharoensirikul, R. Diis, J.L. Silver, T.A. Coulther, M.J. Ondrechen, D. Labaree, R.B. Hochberg
Synthesis of Benzoylbenzamide Derivatives of 17α-E-Vinyl Estradiol and Evaluation as Ligands for the Estrogen Receptor-a Ligand Binding Domain, Steroids, 144, 2019, 15-20
D.J. MacPherson, C.L. Mills, M.J. Ondrechen, J.A. Hardy
Functional Classification of Protein Structures by Local Structure Matching in Graph Representation, Protein Science, 27, 2018, 1125-1135
Prediction of Active Site and Distal Residues in E. Coli DNA Polymerase III Alpha Polymerase Activity, Biochemistry, 57(7), 2018, 1063-1072

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
Tethering SOD1 Cysteine Pairs with Cyclic Disulfides: a New Method for Protein Stabilization
Co-Principal Investigator, ALS Association

HARI PARAMESWARAN

Assistant Professor, Bioengineering
PhD, Boston University, 2009
coe.northeastern.edu/people/parameswaran-harikrishnan

Scholarship focus: Cell-extracellular matrix interactions, force transmission in multicellular ensembles, asthma, pulmonary physiology

SELECTED PUBLICATIONS
CT Imaging-Based Low-Attenuation Super Clusters in Three Dimensions and the Progression of Emphysema, Chest, 155(1), 2019, 79-87
S.R. Polio, S.E. Stasiak, R.R. Jamieson, J.L. Balestrini, R. Krishnan, H. Parameswaran
Extracellular Matrix Stiffness Regulates Human Airway Smooth Muscle Contraction by Altering the Cell-Cell Coupling, Scientific Reports, 9, 2019, 9564
J. Imsirovic, E. Bartolák-Suki, S.B. Jawde, H. Parameswaran, B. Suki
Blood Pressure-Induced Physiological Strain Variability Modulates Wall Structure and Function in Aorta Rings, Physiological Measurement, 39(10), 2018, 105014
H. Parameswaran, B. Suki
Assessing Structure-Function Relations in Mice Using the Forced Oscillation Technique and Quantitative Histology, Methods in Molecular Biology, 1639, 2017, 77-91
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

SELECTED RESEARCH PROJECTS
Extracellular Determinants of Airway Smooth Muscle Force: A New Paradigm for Sustained Airway Constriction
Principal Investigator, R00 Award, National Institutes of Health
CAREY RAPPAPORT

COE Distinguished Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering; Associate Director, CenSSIS
PhD, Massachusetts Institute of Technology, 1987
coe.northeastern.edu/people/rappaport-carey

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

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

SELECTED PUBLICATIONS
M. Tajdini, B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, A. Morgenthaler, C. Rappaport

Y. Fuse, B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, C. Rappaport
Model-Based Clutter Reduction Method for Forward Looking Ground Penetrating Radar Imaging

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

SARA ROUHANIFARD

Assistant Professor, Bioengineering
PhD, Albert Einstein College of Medicine, 2014
coe.northeastern.edu/people/rouhanifard-sara

Scholarship focus: developing chemical approaches to track, quantify and model the behaviors of RNA processing events and modifications in single cells. Understanding DNA: protein interactions that drive differences in RNA expression

Honors and awards: Ruth S. Kirschstein F32 National Research Service Award

SELECTED PUBLICATIONS
ClampFISH Detects Individual Nucleic Acid Molecules using Click Chemistry–Based Amplification, Nature Biotechnology, 37(1), 2019, 84-89

S.H. Rouhanifard, A.L. Aguilar, L. Meng, K.W. Moremen, P. Wu
Engineered Glycocalyx Regulates Stem Cell Proliferation in Murine Crypt Organoids, Cell Chemical Biology, 25(4), 2018, 439-446

S.H. Rouhanifard, A. Raj
Neutrophils and Ly6Chi Monocytes Collaborate in Generating an Optimal Cytokine Response that Protects Against Pulmonary Legionella Pneumophila Infection, PLOS Pathogens, 13(4), 2017

I.A. Mellis, R. Gupte, A. Raj, S.H. Rouhanifard
Visualizing Adenosine to Inosine RNA Editing in Single Mammalian Cells, Nature Methods, 8, 2017, 801-804

S.H. Rouhanifard, A. Lopez-Aguilar, P. Wu

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-Borne Threats
Principal Investigator, Department of Homeland Security
JEFFREY RUBERTI

Professor, Bioengineering
PhD, Tulane University, 1998
coe.northeastern.edu/people/ruberti-jeffrey

Scholarship focus: tissue engineering of load-bearing matrix (bone, cornea); bioreactor design; multi-scale mechanobiomechanics; statistical mechanics; energetics microscopy; high-resolution imaging; biopolymer self-assembly

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

SELECTED PUBLICATIONS
B. Wingender, P. Bradley, N. Saxena, J.W. Ruberti, L. Gower
Biomimetic Organization of Collagen Matrices to Template Bone-Like Microstructures, Matrix Biology, 52-54, 2016, 384-396
Collagen Network Strengthening Following Cyclic Tensile Loading, Interface Focus, 6(1), 2016
Flow-Induced Crystallization of Collagen: A Potentially Critical Mechanism in Early Tissue Formation, ACS Nano, 10(5), 2016, 5027-5040
Assessing the Impact of Engineered Nanoparticles on Wound Healing Using a Novel in Vitro Bioassay, Nanomedicine, 9(18), 2014, 2803-2815
TGF-β3 Stimulates Stromal Matrix Assembly by Human Corneal Keratocyte-like Cells, Investigative Ophthalmology and Visual Science, 54(10), 2013, 6612-6619

SELECTED RESEARCH PROJECTS
Biomimetic Bone: From Nano to Micro
Principal Investigator, National Science Foundation
Mechanobiology of Matrix Production
Principal Investigator, National Institutes of Health

BAHRAM SHAFAI

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, George Washington University, 1985
coe.northeastern.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 ISIC-AWC; Senior Life Member, Institute of Electrical and Electronics Engineers, Lifetime Achievement Award from World Automation Congress, 2018; Certificate of Appreciation for Technical Seminar Institute of Electrical and Electronics Engineers, Young Professionals

SELECTED PUBLICATIONS
G. Eftekhari Yazdi, H. Nezamfar, M. Moghadamfalahi, M. Akcakaya, B. Shafai, D. Erdogmus
An Adaptive Proportional BCI-Controller for Linear Dynamic Systems, Proceedings of ISIC-AWC, 2018
A. Oghbaee, B. Shafai, S. Nazari
A. Oghbaee, B. Shafai
Eigenvalue Assignment for Positive Discrete-Time Linear Systems, Proceedings of ISIC-AWC, 2018
S. Nazari, B. Shafai
S. Nazari, B. Shafai, A. Oghbaee
B. Shafai, C. Li
A. Oghbaee, B. Shafai, M. Sznaier
SANDRA SHEFELBINE

Professor, Mechanical and Industrial Engineering; joint faculty, Bioengineering

PhD, Stanford University, 2002
coe.northeastern.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

R.B. Woodward, S.J. Shefelbine, R. Vaidyanathan

R. DeSouza, B. Javaheri, R.S. Collinson, C. Chenu, S.J. Shefelbine, P.D. Lee, A.A. Pitsillides

K.P. Chadwick, S.J. Shefelbine, A. Pitsillides, J.R. Hutchinson
Finite-Element Modelling of Mechanobiological Factors Influencing Sesamoid Tissue Morphology in the Patellar Tendon of an Ostrich, Royal Society Open Science, 4(6), 2017, 170133

SELECTED RESEARCH PROJECTS

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

Mechanobiology of Joint Morphogenesis: Manipulating Salamander Limbs
Principle Investigator, National Science Foundation

NIKOLAI SLAVOV

Assistant Professor, Bioengineering; affiliated faculty, Biology

PhD, Princeton University, 2010
coe.northeastern.edu/people/slavov-nikolai

Scholarship focus: single-cell proteomics, Ribosome-mediated translational regulation, quantitative systems biology

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

SELECTED PUBLICATIONS

E. Emmott, M. Jovanovic, N. Slavov
Ribosome Stoichiometry: From Form to Function, Trends in Biochemical Sciences, 44(2), 2019, 95-109

R. Gary Huffman, A. Chen, H. Specht, N. Slavov
DO-MS: Data-Driven Optimization of Mass Spectrometry Methods, Journal of Proteome Research, 18(6), 2019, 2493-2500

B. Budnik, E. Levy, G. Harmange, N. Slavov
SCoPE-MS: Mass Spectrometry of Single Mammalian Cells Quantifies Proteome Heterogeneity During Cell Differentiation, Genome Biology, 19, 2018, 161

H. Specht, N. Slavov
Transformative Opportunities for Single Cell Proteomics, Journal of Proteome Research, 17(8), 2018, 2565-2571

E. Levy, N. Slavov
Single Cell Protein Analysis for Systems Biology, Essays in Biochemistry, 2018, EBC20180014

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

SELECTED RESEARCH PROJECTS

Developing a Technology Platform for Discovering Biomarkers and Drug Targets
Principal Investigator, Sanofi iAward

Ribosome-Mediated Translational Regulation During Stem Cell Differentiation
Principal Investigator, National Institutes of Health
EDUARDO SONTAG

University Distinguished Professor, Electrical and Computer Engineering; jointly appointed, Bioengineering
PhD, University of Florida, 1977
coe.northeastern.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; Bode Prize, IEEE

SELECTED PUBLICATIONS

J.M. Greene, J.L. Gevertz, E.D. Sontag
A Mathematical Approach to Distinguish Spontaneous from Induced Evolution of Drug Resistance during Cancer Treatment, JCO Clinical Cancer Informatics, 3, 2019, 1-20

E.V. Nikolaev, A. Zloza, E.D. Sontag
Immunobiochemical Reconstruction of Influenza Lung Infection -Melanoma Skin Cancer Interactions, Frontiers in Immunology, 10, 2019, 4

M.A. Al-Radhawi, D. Del Vecchio, E.D. Sontag
Multi-Modality in Gene Regulatory Networks with Slow Gene Binding, PLoS Computational Biology, 15, 2019, e1006784

E.V. Nikolaev, S.J. Rahi, E.D. Sontag
Chaos in Simple Periodically-Forced Biological Models, Biophysical Journal, 114, 2018, 1232-1240

T.H. Segall-Shapiro, E.D. Sontag, C.A. Voigt
Engineered Promoters Enable Constant Gene Expression at any Copy Number in Bacteria, Nature Biotechnology, 36, 2018, 352-358

SELECTED RESEARCH PROJECTS

Design Principles of Molecular Computing Using Engineered Enzymes
Co-Principal Investigator, National Science Foundation

Model-Guided Discovery and Optimization of Navy-Relevant Cell-Based Sensors
Co-Principal Investigator, Office of Naval Research

Theory-Based Engineering of Biomolecular Circuits in Living Cells
Co-Principal Investigator, Air Force Office of Scientific Research

BRYAN SPRING

Assistant Professor, Physics; Affiliated Faculty, Bioengineering
PhD, University of Illinois 2008
coe.northeastern.edu/people/spring-bryan

Scholarship focus: targeted photomedicine, biophysical microscopy and cancer biology

Honors and awards: Smith Family Awards Program for Excellence in Biomedical Research; The National Cancer Institute Transition Career Development Award

SELECTED PUBLICATIONS

N. Davoudzadeh, G. Ducourthial, B.Q. Spring
Custom Fabrication and Mode-Locked Operation of a Femtosecond Fiber Laser for Multiphoton Microscopy, Scientific Reports, 9, 2019, 4233

Illuminating the Numbers: Integrating Mathematical Models to Optimize Photomedicine Dosimetry and Combination Therapies, Frontiers of Physics, 7(46), 2019

G. Obaid, B.Q. Spring, S. Bano, T. Hasan

SELECTED RESEARCH PROJECTS

Peering into Cancer Stem Cell Niches to Guide Suppression of Multiple Signaling Loop Pathways
Principal Investigator, Richard and Susan Smith Family Foundation
SRINIVAS SRIDHAR

University Distinguished Professor, Physics; affiliated faculty, Bioengineering, Chemical Engineering
PhD, California Institute of Technology, 1984
coe.northeastern.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
C. Versek, A. Rissmiller, A. Tran, M. Taya, K. Chowdhury, P. Bex, S. Sridhar
Portable System for Neuro-Optical Diagnostics Using Virtual Reality Display, Military Medicine, 184(Issue Supplement_1), 2019, 584-592

P. Baldwin, A.W. Ohman, S. Tangutoori, D.M. Dinulescu, S. Sridhar
Intraperitoneal Delivery of NanoOlaparib for Disseminated Late-Stage Cancer Treatment, International Journal of Nanomedicine, 13, 2018, 8063-8074

Sustained Release Talazoparib Implants for Localized Treatment of BRCA1-deficient Breast Cancer, Theranostics, 7(17), 2017, 4340-4349

SELECTED RESEARCH PROJECTS
CaNCURE: Cancer Nanomedicine Co-ops for Undergraduate Research Experiences
Principal Investigator, National Institutes of Health

Nanoformulations and Sustained Delivery of PARP Inhibitors for Breast Cancer
Principal Investigator, Department of Defense

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

Nanoscale Magnetism of Novel Structures
Principal Investigator, Air Force Research Laboratory

Neuro-Optical Diagnostic System for Macular Degeneration
Principal Investigator, National Institutes of Health

Quantitative Non-Invasive Brain Imaging using Magnetic Nanoparticles
Principal Investigator, National Institutes of Health

ARMEN STEPANYANTS

Professor, Physics; affiliated faculty, Bioengineering
PhD, University of Rhode Island, 1999
coe.northeastern.edu/people/stepanyak-armen

Scholarship focus: theoretical neuroscience, bioimaging & signal processing, integrated modeling, inference, and computing

Honors and awards: NIH/NINDS K25 Mentored Quantitative Career Development Award, Shared first prize at Digital Reconstruction of Axonal and Dendritic Morphology (DIADEM) challenge

SELECTED PUBLICATIONS
S.M.M. Kahaki, S.L. Wang, A. Stepanyants
Accurate Registration of In Vivo Time-lapse Images, SPIE Medical Imaging, 10949, 2019, 109491D

S.L. Wang, S.M.M. Kahaki, A. Stepanyants
Artificial Neural Network Filters for Enhancing 3D Optical Microscopy Images of Neurites, SPIE Medical Imaging, 10949, 2019, 109490G

D. Zhang, C. Zhang, A. Stepanyants
Robust Associative Learning is Sufficient to Explain the Structural and Dynamical Properties of Local Cortical Circuits, Journal of Neuroscience, 2019, 3218

R. Gala, D. Lebrecht, D.A. Sahlender, A. Jorstad, G. Knott, A. Holtmaat, A. Stepanyants

B.E.P Mizusaki, A. Stepanyants, D.B. Chklovskii, P.J. Sjöström
Neocortex: A Lean Mean Memory Storage Machine, Nature Neuroscience, 19(5), 2016, 643-644

J. Chapeton, R. Gala, A. Stepanyants
Effects of Homeostatic Constraints on Associative Memory Storage and Synchronous Connectivity of Cortical Circuits, Frontiers in Computational Neuroscience, 9(74), 2015

SELECTED RESEARCH PROJECTS
Principles of Robust Learning Derived from the Structure and Function of the Cortical Column
Principal Investigator, Air Force

Software for Automated Reconstruction of Structure and Dynamics of Neural Circuits
Principal Investigator, National Institutes of Health

RI Small: Theory of Robust Learning in the Brain
Principal Investigator, National Science Foundation
**DAGMAR STERNAD**

University Distinguished Professor, Biology; jointly appointed: Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, University of Connecticut, 1995
coe.northeastern.edu/people/sternad-dagmar

**Scholarship focus:** motor control and learning, variability and stability, human-robot interaction, dynamic modeling

**Honors and awards:** Faculty of the Year, Award from Residential Life, Klein Lectureship Award; Distinguished Lecturer on Life and the Sciences of Complexity, University of Connecticut

**SELECTED PUBLICATIONS**

Z. Zhang, D. Sternad
The Primacy of Rhythm: How Discrete Actions Merge into a Stable Rhythmic Pattern, *Journal of Neurophysiology*, 121, 2019, 574-587

S. Bazzi, J. Ebert, N. Hogan, D. Sternad

Z. Zhang, D. Guo, M.E. Huber, S.W. Park, D. Sternad

D. Sternad
It’s Not (Only) the Mean that Matters: Variability, Noise and Exploration in Skill Acquisition, *Current Opinion in Behavioral Sciences*, 20, 2018, 183-195

P. Maurice, N. Hogan, D. Sternad
Predictability, Effort, and (Anti-)Resonance in Complex Object Control, *Journal of Neurophysiology*, 120(2), 2018, 765-780

**SELECTED RESEARCH PROJECTS**

Collaborative Research: Learning to Control Dynamically Complex Objects
Co-Investigator, National Science Foundation

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

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

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**MILICA STOJANOVIC**

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering

PhD, Northeastern University, 1993
coe.northeastern.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 and Distinguished Lecturer, IEEE Ocean Engineering Society; Fellow, Institute of Electrical and Electronics Engineers

**SELECTED PUBLICATIONS**

R. Ahmed, M. Stojanovic

A. Tadayon, M. Stojanovic

R. Ahmed, M. Stojanovic

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

Y. Aval, M. Stojanovic

P. Qarabaqi, M. Stojanovic

**SELECTED RESEARCH PROJECTS**

Active Communication, Sensing and Control in Actuated Underwater Sensing Networks
Principal Investigator, Office of Naval Research

Development of a Software-Defined Networking Testbed for the Internet of Underwater Things
Principal Investigator, National Science Foundation
NIAN SUN
Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Stanford University, 2002
coe.northeastern.edu/people/sun-nian-xiang

Scholarship focus: micro/nanofabricated sensors, including antennas, electrochemical gas sensors, magnetic field sensors, strain and pressure sensors, etc.; magnetic, ferroelectric and magnetoelastic materials; RF/microwave magnetic and magnetoelastic devices design, fabrication and testing; materials properties at RF/microwave frequency

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
Highly Sensitive Integrated Flexible Tactile Sensors with Piezoresistive Ge 2 Sb 2 Te 5 Thin Films, npj Flexible Electronics, (1), 2018, 17

Acoustically Actuated Ultra-Compact NEMS Magnetoelastic Antennas, Nature Communications, 8(1), 2017, 296

Coexistence of Low Damping and Strong Magnetoelastic Coupling in Epitaxial Spinel Ferrite Thin Films, Advanced Materials 29(34), 2017, 1701130

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

SELECTED RESEARCH PROJECTS
Novel Implantable Smart Magnetoelastic NanoRFIDs for Large-Scale Neural Magnetic Recording and Modulation
Principal Investigator, National Institutes of Health

NSF Nanosystems Engineering Research Center (ERC) for Translational Applications of Nanoscale Multiferroic Systems (TANMS)
Co-Principal Investigator, National Science Foundation Engineering Research Centers

EUGENE TUNIK
Associate Professor, Physical Therapy, Movement and Rehabilitation Science; affiliated faculty, Bioengineering, Electrical and Computer Engineering
PhD, Rutgers University, 2003
coe.northeastern.edu/people/tunik-eugene

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

SELECTED PUBLICATIONS
G. Chen, M. Yarossi, S. Gordon, S. Gomes, A. Rubakhina, S. Adamovich, E. Tunik
Concurrent tDCS and Mirror Feedback has Additive Effects on M1 Excitability, Brain Stimulation, 10(4), 2018, e39-e40

M. Yarossi, M. Dannhauer, D. Erdogmus, D. Brooks, E. Tunik
Multi-Muscle TMS Mapping Using Subject-Specific FEA models of Induced Currents, Brain Stimulation, 10(4), 2017, e28

L.F. Schettino, S.V. Adamovich, E. Tunik
Coordination of the Pincer Grasp and Transport Following a Haptic Perturbation of the Index Finger, Journal of Neurophysiology, 117(6), 2017, 2292-2297

M. Yarossi, S.V. Adamovich, E. Tunik
Facilitation of Ipsilateral Corticospinal Excitability During Mirror Visual Feedback Requires Target Directed Actions, Frontiers Human Neuroscience, 11, 2017, 242

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

SELECTED RESEARCH PROJECTS
Optimizing Hand Rehabilitation Post-Stroke Using Interactive Virtual Environments
Principal Investigator, National Institutes of Health
Planning and Updating in Frontoparietal Networks for Grasping
Principal Investigator, National Institutes of Health
MENI WANUNU
Associate Professor, Physics; affiliated faculty, Bioengineering
PhD, Weizmann Institute, 2005
coe.northeastern.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
Distance-Dependent Energy Transfer Between CdSe/CdS Quantum Dots and a Two-Dimensional Semiconductor, Applied Physics Letters, 108, 2016, 021101
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
G.-M. Mustata, Y.H. Kim, J. Zhang, W.F. DeGrado, G. Grigoryan, M. Wanunu
Graphene Symmetry Amplified by Designed Peptide Self-Assembly, Biophysical Journal, 110(11), 2016, 2507-2516

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

PAUL WHITFORD
Associate Professor, Physics; affiliated faculty, Bioengineering
PhD, University of California, 2009
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Scholarship focus: dynamics of large-scale molecular machines, working to identify the physical principles that guide biomolecular dynamics, using molecular simulation approaches to interpret experimental data from a wide range of techniques, including biochemical, small-angle X-ray scattering and cryogenic electron microscopy

Honors and awards: National Science Foundation CAREER Award

SELECTED PUBLICATIONS
Nanopore-Based Measurements of Protein Size, Fluctuations, and Conformational Changes, ACS Nano, 11, 2017, 5706-5716
M. Levi, K. Nguyen, L. Dukaye, P.C. Whitford
K. Nguyen, P.C. Whitford
Steric Interactions Lead to Collective Head Tilting During mRNA-tRNA Translocation on the Ribosome, Nature Communications, 7, 2016, 10586

SELECTED RESEARCH PROJECTS
Disorder, tRNA Composition and Energy Transduction in the Ribosome
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
Patrick Bradley  
PhD 2019, Bioengineering; Advisor, Jeffrey Ruberti

On The Physicochemical Control Of Collagen Fibrillogenesis And Biomineralization

Tissue engineered collagen-based scaffolds have been widely explored for their ability to provide a three-dimensional, variable-stiffness extracellular matrix mimic capable of directing local cellular morphology, differentiation, and gene expression. Of the numerous approaches to fabricate collagen scaffolds, the method that most closely emulates the density and architecture of native tissue is the liquid crystal manipulation method. Despite significant advances in the last 25 years, the development of collagen scaffolds from liquid crystal phase solutions still faces two major hurdles: 1) an inability to control orientation of fibril arrays over clinically-relevant distances; 2) an inability to recapitulate the native-state morphology of collagen fibrils in connective tissues. The goal of this dissertation was to overcome the limitations of collagen self-assembly in the crowded state through the tuning of relevant physicochemical assembly parameters.

See full dissertation at coe.northeastern.edu/19/PatrickBradley

Judith Piet  
PhD 2019, Bioengineering; Advisor, Sandra Shefelbine

Restoring Mechano-adaptation In Aged Murine Bone

Osteoporosis is an age-related deterioration of bone mass and structure, which leads to debilitating and costly fractures. Bone is a dynamic tissue that adapts to external loads. In young and mature healthy bone, high loads promote bone formation by osteoblasts, and reduced loads promote bone resorption by osteoclasts. With age, a myriad of factors contribute to bone loss. In particular, the mechano-adaptive response is impaired in old bone, which is the focus of this thesis. The central idea behind this work is that old bone is lacking cells to respond to mechanical cues: compared to young bone, osteoclasts are more numerous and active, osteoblasts are fewer and less active, and mesenchymal stem cells in the marrow tend to differentiate into adipocytes rather than osteoblasts. In turn, osteoclastic resorption overtakes osteoblastic formation. This thesis used a mouse model to examine the decrease in mechano-adaptation in aged bone (over 20 months of age). The research questions underlying this thesis are the following: Is old bone capable of a robust osteogenic response? Can old bone be primed to increase the adaptive response to loading? This thesis used the in vivo tibial loading model to deliver controlled compressive loads, intense treadmill running to deliver physiological loading, and sciatic neurectomy to induce disuse. Marrow aspiration was used to alter marrow adipose content. Intermittent parathyroid hormone (iPTH) and IL-15 were injected to promote a potential systemic response.

See full dissertation at coe.northeastern.edu/19/JudithPiet
Daniel Ventre
PhD 2019, Bioengineering; Advisor, Abigail Koppes

The Effects Of Low Intensity Focused Ultrasound Stimulation On Dorsal Root Ganglia Neurons And Schwann Cells In Vitro

Despite current therapies for peripheral nerve injuries (PNIs), only approximately half of 20 million of patients receiving treatment each year regain satisfactory motor and sensory functionality (Grinsell & Keating, 2014). Both the prevalence and poor prognosis for PNI patients underscore a need for novel treatment options. While electrical stimulation has shown promise for nerve regeneration, it often requires invasive surgery to implant electrodes and can result in scar tissue and introduce infection. Ultrasound stimulation (US) can achieve similar regenerative effects as electrical stimulation but can be delivered completely non-invasively and at sub-millimeter resolution. In fact, US has been shown to facilitate action potential firing and synaptic vesicle release in neurons. To implement US safely as a potential therapy for PNI, the effect of US on neuronal cytoskeletal rearrangement and its effect on proximal glial cells such as Schwann cells (SCs) needs to be investigated further. Therefore, this dissertation aims to expand upon previous studies of US on neurons alone, by observing the impact of US on neuron/SC cocultures and on the SCs alone. In the studies described herein, it was determined that US can enhance neurite outgrowth and branching in DRG neurons in an acoustic intensity-dependent manner in both DRG neuron cultures alone and in DRG/SC cocultures.

See full dissertation at coe.northeastern.edu/19/DanielVentre
Minhal Ahmed, E’19, bioengineering, was selected as a George J. Mitchell Scholar and named the winner of the Harold D. Hodgkinson Achievement Award for 2019, one of the highest honors a senior can receive. He is also a prior recipient of the prestigious Barry Goldwater Scholarship. Ahmed studied the gut microbiome, which refers to the bacteria, virus, and fungi in the intestines while working with Assistant Professor Abigail Koppes’ Advanced Biomaterials for NeuroEngineering Laboratory (ABNEL).