Northeastern University
College of Engineering

BioE

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Scholarship Report

Global Experiential Research University

Founded in 1898, Northeastern is a global, experiential, research university offering undergraduate and graduate programs leading to degrees through the doctorate in nine colleges and schools, and select advanced degrees at graduate campuses in Charlotte, North Carolina, and Seattle,Washington.

Northeastern University
College of Engineering

» WELCOME to the Northeastern University Department of Bioengineering «

Dear Friends,

This first annual scholarship report reflects the exceptional academic and professional accomplishments of the Northeastern University faculty affiliated with the new Bioengineering Department during the 2013-2014 academic year.

Our affiliated faculty includes interdisciplinary scholars from the College of Engineering, the College of Science, and the Bouvé College of Health Sciences--scientists, engineers, and teachers involved in exciting initiatives, pushing forward the cutting edge of research and committed to excellence in teaching.

In the coming year, the Bioengineering Department will be putting Bachelors and Master's degree programs in place to augment the existing Ph.D. program.

With $59 million in annual research expenditures and 134 faculty members, the College of Engineering is expanding in both size and research capabilities. We look forward to a new infrastructure in 2016, adding a 220,000 square foot interdisciplinary science and engineering building which will provide state-of-the art labs.

Our scholars strive to use today's discoveries and research to make tomorrow happen. You can see some highlights of our engineering faculty members at northeastern.edu/tomorrow. We hope you enjoy this book, and we look forward to sharing our future accomplishments in our annual scholarship reports.

Sincerely,

Lee Makowski
Interim Chair of Bioengineering
l.makowski@neu.edu

inside

Key Contacts

Interim Chair
Lee Makowski, l.makowski@neu.edu

Graduate Studies Director
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Program Coordinator
Susan Wilcox, s.wilcox@neu.edu

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QUICK FACTS

COLLEGE QUICK FACTS

134
Faculty Members

Top 50 US Engineering School

Degree Programs

Undergraduate	Graduate
Chemical Engineering	Bioengineering
Chemical Engineering and Physics	Biotechnology
Civil Engineering	Chemical Engineering
Computer Engineering	Civil Engineering
Computer Engineering and Physics	Computer Engineering
Electrical Engineering	Computer Systems Engineering
Electrical and Computer Engineering	Electrical and Computer Engineering
Electrical Engineering and Physics	Electrical Engineering
Industrial Engineering	Energy Systems
Mechanical Engineering	Engineering Management
Mechanical Engineering and Physics	Gordon Engineering Leadership
	Industrial Engineering
	Information Systems
	Interdisciplinary Engineering
	Mechanical Engineering
	Operations Research
	Sustainable Building Systems
	Telecommunication System Management

Federally Funded Multi-Institutional Research Centers

ALERT	Awareness and Localization of Explosives-Related Threats; a Department of Homeland Security Center of Excellence
GORDON-CenSSIS	Bernard M. Gordon Center for Subsurface Sensing and Imaging Systems; a National Science Foundation Engineering Research Center
CHN	Center for High-rate Nanomanufacturing; a National Science Foundation Nanoscale Science and Engineering Center
CURENT	Center for Ultra-wide-area Resilient Electric Energy Transmission Networks; a National Science Foundation Engineering Research Center, jointly supported by NSF and the Department of Energy and led by the University of Tennessee
CHOT	Center for Health Organization Transformation; a National Science Foundation Industry-University Collaborative Research Center led by Texas A & M
HSyE	CMS Innovation Center for Healthcare Systems Engineering; a Department of Health and Human Services Regional Systems Engineering Extension Center
PROTECT	Puerto Rico Testsite for Exploring Contamination Threats; a National Institute of Environmental Health Sciences Superfund Research Program (SRP) Center
VOTERS	Versatile Onboard Traffic Embedded Roaming Sensors; a National Institute of Standards and Technology (NIST) Technology Innovation Program project

BIOENGINEERING
Faculty by Scholarship Focus

Biochemical and Bioenvironmental Engineering

Alshawabkeh, Akram
Carrier, Rebecca
Goluch, Edgar
Gu, April
Hanson, Robert
Hellweger, Ferdinand
Lee-Parsons, Carolyn
Lewis, Kim
Makowski, Lee
Makriyannis, Alex
Murthy, Shashi
Ondrechen, Mary Jo
Zhou, Sunny

Biocomputing

Basagni, Stefano
Cooperman, Gene
Kaeli, David
Leeser, Miriam
Meleis, Waleed

Bioimaging and Signal Processing

Brooks, Dana
Camps, Octavia
DiMarzio, Charles
Dy, Jennifer
Epstein, Michael
Erdogmus, Deniz
Ferris, Craig
Holden, Maureen
Kong, Ying-Yee
Marengo, Edwin
Niedre, Mark
Patel, Rupal
Petrov, Yury
Rappaport, Carey
Ratilal, Purnima
Reilly, Kevin
Shafai, Bahram
Stojanovic, Milica
Tadmor, Gilead
Torchilin, Vladimir

Biomechanics and Mechanobiology

Asthagiri, Anand
Ebong, Eno
Gouldstone, Andrew
Lin, Yingzi
Mavroidis, Dinos
Nayeb-Hashemi, Hamid
Ruberti, Jeffrey
Sceppa, Carmen
Shefelbine, Sandra
Vaziri, Ashkan
Wan, Kai-Tak

BioMEMs/BioNano

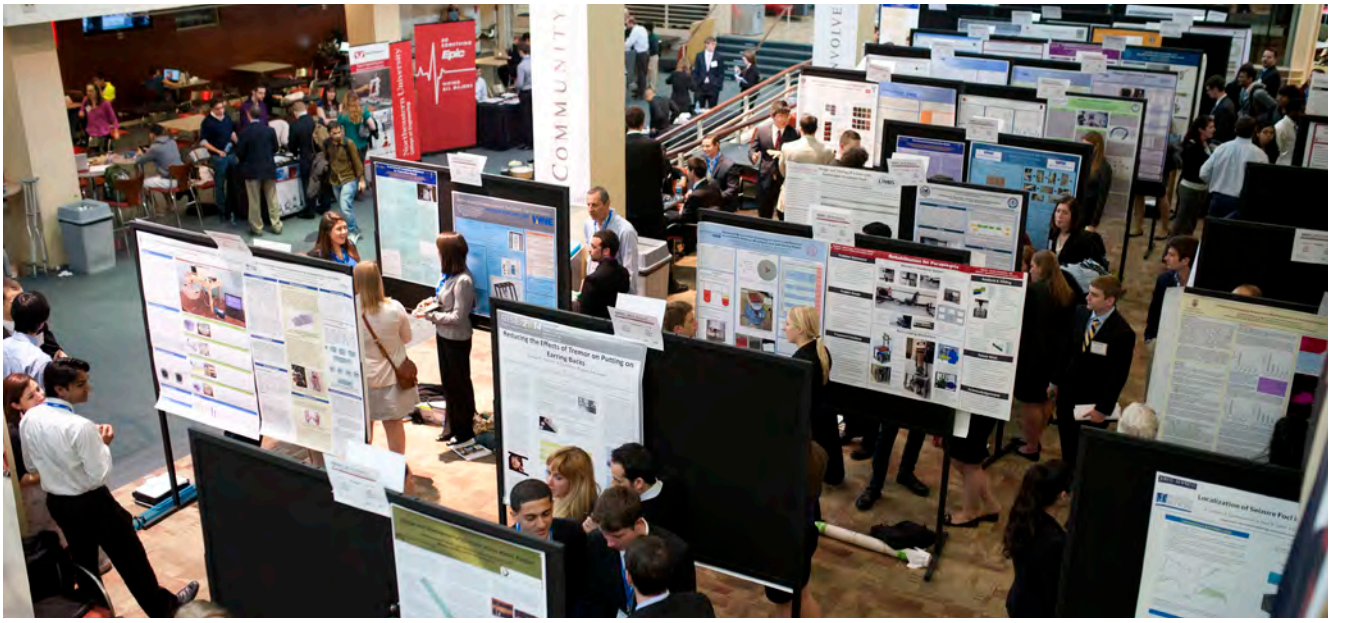
Amiji, Mansoor
Busnaina, Ahmed
Clark, Heather
Dennerlein, Jack
Ekenseair, Adam
Hanson, Robert
McGruer, Nick
Mosallaei, Hossein
Mukerjee, Sanjeev
Murthy, Shashi
Ondrechen, Mary Jo
Rinaldi, Matteo
Ruberti, Jeffrey
Sridhar, Sri
Sun, Nian
Wanunu, Meni
Webster, Thomas
Williams, Mark

Cell & Tissue Engineering

Asthagiri, Anand
Beuning, Penny
Carrier, Rebecca
Cram, Erin
Gouldstone, Andrew
Karma, Alain
Livermore, Carol
O'Malley, Donald
Ruberti, Jeffrey
Wan, Kai-Tak

Motor Control

Ayers, Joseph
Jalili, Nader
Mavroidis, Dinos
Shafai, Bahram
Sipahi, Rifat
Sternad, Dagmar
Sznaier, Mario
Tadmor, Gilead



Bioengineering Conference Draws Global Research Leaders

Curry Student Center buzzed with excitement on Friday as more than 700 researchers from around the world filed in for the 40th annual Northeast Bioengineering Conference, a three-day event on April 25–27 hosted by the College of Engineering.

“Bioengineers inherently are working to help people and it’s wonderful to work with such a great group of people who are motivated by such a noble thing,” said conference co-organizer Rebecca Carrier, an associate professor in Northeastern’s Department of Chemical Engineering.

In opening remarks on Friday, fellow co-organizer Anand Asthagiri noted that the event was held in conjunction with the Biomedical Engineering Society’s Career Connections conference, which drew biomedical engineers to campus to discuss their career paths with students in the field.

“Bioengineering is so intimately connected to improving human life and well being that trainees in this discipline find themselves drawn to a remarkable range of career opportunities in research, industry, medicine, law, business and many other arenas,” said Asthagiri, an associate professor of chemical engineering at Northeastern. “We wanted to give conference attendees a platform not only to share their scientific and engineering advances, but also to explore the many ways they can translate bioengineering advances to impact society.”

After a morning session devoted to career talks, more than 100 teams of undergraduate students participated in an engineering design poster competition, which kicked off the start of the NEBEC portion of the event. Ten Northeastern teams presented on topics ranging from designing new earring backs for people with essential tremor to developing better breast cancer detection methods.

“I like the effect that bioengineering has on human life,” said Maggie McGuire, E’14, who participated in the competition with her senior capstone teammates. “You can still use engineering and math to have an impact on wellness.”

Over the next two days, 65 researchers presented current work during 13 platform sessions, touching on aspects of bioengineering ranging from drug delivery to human dynamics.

In opening remarks on Friday, Northeastern professor of electrical and computer engineering Lee Makowski discussed the university’s recently formed bioengineering department. In five months, the program has amassed 80 affiliated faculty members representing every department in the College of Engineering, the College of Science, and the Bouvé College of Health Sciences.

When they were developing the program, Makowski and his colleagues probed other field leaders for their definitions of bioengineering. “Everyone gave a very firm and different answer,” he said. “What we decided was that for Northeastern, bioengineering was really engineering in the biological context.”

Engineering is a design discipline, he explained, and the way one designs is entirely dependent on the environment in question. “Depending on the environment that you’re designing for, you’re going to have different constraints, different tolerances, different material requirements,” Makowski said. “Those are very different constraints in the engineering process than if you were designing for an internal combustion engine, for instance.”

In platform sessions, researchers from five Northeastern labs discussed their approaches to designing for the biological environment. Another six Northeastern labs were represented during poster sessions on Saturday and Sunday, which drew more than 250 abstracts.

Stacey Markovic, a student who conducts research in chemical engineering professor Thomas Webster’s lab, won a competition among graduate researchers for delivering the Most Outstanding Graduate Student Paper and Poster Presentation. Nil Tandogan, a student who works in chemical engineering assistant professor Ed Goluch’s lab, received an honorable mention.

“Bioengineering is a focus we’ve decided to emphasize here at Northeastern,” said Nadine Aubry, dean of the College of Engineering, in her opening remarks on Saturday. “Northeastern has made tremendous contributions to this field so far but it’s about to make even more.”

Can Current Stimulate Smarts?

"I'm not yet convinced it's going to work," Misha Pavel, an expert in neural engineering and a professor of practice at Northeastern University, said of the possibility of applying low-level current to the scalp as a means of improving intelligence.

But that skepticism has only inspired Pavel and his colleagues, including associate professor of electrical and computer engineering Deniz Erdogmus, to work even harder on a project aimed at exploring their innovative research. They recently received a contract to study the phenomenon from the Strengthening Human Adaptive Reasoning and Problem-solving Program, known as SHARP. The program is sponsored by the Intelligence Advanced Research Projects Activity, a government agency that invests in high-risk, high-payoff research.

Researchers at Oxford University, who are part of the same SHARP team as Erdogmus and Pavel, previously demonstrated that applying transcranial current stimulation helps children perform better on mathematics problems. "The question is how well does this method work for improving fluid intelligence," said Pavel, who holds joint appointments in the College of Computer and Information Science and the Bouvé College of Health Science.

Fluid intelligence, he explained, is the ability to think logically and solve problems in novel situations, independent of acquired knowledge. It's an intuitive concept, he said, and it involves several types of brain processes including attention, working memory, inhibition, and the ability to shift rapidly between tasks.

To begin answering its research question, the team—which is led by Honeywell, and also includes collaborators at Beth Israel Deaconess Medical Center—will take advantage of Erdogmus' expertise in developing algorithms and models for measuring these processes using brain activity.

Erdogmus has more than a decade of experience working with brain-controlled interfaces, having developed technologies that allow users to control a robot or computer with nothing but the power of his or her mind through electrical activity generated in the brain. More recently, he's been applying insights from that work to expand our knowledge of the human brain and its capacity for learning.

"So far we've been primarily measuring brain signals and trying to make sense of them," Erdogmus said. "Now for the first time we'll actually be trying to stimulate the brain in order to change the way it operates."

From his previous research, Erdogmus knows that certain regions of the brain are more active during different kinds of learning. For instance, when a student is focusing all his attention on a single task, the frontal cortex and basal ganglia appear to be more active, he said. The team plans to use this knowledge to develop effective transcranial stimulation protocols to improve fluid intelligence.

While an intervention for improving intelligence is the program's primary driver, the researchers' work will also provide the brain research community with a greater understanding of the way one of the world's most mysterious machines—the brain—actually works.

"You have 100 billion neurons in your brain and they work relatively well—for most of us—and do such complex things that we can't yet program computers to do," Pavel said. "It's a mystery."

With its SHARP research—which combines multidisciplinary empirical research with computational modeling—the team hopes to contribute not only to the practical call to improve intelligence, but also to our current understanding of this mysterious machine called the human brain.

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An Eye Toward Better Treatment

Every two months, Northeastern bioengineering graduate student David Walsh's 91-year-old grandmother goes to the doctor to receive a drug injection into her eyes. She has wet age-related macular degeneration. There is no cure, only this invasive, recurring treatment. "She worries a lot because she goes in, they inject her, and she leaves, and since the effect of the drugs is so gradual, she doesn't know if it's working or not," said Walsh. "She worries that maybe she got too much drug, not enough drug, or if the drug is doing anything at all for her condition." David Walsh and his grandmother, Alice Neves, who has age-related macular degeneration and was an inspiration for Walsh's research. To solve this problem, Walsh is developing a device that will provide valuable feedback to patients such as his grandmother and their clinicians. As a member of associate professor of chemical engineering Shashi Murthy's lab, Walsh helps design microfluidic devices that use a single drop of blood or other bodily fluid to diagnose a range of diseases. In work recently reported in the journal Lab On a Chip, Walsh and his colleagues have created a device that monitors the efficacy of treatments for two eye diseases: age-related macular degeneration and diabetic retinopathy. "These are diseases where little blood vessels grow in the back of the eye and can pop your retina off or obscure your vision," Walsh explained. This, he said, is due to increased levels of a molecular biomarker called vascular endothelial growth factor, or VEGF. The standard treatments for these two eye diseases involve using drugs that bind to VEGF, thereby blocking its ability to interact with the cellular environment and causing blood vessel growth. These drugs are injected directly into the eye typically every four to six weeks, and often over the course of a lifetime. Walsh said the invasive nature of treatment and lack of personalized dosage raise patient risk and discomfort. What's more, clinicians don't usually test to confirm the efficacy of treatment. That's because the current diagnostic protocol—ELISA, or enzyme-linked immunosorbent assay—is extremely expensive and time consuming. Unless there's no visible improvement after many injections, it doesn't make sense to do an ELISA test, Walsh explained. That's where his device is different. Each time a patient undergoes a round of treatment, which includes a drug injection directly into the eye, a clinician can also take a very small sample of eye fluid—which contains a plethora of information—and test it in-house in fewer than 20 minutes. The device works like a light switch, where the on-button is only activated when VEGF is present. And the more VEGF, the brighter the light. It's made of two thin disks just a few inches wide, held together by double-sided sticky tape that's been expertly etched into a specific design. That design creates an array of microscopically thin hollow channels into which Walsh inserts three reagents of varying density. The first is the densest and contains a photoactive substrate that glows in the presence of a particular enzyme. The second layer simply acts as a density gradient, while the third layer is the ocular fluid sample that Walsh wants to test. This layer also contains the enzyme as well as some tiny dense beads. Both of these are linked to an antibody specific to VEGF, which allows them to form a complex with the biomarker. Spinning the whole device at very high speed allows these dense complexes to migrate to the layer containing the substrate where the enzyme causes it to ignite. But if there's no VEGF in the sample, the enzyme stays in the least dense layer and no light is produced. The team collaborated with clinicians at the Duke Eye Center in Durham, North Carolina, to obtain fluid samples with which to test the device. It passed with soaring colors, distinguishing not only between patients with age-related macular degeneration or diabetic retinopathy and patients with other diseases, but also between patients who have active and inactive forms of either of these two eye diseases. The devices cost less than $1 and take minutes to assemble and run. With this platform, a clinician wouldn't need a compelling reason to test whether treatment for these two eye diseases is effective—instead, she could look at a patient's VEGF levels every time he came in for treatment. Blood vessel growth without VEGF would be a strong—and early—sign that something else was going on. What's more, lack of reduction of VEGF over a few treatments would indicate a non-responder and allow the clinician to switch to another drug or treatment. Information like this could not only help put Walsh's grandmother—and patients like her—at ease. It could also help diagnose more serious conditions earlier. Separately, Walsh also recently earned a NSF Graduate Research Opportunities Worldwide grant to perform related ocular diagnostic research at the KTH Royal Institute of Technology in Stockholm, Sweden. He will begin that work in September.

AKRAM ALSHAWABKEH

George A. Snell Professor, Civil and Environmental Engineering; affiliated faculty, Bioengineering
PhD, Louisiana State University, 1994. Joined Northeastern in 1997
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Scholarship Focus

- Geotechnical and geoenvironmental engineering
- Soil and groundwater remediation
- Contaminant fate and transport
- Environmental restoration and health

Honors and Awards

- Fellow, American Society of Civil Engineers
- National Science Foundation CAREER Award
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Papers in refereed journals

A. Anaya, I. Padilla, R. Macchiavelli, D. Vesper, J. Meeker, A. Alshawabkeh
Estimating Preferential Flow in Karstic Aquifers Using Statistical Mixed Models, Ground Water Journal, 2013

S. Yuan, P. Liao, A.N. Alshawabkeh
Electrolytic Manipulation of Persulfate Reactivity by Iron Electrodes for Trichloroethylene Degradation in Groundwater, Environmental Science and Technology, 48 (1), 2013, 656-663

S. Yuan, N. Gou, A. Alshawabkeh, A.Z. Gu
Efficient Degradation of Contaminants of Emerging Concerns by a New Electro-Fenton Process with Ti/MMO Cathode, Chemosphere, 93 (11), 2013, 2796–2804

W. Xie, S. Yuan, X. Mao, W. Hu, P. Liao, M. Tong, A. Alshawabkeh
Electrocatalytic Activity of Pd-Loaded Ti/TiO_2 Nanotubes Cathode for TCE Reduction in Groundwater, Water Res., 47 (11), 2013, 3573–3582

J.H. Choi, S. Maruthamuthu, Y.J. Lee, A. Alshawabkeh
Reduction of Nitrate in Agricultural Soils by Bio-Electrokinetics, Soil and Sediment Contamination: An International J., 22 (7), p 767-782, 2013

E. Eseller-Bayat, S. Gokyer, M.K. Yegian, E. Ortakci, A. Alshawabkeh
Design and Application of Simple Shear Liquefaction Box, ASTM Geotechnical Testing Journal 36 (3), 2013, 322-330

E. Eseller-Bayat, M.K. Yegian, A. Alshawabkeh, S. Gokyer
Liquefaction Response of Partially Saturated Sands. I: Experimental Results, Journal of Geotechnical and Geoenvironmental Engineering, 139, 2013, 863-871

E. Eseller-Bayat, M.K. Yegian, A. Alshawabkeh, S. Gokyer
Liquefaction Response of Partially Saturated Sands. II: Empirical Model, Journal of Geotechnical and Geoenvironmental Engineering, 139, 2013, 872-879

AKRAM ALSHAWABKEH continued

E. Eseller-Bayat, S. Gokyer, M.K. Yegian, R.O. Deniz, A. Alshawabkeh
Bender Elements and Bending Disks for Measurement of Shear and Compression Wave Velocities in Large Sand Specimens, ASTM Journal of Geotechnical Testing, 36 (2), 2013, 275-282

J.D. Meeker, D.W. Cantonwine, L.O. Rivera-Gonzalez, K.K. Ferguson, B. Mukherjee, A.M. Calafat, X. Ye, L.V. Anzalota Del Toro, N. Crespo, B. Jimenez-Velez, A. Alshawabkeh, J.F. Cordero
Distribution, Variability and Predictors of Urinary Concentrations of Phenols and Parabens Among Pregnant Women in Puerto Rico, Environmental Science and Technology, 47 (7), 2013, 3439–3447

D. Meric, F. Hellweger, S. Barbuto, N. Rahbar, A. Alshawabkeh, T. Sheahan
Model Prediction of Long-Term Reactive Core Mat Efficacy for Capping Contaminated Aquatic Sediments, Journal of Environmental Engineering, 139 (4), 2013, 564–575

S. Yuan, M. Chen, X. Mao, A. Alshawabkeh
A Three-Electrode Column for Pd-Catalytic Oxidation of TCE in Groundwater With Automatic pH-Regulation and Resistance to Reduced Sulfur Compound Foiling, Water Research, 47 (1), 2013, 269-278

S. Yuan, M. Chen, X. Mao, A. Alshawabkeh
Effects of Reduced Sulfur Compounds on Pd-Catalytic Hydrodechlorination of TCE in Groundwater by Cathodic H_2 Under Electrochemically Induced Oxidizing Conditions, Environmental Science and Technology, 47 (18), 2013, 10502-10509

K. Baek, N. Kasem, A. Ciblak, D. Vesper, I. Padilla, A. Alshawabkeh
Electrochemical Removal of Selenate From Aqueous Solutions, Chemical Engineering Journal, 2013, 678-684

K. Baek, A. Ciblak, X. Mao, E.J. Kim, A. Alshawabkeh
Iron Anode Mediated Transformation of Selenate in Sand Columns, Water Research, 47 (17), 2013, 6538–6545

Research Projects

Puerto Rico Testsite for Exploring Contamination Threats (PROTECT), a National Institute of Environmental Health Sciences Superfund Research Center. PROTECT investigates the relationship between environmental contamination and preterm birth
Principal Investigator, National Institutes of Health

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

MANSOOR AMIJI

Distinguished Professor and Chair, Pharmaceutical Sciences; affiliated faculty, Chemical Engineering, Bioengineering, PhD, Purdue University, 1992. Joined Northeastern in 1993
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Scholarship Focus

- Synthesis of novel polymeric materials for medical and pharmaceutical applications
- Preparation and characterization of polymeric membranes and microcapsules with controlled permeability properties for medical and pharmaceutical applications
- Target-specific drug, gene, and vaccine delivery systems for diseases of the gastro-intestinal tract
- Delivery of DNA and siRNA to mucosal surfaces for gene therapy and vaccination
- Localized delivery of cytotoxic and anti-angiogenic drugs, siRNA, and genes for solid tumors in novel biodegradable polymeric nanoparticles

Honors and Awards

- Fellow, American Association of Pharmaceutical Scientists
- Fellow, Controlled Release Society
- T. Nagai Award, Controlled Release Society

Selected Recent Publications

Book and book chapters

C.R. Fontana, M.A. Lerman, N. Patel, C. Grecco, C.A. Costa, M.M. Amiji, V.S. Bagnato, N.S. Soukos
Safety Assessment of Oral Photodynamic Therapy in Rats, Lasers in Medicine and Surgery, (2): 479-486, 2013

E. Kobayashi, A.K. Iyer, F.J. Hornicek, M.M. Amiji, Z. Duan
Lipid-Functionalized Dextran Nanosystems to Overcome Multidrug Resistance in Cancer: a Pilot Study, Clinical Orthopaedics and Related Research, 471 (3): 915-925, 2013

C. Kriegel, H. Attarwala, M. Amiji
Multi-Compartmental Oral Delivery Systems for Nucleic Acid Therapy in the Gastrointestinal Tract, Advanced Drug Delivery Reviews, 65: 891–901, 2013

S. Ganesh, A. Iyer, D. Morrissey, M. Amiji
Hyaluronic Acid-Based Self-Assembling Nanosystems for CD44 Target Mediated siRNA Delivery to Solid Tumors, Biomaterials, 34 (13): 3489-3502, 2013

C.A. Dehelean, S. Feflea, D. Gheorgheosu, S. Ganta, A.M. Cimpean, D. Muntean, M.M. Amiji
Anti-Angiogenic and Anti-Cancer Evaluation of Betulin Nanoemulsion in Chicken Chorioallantoic Membrane and Skin Carcinoma in Balb/c Mice, Journal of Biomedical Nanotechnology, 9 (4): 577-589, 2013

J. Xu, F. Gattacceca, M. Amiji
Biodistribution and Pharmacokinetics of EGFR-Targeted Thiolated Gelatin Nanoparticles Following Systemic Administration in Pancreatic Tumor-Bearing Mice, Molecular Pharmaceutics, 10 (5): 2031-2044, 2013

MANSOOR AMIJI continued

L. Shah, S. Yadav, M. Amiji
Nanotechnology for CNS Delivery of bio-Therapeutic Agents, Drug Delivery and Translational Research, 3: 336–351, 2013

D. Deshpande, D.R. Janero, M. Amiji
Engineering of an w-3 Polyunsaturated Fatty Acid-Containing Nanoemulsion System for Combination C6-Ceramide and 17ß-estradiol Delivery and Bioactivity in Human Vascular Endothelial and Smooth Muscle Cells, Nanomedicine: Nanotechnology, Biology, and Medicine, 9 (7): 885-894, 2013

M. Talekar, S. Ganta, A. Singh, M. Amiji, S. Garg
Development of PIK-75 Nano-Suspension Formulation with Enhanced Delivery Efficiency and Cytotoxicity for Targeted Anti-Cancer Therapy, Int. Journal of Pharmaceutics, 450 (1-2): 278-89, 2013

Research Projects

Combinatorial-Designed Nano-Platforms to Overcome Tumor Drug Resistance
Principal Investigator, National Institutes of Health

Multi-Modal Gene Therapy for Pancreatic Cancer with Targeted Nanovectors
Principal Investigator, National Institutes of Health

IGERT-Nanomedical Science and Technology
Co-Investigator, National Science Foundation

Integrated Image-Guided Targeted Therapy for Refractory Ovarian Cancer
Principal Investigator, Nemucore Medical Innovations, Inc.

Pharm Sci Industrial Graduate Fellowship Program
Principal Investigator, Novartis Vaccine and Diagnostics

Evaluating Synergy Between Inhibition of Replication and Promotion of Apoptosis in the Treatment of Ovarian Cancer
Principal Investigator, Northeastern University

Impact of Lipids on Compound Absorption: Mechanistic Studies and Modeling
Co-Investigator, National Institutes of Health

Hepatic Insulin Resistance and Metabolic Disease
Principal Investigator, National Institutes of Health

Targeted Platinates/siRNA Combination Therapy for Resistant Lung Cancer
Principal Investigator, National Institutes of Health

ANAND ASTHAGIRI

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Scholarship Focus

- Cell and tissue engineering
- Biomaterials
- Cancer biology
- Systems and synthetic biology

Honors and Awards

Frontiers in Bioengineering Young Investigator Award

Selected Recent Publications

Papers in refereed journals

K. Blagovic, E.S. Gong, D.F. Milano, R.J. Natividad, A.R. Asthagiri
Engineering Cell-Cell Signaling, Current Opinion in Biotechnology, 2013

Research Projects

Quantitative Analysis of Epithelial Cell Scatter
Principal Investigator, National Institutes of Health

Multi-Scale Complex Systems Transdisciplinary Analysis of Response to Therapy
Co-Principal Investigator, National Institutes of Health

JOSEPH AYERS

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Scholarship Focus

- Neurophysiology and Behavior
- Biorobotics and Electronic Nervous Systems
- Synthetic Biology

Selected Recent Publications

Books and book chapters

A. Westphal, D. Blustein, J. Ayers

A Biomimetic Neuronal Network-Based Controller for Guided Helicopter Flight, Biomimetic and Biohybrid Systems, Springer: p 299-310, 2013

Papers in refereed conferences

D. Blustein, N. Rosenthal, J. Ayers

Designing and Implementing Nervous System Simulations on LEGO Robots, Journal of Visualized Experiments: JoVE (75), e50519, 2013

Research Projects

RoboBees: A Convergence of Body, Brain and Colony

Principal Investigator, National Science Foundation

Utilizing Synthetic Biology to Create Programmable Micro-Bio-Robots

Co-Principal Investigator, Office of Naval Research

Cyberplasm - An Autonomous Micro-Robot Constructed Using Synthetic Biology

Principal Investigator, National Science Foundation

Modernization and Enhancement of the Seawater System and Research Infrastructure at Northeastern University's Marine Science Center

Co-Principal Investigator, National Science Foundation

Biomimetics of Jellyfish Tentacles

Principal Investigator, Schlumberger Doll, Inc

STEFANO BASAGNI

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Scholarship Focus

- Mobile networks and wireless communications systems
- Wireless sensor networking (underwater and terrestrial)
- Design and implementation of network protocols

Selected Recent Publications

Books and book chapters

S. Basagni, M. Conti, S. Giordano, I. Stojmenovic
Mobile Ad Hoc Networking: Cutting Edge Directions, IEEE Series on Digital & Mobile Communication, IEEE Press and John Wiley & Sons, Inc., Piscataway, NJ and Hoboken, second edition, March 5 2013

S. Basagni, M. Y. Naderi, C. Petrioli, D. Spenza
Mobile Ad Hoc Networking: Cutting Edge Directions, ch. 20, pages 703–736, John Wiley & Sons, Inc., Hoboken, NJ, March 5 2013

Papers in refereed conferences

S. Basagni, L. Boloni, L. C. Petrioli, C. A. Phillips, D. Turgut
Maximizing the Value of Sensed Information in Underwater Wireless Sensor Networks via an Autonomous Underwater Vehicle, in Proceedings of IEEE Infocom 2014, Toronto, Canada, April 27- May 2, 2014

L. Boloni, D. Turgut, S. Basagni, C. Petrioli
Scheduling Data Transmissions of Underwater Sensor Nodes for Maximizing Value of Information, in Proceedings of IEEE Globecom 2013, Ad Hoc and Sensor Networking Symposium, Atlanta, GA, December 9–13 2013

L. Chen, S. Cool, H. Ba, W. Heinzelman, I. Demirkol, U. Muncuk, K. R. Chowdhury, S. Basagni
Range Extension of Passive Wake-up Radio Systems Through Energy Harvesting, in Proceedings of IEEE ICC 2013, Ad Hoc and Sensor Networking Symposium, pages 142–147, Budapest, Hungary, June 9–13 2013, Best Paper Award

K. Kaushik, D. Mishra, S. De, S. Basagni, W. Heinzelman, K.R. Chowdhury, S. Jana
Experimental Demonstration of Multi-Hop RF Energy Transfer, in Proceedings of IEEE PIMRC 2013, London, U.K., September 8–11 2013

Research Projects

Development of a Second-Generation Applications-Driven Wireless Sensor Networking Instrument
Co-Principal Investigator, National Science Foundation

GENIUS: Green Sensor Networks for Air Quality Support
Co-Principal Investigator, National Science Foundation

PENNY BEUNING

Associate Professor, Chemistry and Chemical Biology; affiliated faculty, Bioengineering
PhD, University of Minnesota, 2000. Joined Northeastern in 2006
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Scholarship Focus

- Chemical biology
- Biotechnology

Honors and Awards

- National Science Foundation CAREER Award
- Cottrell Scholar Award

Selected Recent Publications

Papers in refereed journals

J. N. Ollivierre, J. L. Sikora, P. J. Beuning
Dimer Exchange and Cleavage Specificity of the DNA Damage Response Protein UmuD, Biochimica et Biophysica Acta-Proteins and Proteomics 1834 611-620, 2013

J. M. Walsh, P. J. Ippoliti, E. A. Ronayne, E. Rozners, P. J. Beuning
Discrimination Against Major Groove Adducts by Y Family Polymerases of the DinB Subfamily, DNA Repair, 12 713-722, 2013

K.R. Chaurasiya, C. Ruslie, M.C. Silva, L. Voortman, P. Nevin, S. Lone, P.J. Beuning, M.C. Williams
Polymerase Manager Protein UmuD Directly Regulates E. coli DNA Polymerase III Binding to ssDNA, Nucleic Acids Research 41 8959-8968, 2013

J. Fang, P. Nevin, V. Kairys, C. Venclovas, J. R. Engen, P. J. Beuning
Conformational Analysis of Processivity Clamps in Solution Demonstrates That Tertiary Structure Does not Correlate with Protein Dynamics, Structure 22 572-581, 2014

Research Projects

Effective Practices in Learning and Pedagogy from Cottrell Scholars: A High Impact Text for Educational Leadership in the 21st Century
Principal Investigator, Cottrell Scholars Collaborative

Understanding Extended Active Sites in Enzymes
Co-Principal Investigator, National Science Foundation

Molecular Basis of DNA Damage Tolerance
Principal Investigator, American Cancer Society Research

Chemical Signatures for the Discovery of Protein Function
Co-Principal Investigator, National Science Foundation

DANA BROOKS

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Northeastern University, 1991. Joined Northeastern in 1991
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Scholarship Focus

- Biomedical signal processing
- Medical imaging
- Inverse problems
- Dynamics and manifolds in biomedical imaging
- Electrocardiography
- Diffuse and fluorescence optical tomography
- Magnetic resonance imaging
- Fresh tissue microscopy image analysis
- Machine learning for biomedical imaging and image analysis
- Open source software for biomedical imaging
- Modeling and optimization of transcranial neuromodulation

Honors and Awards

Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Papers in refereed journals

A.F. Frangi, D.R. Hose, P.J. Hunter, N. Ayache, D. Brooks
Guest Editorial Special Issue on Medical Imaging and Image Computing in Computational Physiology, IEEE Transactions on Medical Imaging, vol. 32, issue 1, Jan 2013, p 1-7

V. Pera, E. Zettergren, D.H. Brooks, M. Niedre
Maximum Likelihood Tomographic Reconstruction of Extremely Sparse Solutions in Diffuse Fluorescence Flow Cytometry, Optics Letters, vol. 38, issue 13, 2357-2359, July 2013

M. Milanic, V. Jazbinšek, R.S. MacLeod, D.H. Brooks, Rok Hren
Assessment of Regularization Techniques for Electrocardiographic Imaging, Journal of Electrocardiology, 1 January 2014, vol. 47, issue 1 p 20-28

V. Pera, D.H. Brooks, M. Niedre
On the Use of the Cramer-Rao Lower Bound for Diffuse Optical Imaging System Design, Journal of Biomedical Optics. Opt. 19 (2), 025002, February 06, 2014

B. Erem, J. Coll-Font, R. Martinez-Orellana, P. Stovicek, D.H. Brooks
Using Transmural Regularization and Dynamic Modeling for non-Invasive Cardiac Potential Imaging of Endocardial Pacing with Imprecise Thoracic Geometry, IEEE Transactions on Medical Imaging, 3:3, 2014, p 726-738

B. Erem, P. van Dam, D.H. Brooks
Identifying Model Inaccuracies and Solution Uncertainties in Non-Invasive Activation-Based Imaging of Cardiac Excitation Using Convex Relaxation, IEEE Transactions on Medical Imaging, 33:4, April 2014, p 902-912

DANA BROOKS continued

J. Sourati, D. Erdogmus, J.G. Dy, D.H. Brooks

Accelerated Learning-Based Interactive Image Segmentation using Pairwise Constraints, IEEE Transactions on Image Processing, 23:7, July 2014, p 3057-3070

L. Sallaway, S. Magee, J. Shi, F. Quivira, K. Tgavalekos, D.H. Brooks, S. Muftu, W. Meleis, R.H. Moore, D. Kopans, K-T. Wan

Detecting Solid Masses in Phantom Breast Using Mechanical Indentation, Experimental Mechanics, 4:6 Jul. 2014

Research Projects

Center for Integrative Biomedical Computing

Investigator, National Institutes of Health

High Resolution Multiplexed Fluorescence Tomography

Co-Investigator, National Institutes of Health

Precise Characterization of Conformational Ensembles

Co-Principal Investigator, National Science Foundation

Finding Underlying Manifolds of Large-Scale Complex Biological Signals

Co-Principal Investigator, Northeastern University

Brain-Computer Interface for Signaling Changes in Psychological States

Co-Principal Investigator, Northeastern University

Precise Characterization of Conformational Ensembles

Co-Investigator, National Science Foundation

Completed Dissertations Supervised

Burak Erem

Differential Geometric Models and Optimization Methods for Dynamic Analysis of Electrocardiographic Signals and the Inverse Problem of Electrocardiography (see p 90)

AHMED BUSNAINA

William Lincoln Smith Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering, Electrical and Computer Engineering, PhD, Oklahoma State University, 1983. Joined Northeastern in 2000
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Scholarship Focus

- Development of processes and tools for fast massive directed assembly of nanoscale elements
- High-rate printing 2D and 3D nanoscale structures
- Nano-scale particle transport, deposition, adhesion and removal, contamination-free manufacturing in semiconductor processes
- Nano-scale technologies, physical modeling of semiconductor processes
- Computational fluid dynamics, turbulence modeling, transport phenomena

Honors and Awards

- Fellow, American Society of Mechanical Engineers
- Fellow, the Adhesion Society
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Papers in refereed journals

C. Yilmaz, A.E Cetin, G. Goutzamanidis, J. Huang, S. Somu, H. Altug, D. Wei, A. Busnaina
Three-Dimensional Crystalline And Homogeneous Metallic Nanostructures Using Directed Assembly of Nanoparticles, ACS Nano 2014, 8 (5):4547-58

J.K. Lee, S.H. Cho, J.H. Lee, H.Y. Ryu, J. Park, S. Lim, B. Oh, C.W. Lee, W. Huang, A. Busnaina, H.Y. Lee
Wafer-Scale Nanowell Array Patterning Based Electrochemical Impedimetric Immunosensor, J. of Biotechnology, vol. 168, issue 4, December 2013, p 584-588

H.Y. Jung, Y.L. Kim, S. Park, A. Datar, H.-J. Lee, J. Huang, S. Somu, A. Busnaina, Y.J. Jung, Y.-K. Kwon
A High-Performance H2s Detection by Redox Reactions in Semiconducting Carbon Nanotube-Based Devices, Analyst, 138, December 2013, issue 23, p 7206-7211

T.-H. Kim, C. Yilmaz, S. Somu, A. Busnaina
3-D Perpendicular Assembly of SWNTs for CMOS Interconnects, Electronic Materials Letters, November 2013, vol 9, issue 6, p 763-766

J. Lee, J.K. Lee, B.H. Park, A. Busnaina, H.Y. Lee
Acceleration of Poly(L-Lactide) Degradation by TiO2 Nanoparticles in Sunlight, J. of Nanoscience and Nanotechnology, vol. 13, 10, Oct 2013, p 6983-6987

A. Busnaina, J.Mead, J. Isaacs, S. Somu
Nanomanufacturing and Sustainability: Opportunities and Challenges, J of Nanoparticle Research, vol. 15, September 2013, p 1984-8

T.H. Kim, H. Cho, A. Busnaina, J.-G. Park, D. Kim
Shockwave-Induced Deformation of Organic Particles During Laser Shockwave Cleaning, J. of Appl. Phys, vol.114 ,issue 6, Aug 2013, p 063104 (4)

AHMED BUSNAINA continued

J. Seo, H.I Cho, J.-K. Lee, J. Lee, A. Busnaina, H.Y. Lee
Double Oxide Deposition and Etching Nanolithography for Wafer-Scale Nanopatterning with High-Aspect-Ratio Using Photolithography, Appl. Phys. Lett. 103, issue 3, July 2013, p 033105

J. Huang, S. Somu, A. Busnaina
Spin Coating Fabrication of Thin Film Transistors Using Enriched Semiconducting SWNT Solution, Electronic Materials Letters, July 2013, vol 9, issue 4, p 505-507

G. Li, C. Yilmaz, X. An, S. Somu, S. Kar, Y.J. Jung, A. Busnaina, K.-T. Wan
Adhesion of Graphene Sheet on Nano-Patterned Substrates with Nano-Pillar Array, J. Appl. Phys. vol. 113, issue 24, June 2013, p 244-303

J. Shen, M. Wei, A. Busnaina, C. Barry, J. Mead
Directed Assembly of Conducting Polymers on Sub-Micron Templates by Electrical Fields, J. of Materials Science and Engineering: B, vol. 178, issue 3, 20 February 2013, p 190-201

J. Lee, Jo.-K. Lee, A. Busnaina, B.H. Park, H.Y. Lee
Phospholipase-Catalyzed Hydrolysis in an Artificial Cell Membrane in the Presence of Melittin, J. Nanosci. Nanotechnol. vol. 13, issue 1, Jan 2013, p 144-148

Research Projects

NSF Nanoscale Science and Engineering Center for High-Rate Nanomanufacturing
Principal Investigator and Director, National Science Foundation

Dissertations Supervised

Asanterabi Malima
Design, Fabrication and Assembly of Multiple Biomarker in-Vivo Biosensor (see p 92)

OCTAVIA CAMPS

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Scholarship Focus

- Communications and signal processing
- Robust computer vision
- Image processing
- Machine learning

Selected Recent Publications

Books and book chapters

A. Vasile, O. Camps
Hierarchical Image Geo-Location on a World-Wide Scale, Advances in Visual Computing, 2013, in Lecture Notes in Computer Science (8034), Springer-Verlag, 2013, p 266-277

Papers in refereed journals

S. Markovic, B. Li, V. Pera, M. Sznaier, O. Camps, M. Niedre
A Computer Vision Approach to Rare Cell in Vivo Fluorescence Flow Cytometry, Part A, 83, 12, p 1113-1123, Dec. 2013

Papers in refereed conferences

C. Dicle, O. Camps, M. Sznaier
The Way They Move: Tracking Multiple Targets with Similar Appearance, IEEE Int. Conf. on Computer Vision (ICCV), Sydney, Australia, Dec. 2013

M. Ayazoglu, B. Yilmaz, M. Sznaier, O. Camps
Finding Causal Interactions in Video Sequences, IEEE Int. Conf. on Computer Vision (ICCV), Sydney, Australia, Dec. 2013

F. Xiong, Y. Cheng, O. Camps, M. Sznaier, C. Lagoa
Hankel Based Maximum Margin Classifiers: A Connection Between Machine Learning and Wiener Systems Identification, Proceedings 52 IEEE Conf. Dec. Control (CDC), Dec. 2013, p 6005-6010

Research Projects

Real Time Video Surveillance: Dynamic Research Model Based Anomaly Partnership Detection and Resource Allocation
Principal Investigator, Northeastern University

ALERT DHS HS-STEM Career Development Program at Northeastern University
Co-Principal Investigator, Department of Homeland Security

Compressive Information Extraction: A Dynamical Systems Approach
Co-Principal Investigator, Air Force Office of Scientific Research

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

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

R3B-Millimeter-Wave Standoff Detection of Concealed Explosives
Investigator, Department of Homeland Security

REBECCA CARRIER

Associate Professor, Chemical Engineering; affiliated faculty, Bioengineering
PhD, Massachusetts Institute of Technology, 2000. Joined Northeastern in 2003
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Scholarship Focus

- Drug delivery
- Biomaterials
- Regenerative medicine

Honors and Awards

- College of Engineering Faculty Fellow
- National Science Foundation CAREER Award

Selected Recent Publications

Papers in refereed journals

F. Buyukozturk, S. Di Maio, D.E. Budil, R.L. Carrier
Effect of Ingested Lipids on Drug Dissolution and Release with Concurrent Digestion: A Modeling Approach, Pharmaceutical Research, 2013, 30 (12), 3131-3144

E.D. Gamsiz, A.G. Thombre, I. Ahmed, R.L. Carrier
Model Predicting Impact of Complexation with Cyclodextrins on Oral Absorption, Biotechnology and Bioengineering, 2013

L. Wang, M.A. Acosta, J.B. Leach, R.L. Carrier
Spatially Monitoring Oxygen Level in 3D Microfabricated Cell Culture Systems Using Optical Oxygen Sensing Beads, Lab Chip, 2013,13 (8), 1586-1592

C.A. Pfluger, B.J. McMahon, R.L. Carrier, D.D. Burkey
Precise, Biomimetic Replication of the Multiscale Structure of Intestinal Basement Membrane Using Chemical Vapor Deposition, Tissue Engineering Part A, 2013, (5-6), 649-656

M. Gu, H. Yildiz, R. Carrier, G. Belfort
Discovery of Low Mucus Adhesion Surfaces, Acta Biomaterialia, 2013, 9 (2), 5201-5207

T. Chernenko, F. Buyukozturk, M. Miljkovic, R. Carrier, M. Diem, M. Amiji
Label-Free Raman Microspectral Analysis for Comparison of Cellular Uptake and Distribution Between Non-Targeted and EGFR-Targeted Biodegradable Polymeric Nanoparticles, Drug Delivery and Translational Research, 2013

Research Projects

Impact of Lipids on Compound Absorption: Mechanistic Studies and Modeling
Principal Investigator, National Institutes of Health

Impact of Lipids on Intestinal Mucus Transport and Structural Properties
Principal Investigator, National Institutes of Health

Interphotoreceptor Matrix Based Cell Delivery Vehicle for Retinal Regeneration
Principal Investigator, National Institutes of Health

CAREER: Mechanistic Studies and Modeling of Self-Emulsifying Drug Delivery Systems
Principal Investigator, National Science Foundation

Microfluidic Cell Separation for Tissue Engineering and Regenerative Medicine
Co-Principal Investigator, National Institutes of Health

Dissertations Supervised

Sean Henry Kevlahan
A Microfluidic Capture and Release Method for Isolation Intestinal Progenitor and Stem Cells from Native Rat Tissue Enabling Advances in Vasculogenic Co-Cultures (see p 91)

ERIN J. CRAM

Associate Professor, Biology; affiliated faculty, Bioengineering
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Scholarship Focus

- Tissue architecture
- Cell migration and mechanotransduction in vivo
- Medicinal plant bioengineering

Selected Recent Publications

Papers in refereed journals

J. D. Weaver, S. Goklany, N.F. Rizvi, E.J. Cram, C.W.T. Lee-Parsons
Optimizing the Transient Fast Agro-mediated Seedling Transformation (FAST) Method in Catharanthus Roseus Seedlings, in Plant Cell Reports, 2013

I. Kovacevic, J.M. Orozco, E.J. Cram
Filamin and Phospholipase C Epsilon are Required for Calcium Signaling in the C. elegans Spermatheca, PLoS Genetics, PLOS Genetics,10.1371, May 9, 2013

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

Research Projects

Toward and Integrative Mechano-Chemical Model of a Contractile Tissue
Co-Investigator, Northeastern University

Transcriptional Control of Alkaloid Biosynthesis in Catharanthus roseus Cultures
Co-Investigator, National Science Foundation

Characterization of a Novel Regulator of Cell Migration
Principal Investigator, National Institutes of Health

In Vivo Analysis of Mechanotransduction
Principal Investigator, National Institutes of Health

JACK DENNERLEIN

Professor, Physical Therapy, Movement, and Rehabilitation Sciences; affiliated faculty, Bioengineering
PhD, University of California, 1996. Joined Northeastern in 2012
617.373.5428 | j.dennerlein@neu.edu

Scholarship Focus

- Musculoskeletal disorders
- Work place injury prevention and health
- Occupational biomechanics

Selected Recent Publications

Papers in refereed journals

E. Sparer, J.T. Dennerlein
Determining Safety Inspection Thresholds for Employee Incentives Programs on Construction Sites, Safety Science, 2013; 51:77–84

S.S. Kim, C. Okechukwu, L. Boden, J.T. Dennerlein, O.M. Buxton, D. Hashimoto, G. Sorensen
Association Between Work-Family Conflict and Musculoskeletal Pain Among Hospital Patient Care Workers, American Journal of Industrial Medicine, 2013, 56 (4):488-495

B. Eijckelhof, J. Bruno Garza, M. Huysmans, B. Blatter, P. Johnson, J.H. van Dieen, A.J. Van Der Beek, J. Dennerlein
The Effect of Over Commitment and Reward on Muscle Activity, Posture, and Forces in the Arm-Wrist-Hand Region-a Field Study Among Computer Workers, Scandinavian Journal of Work, Environment and Health, 2013, 39 (4), p 379-389

G.S. Faber, C.C. Chang, I. Kingma, J.T. Dennerlein
Lifting Style and Participant's Sex do not Affect Optimal Inertial Sensor Location for Ambulatory Assessment of Trunk Inclination, Journal of Biomechanics, 2013

G. Sembajwe, T. Tveito, K. Hopcia, C. Kenwood, E. O'Day, A. Stoddard, J. Dennerlein, D. Hashimoto, G. Sorensen
Psychosocial Stress and Multi-Site Musculoskeletal Pain: A Cross-sectional Survey of Patient Care Workers, Workplace Health & Safety, 2013;61 (3):117-125

S.S.Kim, C.A. Okechukwu, J.T. Dennerlein, L.I. Boden, K. Hopcia, D.M. Hashimoto, G. Sorensen
Association Between Perceived Inadequate Staffing and Musculoskeletal Pain Among Hospital Patient Care Workers, Int. Arch. Occupational Environmental Health, Mar 12 2013

J.G. Young, M.B. Trudeau, D. Odell, K. Marinelli, J.T. Dennerlein
Wrist and Shoulder Posture and Muscle Activity During Touch-Screen Tablet use: Effects of Usage Configuration, Tablet Type, and Interacting Hand, Work: A Journal of Prevention, Assessment and Rehabilitation, 2013, 45 (1), 59-71

B. Eijckelhof, J. Bruno-Garza, M. Huysmans, B. Blatter, J.H. van Dieën, J. Dennerlein, A.J. van der Beek
The Effects of Workplace Stressors on Muscle Activity in the Neck-Shoulder and Forearm Muscles During Computer Work: A Systematic Review and Meta-Analysis, European Journal of Applied Physiology, Mar 5 2013

J. Qin, H. Chen, J.T. Dennerlein
Wrist Posture Affects Hand and Forearm Muscle Stress During Tapping, Applied Ergonomics, 2013, 44(6): p 969-976

JACK DENNERLEIN continued

A. Lusk, P. Morency, L. Miranda-Moreno, W. Willett, J.T. Dennerlein
Bicycle Guidelines and Crash Rates on Cycle Tracks in the United States, American Journal of Public Health, 2013, 103 (7):1240-1248

J. Bruno Garza, B. Eijckelhof, M. Huysmans, P. Catalano, J. Katz, P. Johnson, J. van Dieën, A. Van Der Beek, J. Dennerlein
The Effect of Over-Commitment and Reward on Trapezius Muscle Activity and Shoulder, Head, Neck, and Torso Postures During Computer use in the Field, American Journal of Industrial Medicine, 2013 56(10):1190-2000

M. Trudeau, P. Catalano, D. Jindrich, J. Dennerlein
Tablet Keyboard Configuration Affects Performance, Discomfort and Task Difficulty for Thumb Typing in a two-Handed Grip, PLOS One, 2013

G.S. Faber, C.C. Chang, P. Rizun, J. Dennerlein
A Novel Method for Assessing the 3-D Orientation Accuracy of Inertial/Magnetic Sensors, Journal of Biomechanics, 2013 July 30

G.S. Faber, C.C. Chang, I. Kingma, J. Dennerlein
Estimating Dynamic External Hand Forces During Manual Materials Handling Based on Ground Reaction Forces and Body Segment Accelerations, Journal of Biomechanics 2013, 46 (15):2745-51

Research Projects

Safety Culture/Safety Incentives in the Construction Industry
Principal Investigator, The National Institute for Occupational Safety and Health

A Toolkit to Evaluate the Effect of Multi-Touch Interaction on the Musculoskeletal System and Design Safe Multi-Touch Systems
Investigator, National Science Foundation

The Center for Work, Health, and Wellbeing
Co-Principal Investigator, National Institute for Occupational Safety and Health

Randomized Controlled Trial of a Whole Body Vibration Intervention in Truck Drivers
Investigator, Statewide Health Improvement Program

CHARLES DIMARZIO

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering, Mechanical and Industrial Engineering, PhD, Northeastern University, 1996. Joined Northeastern in 1987
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Scholarship Focus

- Coherent optical detection
- Imaging in turbid media
- Multi-modal microscopy
- Medical imaging with light and sound

Selected Recent Publications

Papers in refereed journals

Z.R. Hoffman, C. DiMarzio
Structured Illumination Microscopy Using Random Intensity Incoherent Reflectance, Journal of Biomedical Optics, 2013

Z. Lai, J. Kerimo, Y. Mega, C.A. DiMarzio
Stepwise Multi-Photon Activation Fluorescence Reveals a New Method of Melanin Detection, Journal of Biomedical Optics, Jan. 07, 2013

J.L. Hollmann, R.Horstmeyer, C. Yang, C.A. DiMarzio
Analysis and Modeling of an Ultrasound-Modulated Guide Star to Increase the Depth of Focusing in a Turbid Medium, Journal of Biomedical Optics, 18 (2):025004–025004, 2013

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

J.L .Hollmann, R. Horstmeyer, C. Yang, C.A DiMarzio
Diffusion Model for Ultrasound-Modulated Light, Journal of Biomedical Optics, 19 (3):035005–035005, 2014

JENNIFER DY

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Purdue University, 2001. Joined Northeastern in 2002
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Scholarship Focus

- Machine learning
- Data mining
- Statistical pattern recognition
- Computer vision

Selected Recent Publications

Papers in refereed journals

D. Niu, J. Dy, M.I. Jordan
Iterative Discovery of Multiple Alternate Clustering Views, IEEE Transactions on Pattern Analysis and Machine Intelligence, 2013

Y. Yan, R. Rosales, G. Fung, R. Subramanian, J. Dy
Learning From Multiple Annotators with Varying Expertise, Machine Learning, 1-37, 2013

P. Castaldi, J. Dy, J. Ross, Y. Chang, G. Washko, (COPDGene Study team), E. Silverman, M. Cho
Cluster Analysis in the COPDGene Study Identifies Subtypes of Smokers with Distinct Patterns of Air way Disease and Emphysema, Thorax, 2014

F. Azmandian, A. Yilmazer, J. Dy, J.A. Aslam, D.R. Kaeli
Harnessing the Power of GPUs to Speed up Feature Selection for Outlier Detection, Journal of Computer Science and Technology, vol. 29 (3): 408-422, 2014

Papers in refereed conferences

J. Ross, J. Dy
Nonparametric Mixture of Gaussian Processes with Constraints, Proceedings of the International Conference on Machine Learning, JMLR W&CP 28 (3): 1346-1354, 2013

J. Sourati, K. Kose, M. Rajadhyaksha, J. Dy, D. Erdogmus, Dana H. Brooks
Automated Localization of Wrinkles and the Dermo-Epidermal Junction in Obliquely-Oriented Reflectance Confocal Microscopic Images of Human Skin, SPIE BiOS, 2013

M. Moghadamfalahi, A. Satpute, M. Akcakaya, D. Brooks, J. Dy, D.Erdogmus, L. Barrett
Are Affective Responses in fMRI Independent of Previous Affect-Inducing Stimuli?, Organization for Human Brain Mapng (OHBM), 2013

K. Kose, C. Alessi-Fox, J. Dy, D. Brooks, M. Rajadhyaksha
Computer-Based Algorithms for Classification of Skin Cancer Morphology in Reflectance Confocal Microscopy Images, 62nd Annual Montagna Symposium on the Biology of Skin, Light and Skin: How Light Sustains, Damages, Treats, Images and Modifies Skin Biology,Stevenson, WA, Oct., 2013

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

Research Projects

III:Small: Exploring Data in Multiple Clustering Views
Principal Investigator, National Science Foundation

Genetic Epidemiology of COPD
Principal Investigator, National Institutes of Health

Automated Classification of Retinopathy of Prematurity Using Machine Learning
Investigator, National Institutes of Health

ENO ESSIEN EBONG

Assistant Professor, Chemical Engineering; affiliated faculty, Bioengineering
PhD, Rensselaer Polytechnic Institute, 2006. Joined Northeastern in 2013
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Scholarship Focus

- Biomedical engineering
- Identifying mechanically-regulated cellular and molecular targets to prevent, diagnose and treat vascular disease
- Biofluids
- Vascular mechanotransduction and mechanobiology

Selected Recent Publications

Papers in refereed journals

E.E. Ebong, S. Lopez-Quintero, V. Rizzo, D.C. Spray, J. Tarbell
Shear Induced Endothelial NOS Actication and Remodeling via Heparan Sulfate, Glypican-1, and Syndecan, Integrative Biology, Epub 2014 Jan 30

Y. Zeng, M. Waters, A. Andrews, P. Honarmandi, E.E. Ebong, V. Rizzo, J.M. Tarbell
Fluid Shear Stress Induces the Clustering of Heparan Sulfate via Mobility of Glypican-1 in Lipid Rafts, American Journal of Physiology Heart and Circle Physiology, Sep 15, 2013

E.E. Ebong, N. Depaola
Specificity in the Participation of Connexin Proteins in Flow-Induced Endothelial Gap Junction Communication, Pflugers Arch, Sep 2013

Papers in refereed conferences

E.E. Ebong, D.C. Spray, J.M. Tarbell
Glycocalyx Core Proteins Selectively Mediate Endothelial NOS Activation and Cell Alignment in Response to Shear Stress, FASEB Journal, April 9, 2013

Y. Zeng, E.E. Ebong, V. Rizzo, J.M. Tarbell
Fluid Shear Stress Induces the Clustering of Heparan Sulfate via Mobility of Glypican-1 in Lipid Rafts, FASEB J, April 9, 2013

L.M. Cancel, E.E. Ebong, J.M. Tarbell
Endothelial Apoptosis and Glycocalyx Morphology in Plaque and Non-plaque Areas of the Mouse Atherosclerotic Brachiocephalic Artery, FASEB Journal, April 9, 2013

E.E. Ebong, D.C. Spray, J.M. Tarbell
Glycocalyx Core Protein-Dependent Endothelial Mechanotransduction, Biomedical Engineering Society Annual Fall Meeting, Seattle, WA 2013 September 25-28

L.M. Cancel, E.E. Ebong, J.M Tarbell
Endothelial Glycocalyx and Apoptosis in the Brachiocephalic Artery of a High Fat Fed ApoE-/- Mouse, Biomedical Engineering Society Annual Fall Meeting, Seattle (BESA) WA 2013 September 25-28

S. Mensah, E.E. Ebong, J. Tarbell
The Role of Flow Patterns and Apoptosis on Atherosclerosis Plaque Formation, BESA, 2013

S. Russell-Puleri, E.E. Ebong, J.M. Tarbell
Mechanisms of Flow-Dependent Endothelial COX-2 and PGI2 Expression, Proceedings of the 2014 IEEE 40th Annual Northeast Bioengineering Conference, 2014 April 25-27

S. Mensah, L. Cancel, J.M. Tarbell, E.E. Ebong
The Effect of Flow and Cell Death on the Growth of Atherosclerotic Plaques, Proceedings of the 2014 IEEE 40th Annual Northeast Bioengineering Conference, 2014 April 25-27

E.E. Ebong, J.M. Tarbell
Glycocalyx Mechanisms of Shear Stress Conversion into Endothelial Cell Responses, Proceedings of the 9th International Symposium on Biomechanics in Vascular Biology and Cardiovascular Disease, 2014 April 28-29

ADAM EKENSEAIR

Assistant Professor, Chemical Engineering; affiliated faculty, Bioengineering
PhD, University of Texas at Austin, 2010. Joined Northeastern in 2013
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Scholarship Focus

- Tissue engineering
- Polymer science
- 3-D Bioprinting
- Biomaterials
- Drug delivery

Selected Recent Publications

Papers in refereed journals

A.K. Ekenseair, F.K. Kasper, A.G. Mikos
Perspectives on the Interface of Drug Delivery and Tissue Engineering, Advanced Drug Delivery Reviews, vol. 65 (1): 89-92, 2013

S.N. Tzouanas, A.K. Ekenseair, F.K. Kasper, A.G. Mikos
Mesenchymal Stem Cell and Gelatin Microparticle Encapsulation in Thermally and Chemically Gelling Injectable Hydrogels for Tissue Engineering, Journal of Biomedical Materials Research, Part A, 102 (5): 1222-1230, 2014, April 16-19, 2014, Denver Colorado
*Manuscript Awarded the 2014 Society for Biomaterials Student Award for Outstanding Research in the Undergraduate Category

T.N. Vo, A.K. Ekenseair, F.K. Kasper, A.G. Mikos
Synthesis, Physicochemical Characterization, and Cytocompatibility of Bioresorbable, Dual-Gelling Injectable Hydrogels, Biomacromolecules, 15: 132-142, 2014

Papers in refereed conferences

T.N. Vo, A.K. Ekenseair, P.P. Spicer, B.M. Watson, F.K. Kasper, A.G. Mikos
Biocompatibility Evaluation of Poly (N-Isopropylacrylamide)-Based Hydrogels for Craniofacial Bone Regeneration, Transactions of the Annual Meeting of the Society for Biomaterials, vol. 35, 2013

A.K. Ekenseair, S.N. Tzouanas, T. Vo, P.P. Spicer, B.M. Watson, P.M. Mountziaris, F.K. Kasper, A.G. Mikos
Spontaneous Mineralization of Hydrophobic Hydrogels for Craniofacial Bone Tissue Regeneration, Abstracts of the AIChE Meeting, 2013

S.N. Tzouanas, A.K. Ekenseair, F.K. Kasper, A.G. Mikos
Mesenchymal Stem Cell and Gelatin Microparticle Encapsulation in Thermally and Chemically Gelling Injectable Hydrogels for Tissue Engineering, Transactions of the Annual Meeting of the Society for Biomaterials, vol. 36, 2014
*Student Award Winner in the Undergraduate Category

T.N. Vo, A.K. Ekenseair, F.K. Kasper, A.G. Mikos
Promoting Mineralization and Mesenchymal Stem Cell Differentiation in Injectable, Physically and Chemically Gelling Hydrogels for Craniofacial Tissue Engineering, Transactions of the Annual Meeting of the Society for Biomaterials, vol. 36, 2014

DENIZ ERDOGMUS

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Florida, 2002. Joined Northeastern in 2008
617.373.3021 | erdogmus@ece.neu.edu | ece.neu.edu/~erdogmus

Scholarship Focus

- Statistical signal processing and machine learning
- Brain computer interfaces
- Information theory
- Differential geometry

Honors and Awards

- National Science Foundation CAREER Award
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Papers in refereed journals

M. Akcakaya, B. Peters, M. Moghadamfalahi, A. Mooney, U. Orhan, B. Oken, D. Erdogmus, M. Fried-Oken
Noninvasive Brain Computer Interfaces for Augmentative and Alternative Communication, IEEE Reviews in Biomedical Engineering, Dec 2013

B. Oken, U. Orhan, B. Roark, D. Erdogmus, A. Fowler, A. Mooney, B. Peters, M. Miller, M. Fried-Oken
Brain-Computer Interface with Language Model-EEG Fusion for Locked-in Syndrome, Neuro-Rehabilitation and Neural Repair, Dec 2013

U. Orhan, D. Erdogmus, B. Roark, B. Oken, M. Fried-Oken
Offline Analysis of Context Contribution to ERP-based Typing BCI Performance, Journal of Neural Engineering, vol. 10, no. 6, Oct 2013

K. M. Keck, J. Kalpathy-Cramer, E. Ataer-Cansizoglu, S. You, D. Erdogmus, M.F. Chiang
Plus Disease Diagnosis in Retinopathy of Prematurity: Vascular Tortuosity as a Function of Distance from Optic Disc, Retina, vol. 33, no. 8, p 1700-1707, 2013

M. Higger, M. Akcakaya, D. Erdogmus
A Robust Fusion Algorithm for Sensor Failure, IEEE Signal Processing Letters, vol. 20, no. 8, 2013

A. Cansizoglu, E. Bas, J. Kalpathy-Cramer, G.C. Sharp, D. Erdogmus
Contour-Based Shape Representation Using Principal Curves, Pattern Recognition, vol. 46, no. 4, p 1140-1150, Apr 2013

O. Kyrgyzov, D. Erdogmus
Nonnegative Nonredundant Tensor Decomposition, Frontiers of Mathematics in China, vol. 8, no. 1, p 41-61, Feb 2013

M. Simundic, B. Drasler, V. Sustar, J. Zupanc, R. Stukelj, D. Makovec, D. Erdogmus, H. Hagerstrand, D. Drobne, V. Kralj-Iglic
Effect of Engineered TiO2 and ZnO Nano and Microparticles on Washed Erythrocytes, Platelet Rich Plasma and Giant Unilamelar Phospholipid Vesicles, BMC Veterinary Research, vol. 9, no. 7, 2013

G. Schirner, D. Erdogmus, K. Chowdhury, T. Padir
The Future of Human-in-the-Loop Cyber-Physical Systems, IEEE Computer, vol. 46, no. 1 Jan 2013

Papers in refereed conferences

M. Haghighi, M. Akcakaya, U. Orhan, D. Erdogmus, B. Oken, M. Fried-Oken
Initial Assessment of Artifact Filtering for RSVP Keyboard TM, SPMB 2013, p 1-5, Brooklyn, NY, 2013

A. Ahani, H. Wahbeh, H. Nezamfar, M. Miller, D. Erdogmus, B. Oken
Change in Physiological Signals During Mindfulness Meditation, Neural Engineering, Nov. 6-8 201

A. Fowler, B. Roark, U. Orhan, D. Erdogmus, M. Fried-Oken
Improved Inference and Autotyping in EEG-based BCI Typing Systems, ASSETS 2013, Bellevue,

WA, Oct 2013

N. Ghadar, X. Zhang, K. Li, D. Erdogmus, G. Thibault, A. Bayesteh, I. Shafran, K. Coleman, K.A. Grant
Visual Hull Reconstruction for Automated Primate Behavior Observation, Proc MLSP 2013, p 1-6, Sep 2013

M. Higger, M. Akcakaya, U. Orhan, D. Erdogmus
Failure Robust Sensor Fusion for RSVP Keyboard, Proc. HCI, Foundations of Augmented Cognition, LNCS, vol. 8027, p 443-449, Jul 2013

M. Fried-Oken, U. Orhan, B. Roark, D. Erdogmus, A. Fowler, M. Miller, A. Mooney, B. Oken, B. Peters
The RSVP KeyboardTM: A Brain-Computer Interface for Communication by People with Locked-In Syndrome, Proc. RESNA, Jun 2013

S. You, M. Massey, N. Shapiro, D. Erdogmus
A Novel Line Detection Method in Space-time Images for Microvascular Flow Analysis in Sublingual Microcirculatory Videos, Proc. ISBI 2013, p 828-831, San Francisco, CA, Apr 2013

J. Sourati, M. Rajadhyaksha, J.G. Dy, D. Erdogmus, D.H. Brooks
Automated Localization of Wrinkles and the Dermo-Epidermal Junction in Obliquely-Oriented Reflectance Confocal Microscopic Images of Human Skin, SPIE Optical Imaging 2013, Jan 2013

Research Projects

Flexible, Adaptive, and Synergistic Training
Co-Investigator, Intelligence Advanced Research Projects Agency

Automated Classification of Retinopathy of Prematurity using Machine Learning
Investigator, National Institutes of Health

Automated Segmentation of Vessel Network Structures in Large Image Stack Sets
Principal Investigator, Massachusetts Green High-Performance Computing Center

Adaptive Brain Computer Interfaces Sub Award to CSL at NU
Principal Investigator, National Science Foundation

Precise Characterization of Conformational Ensembles
Co-Principal Investigator, National Science Foundation

CAREER: Signal Models, Channel Capacity, and Information Rate for Noninvasive Brain Interfaces
Principal Investigator, National Science Foundation

SHB-Small: Robustly Detecting Clinical Laboratory Errors
Co-Principal Investigator, National Science Foundation

Signal Processing Support for Oken-National Institutes of Health-K24 Mid-Career Development Grant
Principal Investigator, National Institutes of Health

Collaborative Research: Holistic Design Methodology for Automated Implementation of Human-in-the-Loop Cyber-Physical Systems
Co-Principal Investigator, National Science Foundation

CDI-Type I: Computational Models for the Automatic Recognition of Non-Human Primate Social Behaviors
Principal Investigator, National Science Foundation

Translational Refinement of an Adaptive Communication System for Locked-in Patients
Co-Investigator, National Institutes of Health

Completed Dissertations Supervised

Umut Orhan
RSVP Keyboard: An EGG Based BCI Typing System with Context Information Fusion (see p 92)

EDGAR GOLUCH

DiPietro Assistant Professor, Chemical Engineering; affiliated faculty, Bioengineering
PhD, University of Illinois at Urbana-Champaign, 2007. Joined Northeastern in 2010
617.373.3500 | e.goluch@neu.edu | https://sites.google.com/site/goluchgroup

Scholarship Focus

- Biosensors
- Biophysics
- Microfluidics
- Nanotechnology

Selected Recent Publications

Papers in refereed journals

T.A. Webster, H.J. Sismaet, E.D. Goluch
Amperometric Detection of Pyocyanin in Nanofluidic Channels, Nano LIFE, vol. 3, 2013, p 1340011

E.D. Goluch, A.R. Hall
Nanotechnology in Biological Detection and Characterization, Nano LIFE, vol. 3, 2013, p 1302001

P.N. Abadian, C.P. Kelley, E.D. Goluch
Cellular Analysis and Detection Using Surface Plasmon Resonance Techniques, Analytical Chemistry, 86 (6), p 2799-2812, 2014

T.A. Webster, H.J. Sismaet, J.L Conte, I.J. Chan, E.D. Goluch
Detection of Pseudomonas Aeruginosa in Human Samples via Pyocyanin, Biosensors & Bioelectronics, 60, p 265-270, 2014

G.E. Aninwene II, P.N. Abadian, V. Ravi, E.N. Taylor, D.M. Hall, A. Mei, G.D. Jay, E.D. Goluch, T.J. Webster
Lubricin: A Novel Means to Decrease Bacterial Adhesion and Profileration, Journal of Biomedical Materials Research, Part A, 2014

P.N. Abadian, N. Tandogan, J.J. Jamieson, E.D. Goluch
Using Surface Plasmon Resonance Imaging (SPRi) to Study Bacterial Biofilms, Biomicrofluidics, 8, 021804, 2014

Research Projects

Exploring the Link Between Bacterial DNA Damage Response and Bio-Film Disassembly
Co-Principal Investigator, Northeastern University

Nano-Constriction Devices for Isolation and Cultivation of Environmental Microbes
Principal Investigator, Northeastern University

BRIGE: Microfabricated Bacterial Environments with Integrated Nanofluidic Electrochemical Sensors for Systems Biology Applications
Principal Investigator, National Science Foundation

IDBR: TYPE A Nano-Constriction Devices for Isolation and Cultivation of Environmental Microbes
Principal Investigator, National Science Foundation

ANDREW GOULDSTONE

Associate Professor, Associate Department Chair and Director of Mechanical Engineering; affiliated faculty, Bioengineering, Chemical Engineering, PhD, Massachusetts Institute of Technology, 2001
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Scholarship Focus

- Contact mechanics
- Materials science and engineering
- Thick films and coatings

Honors and Awards

- College of Engineering Faculty Fellow
- National Science Foundation CAREER Award

Selected Recent Publications

Papers in refereed journals

C.T. Nguyen, H.M. Gonnermann, Y. Chen, A. Gouldstone
Film Drainage and the Lifetime of Bubbles, Geochemistry Geophysics Geosystems, vol. 14 issue: 9 p 3616-3631, September 2013

T. Hu, S. Zhalehpour, A. Gouldstone, S. Muftu, T. Ando
A Method for the Estimation of the Interface Temperature in Ultrasonic Joining, Metallurgical and Materials Transactions A, vol. 45, issue 5, p 2545-2552, May 2014

Research Projects

IDR/Collaborative Research: Activities in Thermal Spray Processing and Volcanology
Principal Investigator, National Science Foundation

Garde: An Interdisciplinary Approach to Accommodate Fine Motor Control Disorders
Co-Principal Investigator, National Science Foundation

Fundamentals of Bonding in Kinetic Consolidation Processes
Co-Principal Investigator, National Science Foundation

Dissertations Supervised

Parnian Boloori Zadeh
The Evaluation of Pulmonary Surfactant Mechanics Under Different Inhaled Environments via Surface Tension Studies and Light Scattering (see p 90)

APRIL GU

Associate Professor, Civil and Environmental Engineering; affiliated faculty, Bioengineering
PhD, University of Washington, 2003. Joined Northeastern in 2006
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Scholarship Focus

- Environmental toxicology and nanotoxicity
- Biological wastewater treatment and nutrient removal
- Pollutants and pathogens detection in water
- Biosensors
- Water disinfection and byproducts
- Bioremediation

Honors and Awards

- College of Engineering Faculty Fellow
- National Science Foundation CAREER Award
- National Science Foundation Education BRIGE Award
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Books and book chapters

A.Z. Gu

Attached Growth and Combined Bio-Processes, Wastewater Engineering –Treatment and Reuse, ch. 9, Metcalf & Eddy, Inc., McGraw-Hill, New York, NY 10020, Fifth edition, 2013

Papers in refereed journals

X. Wang, Y.Y. Li, A.Z. Gu, K.-T. Wan

Predicting Macroscopic Colloidal Deposition and Transportation Based on Dimensionless Tabor's Parameter, Nano LIFE, 3 (1), 2013

S.H. Yuan, N. Gou, A. Alshawabkeh, A.Z. Gu

Efficient Degradation of Contaminants of Emerging Concerns by a new Electro-Fenton Process with Ti/MMO Cathode, Chemosphere, 93 (11), 2013, 2796-2804

D. Li, S. Zeng, A.Z. Gu, M. He, H. Shi

Inactivation, Reactivation and Regrowth of Indigenous Bacteria in Reclaimed Water After Chlorine Disinfection of a Municipal Wastewater Treatment Plant, Journal of Environmental Science, 25 (7), 2013, 1319-1325

Y. Li, X. Wang, A. Onnis-Hayden, K.-T. Wan, A.Z. Gu

Universal Quantifier Derived from AFM Analysis Links Cellular Mechanical Properties and Cell-Surface Integration Forces with Microbial Deposition and Transport Behavior, Environmental Science and Technology, 48 (3), 2014, 1769-1778

M. Khatri, D. Bello, A.K. Pal, J.M. Cohen, S. Woskie, T. Gassert, J. Lan, A.Z. Gu, P. Demoktritou, P. Gaines

Evaluation of Cytotoxic Genotic and Inflammatory Reponses of Nanoparticles from Photocopiers in Three Human Cell Lines, Particle and Fibre Toxicology, 10 (42), 2014

Research Projects

A Novel Bio-Mechanical Model of Bacterial Adhesion

Co-Principal Investigator, National Science Foundation

CAREER: Mechanistic Toxicity Assessment Of Emerging Contaminants for Water Quality Monitoring

Principal Investigator, National Science Foundation

Collaborative Research: Impact of Wastewater-Derived Organic Nitrogen on Eutrophication

Principal Investigator, National Science Foundation

Development of Biosensors for Water Quality Monitoring

Principal Investigator, CDM and William and Diane Howard Scholarship

Effect of Advanced Oxidation Processes on Effluent Organic Nutrients Composition- Implications on Bio-Availability and Eutrophication Potential

Principal Investigator, Water Environment Research Foundation

Environmental Sustainability Assessment of Nutrient Removal Technologies via Life Cycle Assessment

Principal Investigator, Water Environment Research Foundation

ROBERT HANSON

Professor, Medicinal Chemistry; affiliated faculty, Bioengineering
PhD, University of California, Berkeley, 1973. Joined Northeastern in 1980
617.373. 3313 | r.hanson@neu.edu

Scholarship Focus

- Neoplastic diseases
- Synthetic organic chemistry

Honors and Awards

- Fellow, National Science Foundation
- Fellow, National Institutes of Health

Selected Recent Publications

Papers in refereed journals

E.B. Corcoran, R.N. Hanson

Imaging EGFR and HER2 by PET and SPECT: A Review, Medicinal Research Reviews, 2013, published online: 29 August 2013

R.N. Hanson, K.-L. Dao

Estrogen Receptor Imaging Agents, Journal of Nuclear Medicine, May, 2013

P.T. Weiser, C.-Y. Chang, DP. McDonnell, R.N. Hanson

Synthesis and Preliminary Evaluation of 4,4'-Unsymmetrically Substituted 3,3' Biphenyls as Alpha Helical Proteomimetics, Bioorganic and Medicinal Chemistry, 2014, 22, 917-926

FERDI HELLWEGER

Associate Professor, Civil and Environmental Engineering; affiliated faculty, Bioengineering
ScD, Columbia University, 2004. Joined Northeastern in 2004
617.373.3992 | ferdi@coe.neu.edu | systemsbioecology.org

Scholarship Focus

- Surface water quality
- Eutrophication and biogeochemical modeling
- Microbial ecology and evolution
- Individual/agent-based modeling
- Systems bioecology

Honors and Awards

Environmental Merit Award, U.S. Environmental Protection Agency

Selected Recent Publications

Papers in refereed journals

J.-U. Kreft, C. Plugge, V. Grimm, C. Prats, J. Leveau, T. Banitz, S. Baines, J. Clark, A. Ros, I. Klapper, C.Topping, T. Field, A. Schuler, E. Litchman, F. Hellweger
Mighty Small: Observing and Modeling Individual Microbes Becomes Big Science, PNAS, 110 (45), 2013, 18027-18028

N.D. Fredrick, J.A. Berges, B.S. Twining, D. Nuñez-Milland, F.L. Hellweger
Exploring Mechanisms of Intracellular P Heterogeneity in Cultured Phytoplankton Using Agent Based Modeling, Applied and Environmental Microbiology, 79 (14), 2013

F.L. Hellweger
A Simple Model of Tetracycline Antibiotic Resistance in the Aquatic Environment: Accounting for Metal Co-Selection, Journal of Environmental Engineering, 8 (2), 2013, 480-497

F.L. Hellweger
Escherichia Coli Adapts to Tetracycline Resistance Plasmid (pBR322) by Mutating Endogenous Potassium Transport: in Silico Hypothesis Testing, FEMS Microbiology Ecology, 83 (3), 2013

X. Ruan, F. Schellenger, F.L. Hellweger
Accounting for N Fixation in Simple Models of Lake N Loading/Export, Environmental Science and Technology, 48 (10), 2014, 5667–5673

F.L. Hellweger, N. Fredrick, J.A. Berges
Age-Correlated Stress Resistance Improves Fitness of Yeast: Support from Agent-Based Simulations, BMC Systems Biology, 8 (18), 2014

Research Projects

Dimensions: Collaborative Research: Anthropogenic Nutrient Input Drives Genetic, Functional and Taxonomic Biodiversity in Hypereutrophic Lake Taihu, China
Principal Investigator, National Science Foundation

Collaborative Research: Causes and Mechanisms of Cell Death in Freshwater Phytoplankton
Principal Investigator, National Science Foundation

Consortium for Ocean Sensing In the Nearshore Environment (COSINE)
Principal Investigator, National Oceanic and Atmospheric Administration

NADER JALILI

Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
PhD, University of Connecticut, 1998. Joined Northeastern in 2009
617.373.3629 | n.jalili@neu.edu | coe.neu.edu/Research/psl

Scholarship Focus

- Piezoelectric-based actuators and sensors
- Dynamic modeling and vibration control of distributed-parameters systems
- Dynamics and control of MEMS and NEMS sensors and actuators
- Control and manipulation at the nanoscale

Honors and Awards

- Fellow, American Society of Mechanical Engineers
- National Science Foundation CAREER Award
- College of Engineering Martin Essigman Outstanding Teaching Award

Selected Recent Publications

Books and book chapters

N. Jalili
Nanomechanical Cantilever-based Manipulation for Sensing and Imaging, NanoRobotics: Current Approaches and Techniques, Springer, ch. 2, New York, NY, 2013

N. Jalili
Dynamic Systems, Controls and Measurements, Fundamentals of Engineering (FE) Exams, ch. 15, NCEES® Publishing, 2013-2014

Papers in refereed journals

S. Faegh, N. Jalili, S. Sridhar
Ultra Sensitive Piezoelectric-Based Microcantilever Biosensor: Theory and Experiment, Published Online, IEEE/American Society of Mechanical Engineers Transactions on Mechatronics, p 1-5

S. Faegh, N. Jalili, O. Yavuzcetin, D. Nagesha, R. Kumar, S. Sridhar
A Cost-Effective Self-sensing Biosensor for Detection of Biological Species at Ultra-Low Concentrations, Journal of Applied Physics, 113, 224905:1-8, 2013

S. Faegh, S. Sridhar, N. Jalili
A Self-Sensing Piezoelectric MicroCantilever Biosensor for Detection of Ultra-Small Adsorbed Masses: Theory and Experiment, Sensors, 13, 6089-6108, 2013

S. Eslami, N. Jalili
A Comprehensive Modeling and Vibration Analysis of AFM Microcantilevers Subjected to Nonlinear tip- Sample Interaction Forces, by Sohrab Eslami and Nader Jalili, Ultramicroscopy, p 94-95, 2013

S. Faegh, N. Jalili
Comprehensive Distributed-parameters Modeling and Experimental Validation of Microcantilever-based Biosensor with Application to Ultra-Small Biological Species Detection, Journal of Micromechanics and Microengineering 23, 025007, 2013

S. Eslami, N. Jalili

Model Development and Boundary Interaction Force Control of a Piezoresistive-Based Microcantilever, Robotica, FirstView Articles, p 1-19, June, 2014

Research Projects

High Temperature and High Acceleration End-Effector Pads for Semiconductor Applications – Phase II: Carbon Nanotube (CNT)-based Surface Treatment for Improved Adhesion and Friction Properties

Principal Investigator, Brooks Automation Inc.

High Temperature and High Acceleration End-Effector Pads for Semiconductor Applications – Phase I

Principal Investigator, Brooks Automation Inc.

Design and Development of Nanoscale Package-Embedded Vibration Sensing and Active Isolation – Phases I-V

Principal Investigator, Raytheon

A New Hands-on Mechatronics Course in Emerging Fields

Co-Principal Investigator, Mathworks

Dissertations Supervised

Samira Faegh

A Novel Self-Sensing Piezoelectric Microcantilever-Based Sensor for Detection of Ultra Small Masses and Biological Species (see p 91)

DAVID KAELI

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Rutgers University, 1992. Joined Northeastern in 1993
617.373.5413 | kaeli@ece.neu.edu | ece.neu.edu/faculty/kaeli.html

Scholarship Focus

- Parallel computer architectures
- Cybersecurity
- Hardware and software reliability
- Big data analytics

Honors and Awards

- National Science Foundation CAREER Award
- Søren Buus Outstanding Research Award, College of Engineering
- Fellow, Institute of Electrical and Electronics Engineers

Selected Recent Publications

Books and book chapters

B. Gaster, L. Howes, D. Kaeli, P. Mistry, D. Schaa
Heterogeneous Computing with Open CL - Revised Open CL 1.2, Edition Morgan Kaufmann, p 1-291, 2013

J. Cavazos, X. Gong, D. Kaeli
Proceedings of the 6th Workshop on General Purpose Processing Using Graphics Processing Units, ACM Online Conference Proceedings Series, March 2013

Papers in refereed conferences

Z. Chen, D. Kaeli, N. Rubin
Characterizing Scalar Opportunities in GPGPU Applications, IEEE International Symposium on Performance Analysis of Systems and Software, April 2013

Y. Ukidave, A. Ziabari, P. Mistry, D. Kaeli
Quantifying the Energy Efficiency of FFT on Heterogeneous Platforms, IEEE International Symposium on Performance Analysis of Systems and Software, April 2013

P. Mistry, Y. Ukidave, D. Schaa, D. Kaeli
A Framework for Profiling and Performance Monitoring of Heterogeneous Applications, 6th Workshop on Programmability Issues for Heterogeneous Multicores (MULTIPROG'13), 2013

P. Mistry, Y. Ukidave, D. Schaa, D. Kaeli
Valar: A Benchmark Suite to Study the Dynamic Behavior of Heterogeneous Systems, GPGPU-6, March, 2013

R. Whelan, T. Leek, D. Kaeli
Architecture-Independent Information Flow Tracking, 22nd International ACM Conference on Compiler Construction, 2013, p 144-163

R. Wang, N. Kandasamy, C. Nwankpa, D. Kaeli
Datacenters as Controllable Load Resources in the Electricity Mark, Proceedings of the 33rd IEEE International Conference on Distributed Computing Systems, July 2013, p 176-185

A. Yimazer, D. Kaeli
HQL: A Scalable Synchronization Mechanism for GPUs, Proceedings of the 27th IEEE International Symposium on Parallel and Distributed Processing, May 2013, p 475-486

L. Anzalota, J. Meeker, D. Kaeli, A. Alshawabkeh, P. Brown, C. Velez Vega, D. Cantonwine, L. Rivera-Gonzalez, B. Jimenez Velez, J. Cordero
Puerto Rico Testsite for Exploring Contamination Threats (PROTECT): An Innovative Approach to

Assessing and Addressing Pre-Term Birth in Puerto Rico, 6th International Conference on Health Promoting Universities, San Juan, PR, March 2013

R. Dominguez, D. Kaeli

Unstructured Control Flow in GPGPU, Programming and Applications for Multi-Core Processors and GPUs: IPDPSW '13 Proceedings of the 2013 IEEE 27th International Symposium on Parallel and Distributed Processing Workshops, May 2013, p 1194-1202

Y. Ukidave, D. Kaeli

Analyzing Optimization Techniques for Power Efficiency on Heterogeneous Platforms, Accelerators and Hybrid Exascale Systems: IPDPSW '13 Proceedings of the 2013 IEEE 27th International Symposium on Parallel and Distributed Processing Workshop, May 2013, p 1040-1049

D. Kaeli, T. Leek, R. Whelan

Leveraging Binary Translation to Support Full-System Tainting, Proceedings of the 6th Workshop on Architectural and Micro-Architectural Support in Binary Translation, June 2013

Research Projects

AMD GPU Research Gift

Principal Investigator, AMD Corporation

Puerto Rico Testsite for Exploring Environmental Contamination Threats (PROTECT)

Co-Principal Investigator, National Institutes of Health

Multi-Disciplinary Preparation of Next Generation Information Assurance Practitioners- Phase II

Co-Principal Investigator, National Science Foundation

CRS: Small: Power Efficient Emerging Heterogeneous Platforms

Co-Principal Investigator, National Science Foundation

MRI: Development of a Testbed for Side-Channel Analysis and Security Evaluation

Co-Principal Investigator, National Science Foundation

SHF: Small: The Cross Layer Reliability Stack

Principal Investigator, National Science Foundation

A System Model for Effective Anomaly Analysis and Detection

Principal Investigator, Northeastern University

Project A: Reducing Uncertainties in SBRT for Pancreatic Cancer

Principal Investigator, Massachusetts General Hospital

Lightweight Hypervisor-Based Instrumentation and Machine Learning to Provide Timely Malware Detection

Principal Investigator, Air Force Small Business Innovation Research

A Disk-Subsystem Interposer Using a Lightweight Virtual Machine Monitor

Principal Investigator, Massachusetts Institute of Technology Lincoln Laboratory

A Biomedical Imaging Acceleration Testbed

Principal Investigator, National Science Foundation

Analogic CenSSIS Corporate Membership to Fund GPU Research

Principal Investigator, Analogic

Analogic Grant to Fund GPU Ultrasound Research

Principal Investigator, Analogic

Samsung-GPU-Modeling

Principal Investigator, Analog Devices

BARRY L. KARGER

Professor and James L. Waters Chair in Analytical Chemistry; affiliated faculty, Bioengineering, Chemical Engineering, PhD, Cornell University, 1963. Joined Northeastern in 1963
617.373.2867 | b.karger@neu.edu | northeastern.edu/barnett

Scholarship Focus

- Development and application of microscale separations and MS analysis to problems of biological relevance
- Comprehensive characterization of complex proteins at the low fmole level
- Bioanalysis
- Proteomics

Honors and Awards

- Arnold O. Beckman Medal
- Csaba Horváth Memorial Award
- Heyrovsky Medal (Czech Republic)
- Michael Widmer Award of the New Swiss Chemical Society
- 3 American Chemical Society Awards

Selected Recent Publications

Papers in refereed journals

W. Ni, M. Lin, P. Salinas, P. Savickas, S.-L. Wu, B.L. Karger
Complete Mapping of a Cystine Knot and Nested Disulfides of Recombinant Human Arylsulfatase A by Multi-Enzyme Digestion and LC-MS Analysis Using CID and ETD, Journal of the American Society for Mass Spectrometry, vol. 24, issue 1, p 125-133, 2013

S. Dai, W. Ni, A.N. Patananan, S.G Clarke, B.L. Karger, Z.S. Zhou
Integrated Proteomic Analysis of Major Isoaspartyl-Containing Proteins in The Urine of Wild Type and Protein L-Isoaspartate O-Methyltransferase-Deficient Mice, Analytical chemistry, vol. 85, p 2423-2430, 2013

W. Ni, J. Bones, B.L. Karger
In-Depth Characterization of N-Linked Oligosaccharides Using Fluoride-Mediated Negative Ion Microfluidic Chip LC–MS, Analytical chemistry, vol. 85, issue 6, p 3127-3135, 2013

S. Tummala, M. Titus, L. Wilson, C. Wang, G. Thill, D. Foster, C. Li, Z. Szabo, A. Guttman, B.L. Karger, et al.
Evaluation of Exogenous siRNA Addition as a Metabolic Engineering Tool for Modifying Biopharmaceuticals, Biotechnology Progress, vol. 29, issue 2, p 415-424, 2013

C. Li, A. Rossomando, S.-L. Wu, B.L. Karger
Comparability Analysis of Anti-CD20 Commercial (Rituximab) and RNAi-Mediated Fucosylated Antibodies by two LC-MS Approaches, MAbs, vol. 5, p 565-575, 2013

K. Brazin, R. Mallis, C. Li, D. Keskin, H. Arthanari, Y. Gao, S.-L. Wu, B.L. Karger, G. Wagner, E.L. Reinherz
Constitutively Oxidized CxxC Motifs Within the CD3 Heterodimeric Ectodomains of the T Cell Receptor Complex Enforce the Conformation of Juxtaposed Segments, Journal of Biological Chemistry, 2014

Research Projects

Separation and Analytical Technologies for Proteomics
Principal Investigator, National Institutes of Health

Development of an Analytical Platform for Comprehensive Characterization of Biotherapeutic Proteins
Top down, middle down and bottom up LC and CE-MS of Biopharmaceuticals
Principal Investigator, Biogen Idec

Proteomic Analysis of Cell Lines, Drug Target Identification and Host Cell Impurity
Principal Investigator, Industrial Collaborations

YING-YEE KONG

Associate Professor, Speech Language Pathology and Audiology; affiliated faculty, Bioengineering
PhD, University of California, Irvine, 2004. Joined Northeastern in 2007
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Scholarship Focus

- Signal processing for hearing devices
- Classification of speech signals
- Brain-computer interfaces for communication and control
- Auditory perception and hearing loss

Selected Recent Publications

Papers in refereed journals

Y.-Y. Kong, A. Mullangi, K. Kokkinakis
Classification of Fricative Consonants for Speech Enhancement in Hearing Devices, PLOS One, 9 (4):e 95001, Journal Pone, April 18 2014

T. Lee, S. Yu, M. Yuan, T. Wong, Y.-Y. Kong
The Effect of Enhancing Temporal Periodicity Cues on Cantonese Tone Recognition by Cochlear Implantees, International Journal of Audiology, 2014

Y.-Y. Kong, A. Mullangi
Using a Vocoder-Based Frequency-Lowering Method and Spectral Enhancement to Improve Place-of-Articulation Perception for Hearing-Impaired Listeners, Ear and Hearing 34, 300-312, 2013

Y.-Y. Kong, A. Mullangi, J. Marozeau
Timbre and Speech Perception in Bimodal and Bilateral Cochlear-Implant Listeners, Ear and Hearing 33, 645-659, 2012

Y.-Y. Kong, A. Mullangi
On the Development of a Frequency-Lowering System that Enhances Place-of-Articulation Perception, Speech Communication 54, 147-160, 2012

Research Projects

Speech Perception with Combined Electric and Acoustic Stimulation
Principal Investigator, National Institutes of Health

Periodicity Enhancement and Phonemic Restoration for Improving Speech Perception by Hearing Impaired Listeners
Co-Investigator, Hong Kong Research Grants Council

CAROLYN LEE-PARSONS

Associate Professor, Chemical Engineering; jointly appointed, Chemistry; affiliated faculty, Bioengineering
PhD, Cornell University,1995. Joined Northeastern in 1999
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Scholarship Focus

- Bioprocessing
- Cell culture
- Metabolic engineering

Honors and Awards

- National Science Foundation CAREER Award
- College of Engineering Outstanding Teaching Award

Selected Recent Publications

Papers in refereed journals

S. Goklany, N. Rizvi, R.H. Loring, E.J. Cram, C.W.T. Lee-Parsons
Jasmonate-Dependent Alkaloid Biosynthesis in Catharanthus roseus is Correlated with the Relative Expression of Orca and Zct Transcription Factors, Biotechnology Progress, 29(6): 1367-76, Epub 2013

N. Rizvi, S. Goklany, E.J. Cram, C.W.T. Lee-Parsons
Rapid Increases of Key Regulators Precede the Increased Production of Pharmaceutically Valuable Compounds in Catharanthus roseus, Pharmaceutical Engineering, 33 (6): 1-8, 2013

J. Weaver, S. Goklany, N. Rizvi, E.J. Cram, C.W.T. Lee-Parsons
Optimizing the Transient Fast Agro-Mediated Seedling Transformation (FAST) Method in Catharanthus roseus Seedlings, Plant Cell Reports, 33 (1): 89-97, Epub, 2013

Research Projects

Engineering Increased Biodiesel Productivity from Microalgae
Principal Investigator, Massachusetts Clean Energy Center

Engineering the Production Oils from Microalgae as a Renewable and Sustainable Source of Biofuels
Principal Investigator, Northeastern University

Regulation of Alkaloid Biosynthesis by Transcription Factors, MYC2 and WRKY1
Principal Investigator, National Science Foundation

Transcriptional Control of Alkaloid Biosynthesis in Catharanthus roseus Cultures
Principal Investigator, National Science Foundation

MIRIAM LEESER

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Cambridge University, 1988. Joined Northeastern in 1996
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Scholarship Focus

- Computer engineering
- Reconfigurable and GPU computing
- Embedded computing
- Computer arithmetic

Selected Recent Publications

Books and book chapters

V. Ross, M. Leeser
GPGPU Computing for Cloud Auditing, High Performance Cloud Auditing and Applications, Springer, November 2013

Papers in refereed conferences

P. Grossmann, M. Leeser, M. Onabajo
Minimum Energy Operation for Clustered Island-Style FPGAs, in Proceedings of the ACM/SIGDA International Symposium on Field Programmable Gate Arrays p 157-166, ACM, February, 2013

N. Moore, M. Leeser, L. S. King
Kernel Specialization for Improved Adaptability and Performance on Graphics Processing Units (GPUs), in Parallel & Distributed Processing (IPDPS), 2013 IEEE 27th International Symposium on p 1037-1048, May 2013

D. Kusinsky, M. Leeser
FPGA-based Hyperspectral Covariance Coprocessor for Size, Weight, and Power Constrained Platforms, in High Performance Extreme Computing Conference (HPEC), 2013 IEEE, p 1-6, September, 2013

X. Fang, M. Leeser
Vendor Agnostic, High Performance, Double Precision Floating Point Division for FPGAs, in High Performance Extreme Computing Conference (HPEC), IEEE, p 1-5, 2013

Research Projects

MRI: Development of a Testbed for Side Channel Analysis and Security Evaluation (TeSCASE)
Co-Principal Investigator, National Science Foundation

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

Modeling Manycore Architectures in Matlab
Principal Investigator, Mathworks

Mathworks System Modelling and Radio Technology Lab (SMART)
Principal Investigator, Mathworks

KIM LEWIS

Distinguished Professor, Biology; affiliated faculty, Bioengineering
PhD, Moscow University,1980. Joined Northeastern in 2001
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Scholarship Focus

- Molecular microbiology
- Antimicrobial drug tolerance
- Drug discovery

Selected Recent Publications

Books and book chapters

K. Lewis, S. Hansen
Type II Toxin-Antitoxin Loci, HipBA and Persisters, in: Prokaryotic Toxin-Antitoxins, Springer, 2013

Papers in refereed journals

I. Keren, Y. Wu, J. Innocencio, L. Mulcahy, K. Lewis
Killing By Bactericidal Antibiotics Does Not Depend on Reactive Oxygen Species, Science 339: p 1213-1216, 2013

K. Lewis
Platforms for Antibiotic Discovery, National Rev. Drug Disc, 12: 371–387, 2013

M. LaFleur, L. Sun, I. Lister, J. Keating, A. Nantel, L. Long, M. Ghannoum, J. North, R. Lee, K. Coleman, T. Dahl, K. Lewis
Potentiation of Azole Antifungals by 2-Adamantanamine, Antimicrob, Agents Chemother, p 3585-3592, 2013

L. Mulcahy, V. Isabella, K. Lewis
Pseudomonas Aeruginosa Biofilms in Disease, Microbial Ecology p 1-12, 2013

A. Theodore, K. Lewis, M. Vulic
Tolerance of Escherichia Coli to Fluoroquinolones Antibiotics Depends on Specific Components of the SOS Response Pathway, Genetics 195 (4): 1265-76, 2013

B. Conlon, E. Nakayasu, L. Fleck, M. LaFleur, V. Isabella, K. Coleman, S. Leonard, R. Smith, J. Adkins, K. Lewis
Activated ClpP Kills Persisters and Eradicates a Chronic Biofilm Infection, Nature 503 (7476) p 365-70, 2013

N. Balaban, K. Gerdes, K. Lewis, J. McKinney
A Problem of Persistence: Still More Questions than Answers?, National Rev. Microbiol. 11 (8): 587-91, 2013

Research Projects

Super-Persistent Cells and the Paradox of Untreatable Infections
Principal Investigator, National Institutes of Health

Persister Cells and Antibiotic Tolerance in B. Burgdorferi
Principal Investigator, Lyme Research Alliance

Developing Therapeutics to Treat Chronic Infections
Co-Principal Investigator, National Institutes of Health

Die Hard: How M. Tuberculosis Survives Antibiotic Treatment
Principal Investigator, Institute Merieux

YINGZI LIN

Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
PhD, University of Saskatchewan, 2004. Joined Northeastern in 2005
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Scholarship Focus

- Human-machine interactions, interface design and user experiences, system integration and evaluation
- Smart systems and non intrusive 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 Recent Publications

Papers in refereed journals

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

Design, Evaluation and Implementation of Gesture Based Functions for CAD Modeling System Using the Multi Touch Interface, International Journal of Human-Computer Studies, 71, p 261-275, 2013

C.J. Liu, Y. Lin, H. Teng, Z.D. Wang, W.J. Zhang

An Experimental Study on Three General Interface Layout Designs for Chemical Process Plants, Journal of Human Factors and Ergonomics in Manufacturing & Service Industries, 2013

Research Projects

Integrated Individualized Modeling Towards Cognitive Control of Human-Machine Systems

Principal Investigator, National Science Foundation

CAREER: Bridging Cognitive Science and Sensor Technology: Non-Intrusive and Multi-Modality Sensing in Human Machine Interactions

Principal Investigator, National Science Foundation

CAROL LIVERMORE

Associate Professor, Mechanical and Industrial Engineering; affiliated faculty: Bioengineering, Electrical and Computer Engineering, PhD, Harvard University, 1998. Joined Northeastern in 2011
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Scholarship Focus

- MEMS-enabled systems for assistive technologies, energy harvesting, and microscale vacuum systems
- Tissue engineering via MEMS-enabled cell assembly and origami folding
- Carbon nanotube-based energy storage

Honors and Awards

National Science Foundation CAREER Award

Selected Recent Publications

Papers in refereed journals

F.A. Hill, T. Havel, A. John Hart, C. Livermore

Enhancing the Tensile Properties of Continuous Millimeter-Scale Carbon Nanotube Fibers by Densification, ACS Appl. Mater. Interfaces 5, 7198–7207, 2013

G. Agarwal, A. Servi, C. Livermore

Size-Selective, Biocompatible, Manufacturable Platform for Structuring Deformable Microsystems, Lab on a Chip, online, 2014

Research Projects

Compact Mechanical and Ion Pumping to Achieve High Vacuum

Principal Investigator, Defense Advanced Research Projects Agency

High-Resolution Tactile Displays for the Visually Impaired

Principal Investigator, Bocelli Foundation

EFRI-ODISSEI: Origami and Assembly Techniques for Human-Tissue-Engineering (OATH)

Principal Investigator, National Science Foundation

LEE MAKOWSKI

Professor and Interim Chair, Bioengineering; affiliated faculty: Chemistry and Chemical Biology, Electrical and Computer Engineering, PhD, Massachusetts Institute of Technology, 1976. Joined Northeastern in 2010
617.373.3006 | makowski@ece.neu.edu

Scholarship Focus

Novel methods for data and signal processing of biophysical data; x-ray scattering for studies of proteins and tissues.

Selected Recent Publications

Papers in refereed journals

D. Minh, L. Makowski
Wide-Angle X-ray Solution Scattering for Protein-Ligand Binding: Multivariate Curve Resolution with Bayesian Confidence Intervals, Biophys. J. 104, p 873-884, Feb 10, 2013

R.E. Iacob, D. Houde, G.M. Bou-Assaf, L. Makowski, J.R. Engen, S.A. Berkowitz
Understanding Monoclonal Antibody Aggregation by Comparing the Higher-Order Structure of Solution-Free Monomers to Aggregate Dimers, J. Pharmaceutical Sciences 102, 4315-4329, 2013

J. Liu, H. Inouye, N. Venugopalan, R.F. Fischetti, S.C. Gleber, S. Vogt, J.C. Cusumano, J.I. Kim, C. Chape, L. Makowski
Tissue Specific Variation in the Nanoscale Architecture of Arabidopsis, Journal of Structural Biology 184, 103, 2013

J. Badger, J. Lal, R. Harder, H. Inouye, S.C. Gleber, S. Vogt, I. Robinson, L. Makowski
Three-Dimensional Imaging of Crystalline Inclusions Embedded in Intact Maize Stalks, Scientific Reports 3, 2843, 2013

Research Projects

MADMAX: Precise Measurement of Conformational Changes in Proteins
Principal Investigator, National Institutes of Health

Center for Direct Catalytic Conversion of Biomass to BioFuels (C3Bio)
Co-Investigator, Basic Energy Sciences

Conformational Flexibility in Activation of Scr-Kinase
Subcontract Lead, National Institutes of Health

Precise Characterization of Conformational Ensembles
Principal Investigator, National Science Foundation

EDWIN MARENGO

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Northeastern University, 1997. Joined Northeastern in 2004
617.373.3358 | emarengo@ece.neu.edu | ece.neu.edu/~emarengo

Scholarship Focus

- Physics-based signal processing and imaging
- Electromagnetic information theory

Honors and Awards

National Science Foundation CAREER Award

Selected Recent Publications

Papers in refereed journals

E. A. Marengo
A New Theory of the Generalized Optical Theorem in Anisotropic Media, IEEE Transactions on Antennas and Propagation, vol. 61, p. 2164-2179, 2013

E.A. Marengo, F.K. Gruber
Optical-Theorem-Based Coherent Scatterer Detection in Complex Environments, International Journal of Antennas and Propagation, Article ID 231729, 12 pages, 2013

E.A. Marengo
Multipole Theory and Algorithms for Target Support Estimation, International Journal of Antennas and Propagation, 2013, Article ID 515240

E.A. Marengo, P. Berestesky
Cramer-Rao Bound Study of Multiple Scattering Effects in Target Separation Estimation, International Journal of Antennas and Propagation, Article ID 572923, 2013

E.A. Marengo
Inverse Diffraction Theory and Computation of Minimum Source Regions of far Fields, Mathematical Problems in Engineering,18 pages, January, 2014

Papers in refereed conferences

E.A. Marengo
Target Detection Based on the Optical Theorem, Proceedings of the 2013 IEEE International Symposium on Antennas and Propagation and URSI National Radio Science Meeting, Buena Vista, Florida, July 7-13, 2013

E.A. Marengo
The Inverse Support Problem with far Field Data, Proceedings of the 2013 IEEE International Symposium on Antennas and Propagation and URSI National Radio Science Meeting, Buena Vista, Florida, July 7-13, 2013

Research Projects

Wave-Based Algorithms and Bounds for Target Support Estimation
Principal Investigator, Air Force Office of Scientific Research

CONSTANTINOS MAVROIDIS

COE Distinguished Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
PhD, Massachusetts Institute of Technology, 1996. Joined Northeastern in 2004
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Scholarship Focus

- Biomedical Mechatronics
- Medical Devices
- Rehibilitation Robotics
- Advanced Actuators

Honors and Awards

- Fellow, American Society of Mechanical Engineers
- Fellow, National Academy of Inventors
- National Science Foundation CAREER Award
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Books and book chapters

C. Mavroidis, A. Ferreira
Nanorobotics: Past, Present, and Future, Nanorobotics, Current Approaches and Techniques, Springer New York Heidelberg Dordrecht London, 2013

E. Brassitos, C. Mavroidis
Kinematics Analysis and Design Considerations of the Gear Bearing Drive, Advances in Mechanisms, Robotics and Design Education and Research Mechanisms and Machine Science, vol. 14, 2013, p 159-175

G. Sharma, Atul Dubey, C. Mavroidis
Protein-Based Nanoscale Actuation, Nanorobotics, 2013, p 425-455

M. Pietrusinski, I. Cajigas, P. Bonato, C. Mavroidis
Healthy Subject Testing with the Robotic Gait Rehabilitation (RGR) Trainer, Romansy 19 – Robot Design, Dynamics and Control CISM International Centre for Mechanical Sciences, 2013, p 341-348

Papers in refereed journals

J.E. Deutsch, M.J. Myslinski, M. Kafri, R. Ranky, M. Sivak, C. Mavroidis, J. Lewis
Feasibility of Virtual Reality Augmented Cycling for Health Promotion of People Post Stroke, Journal of Neurologic Physical Therapy, vol. 37, issue 3, p 118-124, Sept. 2013

Research Projects

Customizable Sensors for Humans Using an Integrated Polymer: C-SHIP
Principal Investigator, National Science Foundation

Prototype Funds to 3-SPARK LLC
Co-Principal Investigator, Northeastern University

Commercialization of Lower Body Robotic Exoskeletons for Gait Retraining
Principal Investigator, National Science Foundation

Compact Drive System for Planetary Rovers and Space Manipulators
Principal Investigator, National Aeronautics and Space Administration

CPS: Breakthrough: A Cyber-Physical Framework for MRI Guided Magnetic Nano-Particles
Principal Investigator, National Science Foundation

The Gear Bearing Drive: A Novel Compact Actuator for Robotic Joints
Principal Investigator, National Science Foundation

Robotic Leg Advancement Device
Principal Investigator, National Science Foundation

NICOL MCGRUER

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering, Mechanical and Industrial Engineering, PhD, Michigan State University, 1983. Joined Northeastern in 1987
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Scholarship Focus

- MEMS
- NEMS
- Micro-fabrication
- Micro-systems
- Organic semiconductor devices

Honors and Awards

Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Papers in refereed journals

H. Pan, Y.-C. Wu, G.G. Adams, G.P. Miller, N. McGruer
Interfacial Shear Stress Between Single-Walled Carbon Nanotubes and Gold Surfaces With and Without an Alkanethiol Monolayer, Journal of Colloid and Interface Science, vol. 407, p 133-139

C. Pramanik, Y. Li, A. Singh, W. Lin, J.Hodgson, J. Briggs, S. Ellis, P. Müller, N. McGruer, G. Miller
Water Soluble Pentacene, J. Mater. Chem. C, 2013, 1, 2193-2201

Y.-C. Wu, N. McGruer, G.G. Adams
Adhesive Slip Process Between a Carbon Nanotube and a Substrate, Journal of Physics D: Applied Physics, vol. 46, 2013, 175305

R.P. Hennessy, A. Basu, G.G. Adams, N. McGruer
Hot-Switched Lifetime and Damage Characteristics of MEMS Switch Contacts, Journal of Micromechanics and Microengineering, vol. 23, 2013

Papers in refereed conferences

A. Basu, R. Hennessy, G. Adams, N. McGruer
Reliability in Hot Switched Ruthenium on Ruthenium MEMS Contacts, Proceedings of the 59th Holm Conference on Electrical Contacts (HOLM),2013, 22-25 Sept. 2013, Pages 1-8

A. Basu, R. Hennessy, G. Adams, N. McGruer
Leading and Trailing Edge Hot Switching Damage in a Metal Contact RF MEMS Switch, Proceedings of Transducers & Eurosensors XXVII: The 17th International Conference on Solid-State Sensors, Actuators and Micro-systems (Transducers & Eurosensors XXVII), p 16-20, 2013

Research Projects

NSEC: The Center for High-Rate Nanomanufacturing (CHN)
Investigator, National Science Foundation

Center for RF MEMS Reliability and Design Fundamentals
Principal Investigator, Defense Advanced Research Projects Agency

WALEED MALEIS

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Michigan, 1996. Joined Northeastern in 1996
617.373.3023 | meleis@ece.neu.edu | ece.neu.edu/faculty/meleis.html

Scholarship Focus

- Combinatorial optimization
- Algorithm design and analysis
- Scheduling
- Machine learning
- Parallel computing
- Online platforms for behavioral experimentation

Selected Recent Publications

Papers in refereed journals

L. Sallaway, S. Magee, J. Shi, F. Quivira, K. Tgavalekos, D. Brooks, S. Muftu, W. Meleis, R. Moore, D. Kopans, K-T. Wan

Detecting Solid Masses in Phantom Breast Using Mechanical Indentation, Experimental Mechanics, Experimental Mechanics, March 27, 2013

Research Projects

Online Laboratory to Study Large Group Network Performance

Co-Principal Investigator, Army Research Office

HOSSEIN MOSALLAEI

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of California, Los Angeles, 2001. Joined Northeastern in 2005
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Scholarship Focus

- Metamaterials and devices
- GHz-THz front-ends
- Photonic and quantum systems
- Computational electromagnetics and physics

Selected Recent Publications

Books and book chapters

C. Pelletti, R. K. Arya, A. Rashidi, H. Mosallaei, R. Mittra
Numerical Techniques for Efficient Analysis of FSSs, EBGs, and Metamaterials, Computational Electromagnetics–Recent Advances and Engineering Applications, Springer, 2013

Papers in refereed journals

J. Cheng, W. L. Wang, H. Mosallaei, E. Kaxiras
Surface Plasmon Engineering in Graphene Functionalized with Organic Molecules: A Multi Scale Theoretical Investigation, Nano Lett, 2013

D. Ansari O.B., M. Rostami, E. Chernobrovkina, S. K. Saikin, S. Valleau, H. Mosallaei, A. Aspuru Guzik
Parametric Hierarchical Matrix Approach for the Wide Band Optical Response of Large Scale Molecular Aggregates, Journal of Applied Physics, vol. 114, 164315, 2013

M. Farmahini-Farahani, J. Cheng, H. Mosallaei
Metasurfaces Nanoantennas for Light Processing, JOSA B, vol. 30, no. 9, p 2365 2370, 2013

B. Memarzadeh, H. Mosallaei
Multi Material Loops as the Building Block for a Functional Metasurface, JOSA B, vol. 30, no. 7, p 1827-1834, 2013

M. Farmahini-Farahani, H. Mosallaei
A Plasmonic MIM Frequency Diplexer, IEEE Trans. Nanotechnology, vol. 12, no. 3, p 361 367, May 2013

S. Saadat, H. Mosallaei, E. Afshari
A Radiation Efficient 60 GHz on Chip Dipole Antenna Realized by a Reactive Impedance Metasurface, IET Microwaves, Antennas & Propagation, vol. 7, issue 2 of MAP, p 98 104, 2013

S. Saadat, M. Adnan, H. Mosallaei, E. Afshari
Composite Metamaterial and Metasurface Integrated with non Foster Active Circuit Elements: A Bandwidth Enhancement Investigation, IEEE Trans. Antennas Propagat, vol. 61, no. 3, p 1210, 2013

M. Farmahini Farahani, H. Mosallaei
A Birefringent Reflectarray Meta-Surface for Beam Engineering in Infrared, Optics Letters, vol. 38, no. 4, Feb. 2013

M. Rostami, D. Ansari O.B., H. Mosallaei
Dispersion Diagram Analysis of Arrays of Multishell Multimaterial Nanospheres, PIERB, 48, p 77-98, 2013

A. Rashidi, H. Mosallaei, R. Mittra
Numerically Efficient Analysis of Array of Plasmonic Nanorods Illuminated by an Oblique Incident Plane Wave Using the Characteristic Basis Function Method, J. Comput. Theor. Nanosci. 10, p 427-445 2013

Papers in refereed conferences

H. Mosallaei
Photonic Materials by Design Computation, Materials Research Society, Fall Meeting, Boston, MA, Dec. 1-6, 2013

D. Ansari O.B., H. Mosallaei
Computation of Large Arrays of Plasmonic Metamaterials: A Model Profile Approach, IEEE AP-S International Symposium and USNC/URSI National Radio Science Meeting, Orlando, FL, 2013

M. Farmahini Farahani, H. Mosallaei
A Birefringent Reflect Array Metasurface for Beam Engineering in Infrared, Materials Research Society, Spring Meeting, San Francisco, CA, Apr. 1-5, 2013

J. Cheng, W. L. Wang, H. Mosallaei, E. Kaxiras
Graphene Metamaterial with Organic Molecular Patterning, Materials Research Society, Fall Meeting, Boston, MA, Dec. 1-6, 2013

Research Projects

3D Optical Metamaterials with Tunability and Low Loss
Co-Principal Investigator, Office of Naval Research

Dielectric and Plasmonic Particles Enabling Nanoscale Energy Engineering
Principal Investigator, Air Force Office of Scientific Research

Transformative Parameters Extreme Antennas: Active, Nonlinear, and Patterned Metamaterials Investigation
Principal Investigator, Office of Naval Research

SİNAN MÜFTÜ

Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering, Civil and Environmental Engineering, PhD, University of Rochester, 1994. Joined Northeastern in 2000
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Scholarship Focus

- Mechanics and tribology of axially moving, thin materials and flexible webs
- Numerical simulation of tissue healing and bone remodeling
- High velocity impact of micron scale particles

Honors and Awards

- Fellow, American Society of Mechanical Engineers
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Papers in refereed journals

J. Aguirrebeitia, S. Müftü, M. Abasolo, J. Vallejo
Experimental Study of the Removal Force in Conical Implant-Abutment Interfaces, Journal of Prosthetic Dentistry, 111(4), 2013

H.Y. Chou, S. Müftü
On Peri-Implant Bone Healing Due to Immediate Loading in Dental Implant Treatments, Journal of Biomechanics, 46 (5), 2013, 871-878

J. Shi, S. Müftü, A.Z. Gu, K.T. Wan
Adhesion of a Cylindrical Shell in the Presence of DLVO Surface Potential, Journal of Applied Mechanics, 80, 2013

Research Projects

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

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

Theoretical and Experimental Investigation of Bonding in Cold Spray
Principal Investigator, Plasma Giken Kogyo Co

Tape Path Mechanics
Principal Investigator, International Storage Industry Consortium

Fundamentals of Bonding and Kinetic Consolidation Processes
Co-Principal Investigator, National Science Foundation

SHASHI MURTHY

Associate Professor, Chemical Engineering; affiliated faculty; Bioengineering, Mechanical and Industrial Engineering, PhD, Massachusetts Institute of Technology, 2003. Joined Northeastern in 2005
617.373.4017 | smurthy@coe.neu.edu | microfluidicslab.org

Scholarship Focus

- Biomaterials
- Microfluidics

Honors and Awards

- College of Engineering Faculty Fellow
- National Science Foundation CAREER Award
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Books and book chapters

B. Zhu, B.D. Plouffe, S.K. Murthy
Functionalized Microfluidic Devices for Separation of Cell Phenotypes, in Microfluidic Cell Culture Systems, Boston, 2013, p 325-340

Papers in refereed journals

B. Zhang, C. Peticone, S.K. Murthy, M. Radisic
A Standalone Perfusion Platform for Drug Testing and Target Validation in Micro-Vessel Networks, Biomicrofluidics, vol. 7, 2013, p 044125

N. Pestana, L. Mortensen, J. Runnels, D.A.L. Vickers, S.K. Murthy, C.P. Lin, M. Niedre
An Improved Prototype Diffuse Fluorescence Flow Cytometer for High Sensitivity Detection of Rare Circulating Cells in Vivo, Journal of Biomedical Optics, vol. 18, 2013, p 077002

D.A.L. Vickers, E.J. Chory, M.C. Harless, S.K. Murthy
P38 Signaling and Receptor Recycling Events in a Microfluidic Endothelial Cell Adhesion Assay, PLoS One, vol. 8, 2013, p 65828

N. Pestana, D. Walsh, A. Hatch, P. Hahn, G.J. Jaffe, S.K. Murthy, N. Niedre
A Dedicated Low-Cost Fluorescence Microfluidic Device Reader for Point-of-Care Ocular Diagnostics, Journal of Medical Devices, vol. 7, 2013, p 024501

B. Zhu, J. Smith, M.L. Yarmush, Y. Nahmias, B.J. Kirby, S.K. Murthy
Microfluidic Enrichment of Mouse Epidermal Stem Cells and Validation of Stem Cell Proliferation in Vitro, Tissue Engineering Part C – Methods, vol. 19, 2013, p 765-773

B. Zhu, S.K. Murthy
Stem Cell Separation Technologies, Current Opinion in Chemical Engineering, vol. 2, 2013, p 3-7

V. Tandon, B. Zhang, M. Radisic, S.K. Murthy
Generation of Tissue Constructs for Cardiovascular Regenerative Medicine: From Cell Procurement to Scaffold Design, Biotechnology Advances, vol. 31, 2013, p 722-735

Research Projects

Microfluidic Cell Separation for Tissue Engineering and Regenerative Medicine
Principal Investigator, National Institutes of Health

SHASHI MURTHY continued

CAREER: Understanding the Role of Cell Surface Markers in Microfluidic Cell Separation- An Integrated Research and Education Program

Principal Investigator, National Science Foundation

Computational Fluid Dynamics Analysis of a Blood Analysis System

Principal Investigator, Constitution Medical Inc.

Completed Dissertations Supervised

Sean Henry Kevlahan

A Microfluidic Capture and Release Method for Isolation Intestinal Progenitor and Stem Cells from Native Rat Tissue Enabling Advances in Vasculogenic Co-Cultures (see p 91)

HAMID NAYEB-HASHEMI

Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
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Scholarship Focus

Biomechanics, mechanics

Honors and Awards

Fellow, American Society of Mechanical Engineers

Selected Recent Publications

Papers in refereed journals

J. A. Renick, A. Nazarian, V. Entezarim J. Kimbaris, A. Tseng, A. Masoud, H. Nayeb-Hashemi, A. Vaziri, B. Snyder

Finite Element Analysis and Computed Tomography Based Structural Rigidity Analysis of Rat Tibia with Simulated Lytic Defects, J. of Biomechanics, 2013

A. Marzban, H. Nayeb-Hashemi, A. Vaziri

Numerical Simulation of Load-Induced Bone Structural Remodeling Using Stress-Limit Criterion, Computer Methods in Biomechanics and Biomedical Engineering, 2013

P. Bloori-Zadeh, S. C. Corbett, H. Nayeb-Hashemi

Effects of Fluid Flow Shear Rate and Surface Roughness on the Calcification of Polymeric Heart Valve Leaflet, Material Science and Engineering C 33, 2013, p 2770-2775

P. Bloori-Zadeh, S. C. Corbett, H. Nayeb-Hashemi

In-Vitro Calcification Study of Polyurethane Heart Valves, Material Science and Engineering C 35, 2013

Research Projects

Knee Injury Prevention and Osteoarthritis Risk in Obesity

Co-Principal Investigator, National Priorities Research Program

Novel Multi Functional Composite Sandwich Panel

Principal Investigator, National Priorities Research Program

High-Performance Biodegradable Composites from Qatari Date Palm Waste

Principal Investigator, National Priorities Research Program

MARK NIEDRE

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Toronto, 2004. Joined Northeastern in 2008
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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

Massachusetts Life Sciences Center New Investigator Award

Selected Recent Publications

Papers in refereed journals

S. Markovic, B. Li, V. Pera, O. Camps, M. Sznaier, M. Niedre
A Computer Vision Approach to Rare-Cell in Vivo Fluorescence Flow Cytometry, Cytometry A, 83 (12):1113-1123, 2013

V. Pera, E. Zettergren, D.H. Brooks, M. Niedre
Maximum Likelihood Tomographic Reconstruction of Extremely Sparse Solutions in Diffuse Fluorescence Flow Cytometry, Optics Letters, 38 (13): 2357-2359, 2013

N. Pestana, L. Mortensen, J. Runnels, D. Vickers, S.K. Murthy, C.P. Lin, M. Niedre
Improved Diffuse Fluorescence Flow Cytometer Prototype for High Sensitivity Detection of Rare Circulating Cells in Vivo, Journal of Biomedical Optics, 18 (7): 77002, 2013

Y. Mu, N. Valim, M. Niedre
Evaluation of a Fast Single-Photon Avalanche Photodiode for Measurement of Early Transmitted Photons Through Diffusive Media, Optics Letters, 38 (12): 2098-2100, 2013

N. Pestana, D. Walsh, A. Hatch, P. Hahn, G.J. Jaffe, S.K. Murthy, M. Niedre
A Dedicated Low-Cost Fluorescence Microfluidic Device Reader for Point-of-Care Ocular Diagnostics, Journal of Medical Devices, 7 (2): 024501, 2013

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

Research Projects

Ultra-Fast Time-Domain Multiplexed Fluorescence Tomography
Principal Investigator, National Institutes of Health

Completed Dissertations Supervised

Niksa Valim
Instrumentation and Methods for Time-Resolved Diffuse Fluorescence Imaging (see p 94)

DONALD O'MALLEY

Associate Professor, Biology; affiliated faculty, Bioengineering
PhD, Harvard, 1989. Joined Northeastern in 1997
617.373.2284 | d.omalley@neu.edu

Scholarship Focus

- Neural control of the zebrafish larva's extended locomotor repertoire
- Human flash memory

Selected Recent Publications

Papers in refereed journals

L. Ricci, C.H. Summers, E.T. Larson, D.M. O'Malley, R.H. Melloni
Development of Aggressive Phenotypes: Interactions of Age, Experience, and Social Status, Animal Behaviour, 86, 245-252, 2013

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

MARY JO ONDRECHEN

Professor, Biology; affiliated faculty, Bioengineering
PhD, Northwestern University, 1978. Joined Northeastern in 2008
617.373.2856 | m.ondrechen@neu.edu | northeastern.edu/org/wp

Scholarship Focus

- Enzyme catalysis
- Unctional genomics
- Modeling of enzyme-substrate interactions
- Drug discovery
- Bioinformatics

Selected Recent Publications

Papers in refereed journals

Z. Wang, P. Yin, J.S. Lee, R. Parasuram, S. Somarowthu, M.J. Ondrechen
Protein Function Annotation with Structurally Aligned Local Sites of Activity (SALSAs), BMC Bioinformatics, 14, S13, 2013

S.O. Ochiana, V. Pandarinath, Z. Wang, R. Kapoor, M.J. Ondrechen, L. Ruben, M.P. Pollastri
The Human Aurora Kinase Inhibitor Danusertib is a Lead Compound for Anti-Trypanosomal Drug Discovery via Target Repurposing, European Journal Medicinal Chemistry, 62, 777-784, 2013

R. Thomas, J. Lee, V. Chevalier, S. Sadler, K. Selesniemi, S. Hatfield, M. Sitkovsky, M. Ondrechen, G. Jones
Design and Eevaluation of Xanthine Based Adenosine Receptor Antagonists: Potential Hypoxia Targeted Immunotherapies, Bioorganic and Medicinal Chemistry 21, 7453-7464, 2013

Research Projects

Chemical Signatures for the Discovery of Protein Function
Principal Investigator, National Science Foundation

Understanding Extended Active Sites in Enzymes
Principal Investigator, National Science Foundation

Design, Synthesis and Testing of Novel Co-Adjuvants for Immunotherapy of Cancer
Co-Principal Investigator, Northeastern University

Computationally Based Identification of Biomass-Converting Enzymes from Genomics Data
Principal Investigator, Mathworks

RUPAL PATEL

Professor, Speech Language Pathology and Audiology; joint appointment, College of Computer and Information Science, affiliated faculty: Bioengineering, Electrical and Computer Engineering, PhD, University of Toronto, 2000. Joined Northeastern in 2003, 617.373.5842 | r.patel@neu.edu

Scholarship Focus

- Speech communications
- Human computer interfaces

Selected Recent Publications

Papers in refereed journals

R. Patel, K. Connaghan, D. Franco, E. Edsall, D. Forgit, L. Olsen, L. Ramage, E. Tyler, S. Russell
The Caterpillar: A Novel Reading Passage for Assessment of Motor Speech Disorders, American Journal of Speech Language Pathology, 22, 1-9, 2013

R. Patel, K. Hustad, K.P. Connaghan, W. Furr
Relationship Between Prosody and Intelligibility in Children with Dysarthria, Journal of Medical Speech Language Pathology, 20 (4), 95-99, 2013

K.P. Connaghan, R. Patel
Impact of Prosodic Strategies on Vowel Intelligibility in Childhood Motor Speech Impairment, Journal of Medical Speech Language Pathology, 20 (4), 133-139, 2013

R. Patel, K. Connaghan, D. Franco, E. Edsall, D. Forgit, L. Olsen, L. Ramage, E. Tyler, S. Russell
The Caterpillar: A Novel Reading Passage for Assessment of Motor Speech Disorders, American Journal of Speech Language Pathology, 22, 1-9, 2013

R. Patel, K.P. Connaghan, P.J. Campellone
The Effect of Rate Reduction on Signaling Prosodic Contrasts in Dysarthria, Folia Phoniatrica et Logopaedica, 65, 109-116, 2014

Papers in refereed conference proceedings

S. Cai, T.H. Bunnell, R. Patel
Unsupervised Vocal Tract Length Estimation Through Model-Based Acoustic-to-Articulatory Inversion, Proceedings of 14th Conference of the International Speech Communication Association, Interspeech, Lyon, France, 2013

Research Projects

Prosodic Control in Acquired and Congenital Dysarthria
Principal Investigator, National Institutes of Health

CELEST: A Center for Learning in Education, Science, and Technology
Co-Principal Investigator, National Science Foundation

Modeling Acoustic and Articulatory Features for Hybrid Synthesis
Principal Investigator, National Science Foundation

Acquisition of Prosodic Control in Typically Developing Children
Principal Investigator, National Institute of Health

Displaying Prosodic Text for Reading Aloud with Expression
Principal Investigator, National Science Foundation

RSVPiconCHAT: A Brain-Computer Interface for Icon-Based Communication
Co-Principal Investigator, National Science Foundation

Visualizing Speech Melody to Improve Second Language Expressive Fluency in Adolescents
Principal Investigator, Northeastern University

Center for Speech Science and Technology
Principal Investigator, Northeastern University

CAREY RAPPAPORT

COE Distinguished Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Massachusetts Institute of Technology, 1987. Joined Northeastern in 1987
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Scholarship Focus

- Antenna design
- Wave propagation in complex media
- Biomedical microwaves device design and analysis
- Subsurface sensing system design and integration
- Concealed object detection for security applications

Honors and Awards

- Fellow, Institute of Electrical and Electronics Engineers
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Papers in refereed journals

B. Gonzalez-Valdes, Y. Alvarez, J.A. Martinez-Lorenzo, F. Las-Heras, C. Rappaport
On the use of Improved Imaging Techniques for the Development of a Multistatic Three-Dimensional Millimeter-Wave Portal Based Imaging for Personnel Screenings, Progress in Electromagnetics Research, vol. 138, p 83-98, 2013

B. Gonzalez-Valdes, Y. Alvarez, J.A. Martinez-Lorenzo, F. Las-Heras, C. Rappaport
SAR Processing for Profile Reconstruction and Characterization of Dielectric Objects on the Human Body Surface, Progress In Electromagnetics Research, vol. 138, p 269-282, 2013

Y. Alvarez, B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, F. Las-Heras, C. Rappaport
An Improved SAR Based Technique for Accurate Profile Reconstruction, IEEE Transactions on Antennas and Propagation (TAP), vol. 61, No. 3, p 1490 – 1495, March 2013

J.A. Martínez Lorenzo, Y. Rodríguez-Vaqueiro, C. Rappaport, O. Rubinos Lopez, O., G. Pino
A Compressed Sensing Apoach for Detection of Explosive Threats at Standoff Distances, Using a Passive Array of Scatterers, Homeland Security Affairs, Supement 6, Article 1, p 1 - 6, 2013

Y. Álvarez, J. Laviada, L. Tirado, C. García, J.A. Martínez-Lorenzo, F. Las- Heras, C. Rappaport
Inverse Fast Multipole Method for Monostatic Imaging Applications, Geoscience and Remote Sensing Letters, vol. 10, no. 5, p 1239-1243, Sept. 2013

B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, C. Rappaport
A New Fast Algorithm for Radar-Based Shape Reconstruction of Smoothly Varying Objects, IEEE Antennas and Wireless Propagation Letters, vol.12, no., p 484-487, 2013

Y. Rodríguez-Vaqueiro, Y. Álvarez, B. Gonzalez-Valdes, J.A. Martínez-Lorenzo, F. Las-Heras, C. Rappaport
On the Use of Compressed Sensing Techniques for Improving Multistatic Three-dimensional Millimeter-Wave Portal-Based Personnel Screening, IEEE (TAP), vol. 62, no. 1, p 494 - 499

B. Gonzalez Valdes, G. Allan, Y. Rodriguez-Vaqueiro, Y. Álvarez, S. Mantzavinos, M. Nickerson, J.A. Martinez Lorenzo, F. Las-Heras, C. Rappaport
Sparse Array Optimization using Simulated Annealing and Compressive Sensing for Near-Field Millimeter Wave Imaging, IEEE Transactions on Antennas and Propagation, vol. PP, no. 99, 2013

Y. Álvarez, Y. Rodriguez-Vaqueiro, B. Gonzalez-Valdes, J.A. Martínez-Lorenzo, F. Las-Heras, C. Rappaport
Phase Error Compensation in Imaging Systems Using Compressed Sensing Techniques, IEEE Antennas and Wireless Propagation Letters, vol. 12, no. 12, Dec. 2013, p 1574 - 1577

Papers in refereed conferences

S. Mantzavinos, B. Gonzalez Valdes, D. Busuioc, M. Nickerson, R. Miller, J.A. Martinez-Lorenzo, C. Rappaport
Low-Cost, Fused Millimeter-Wave and 3D Point Cloud Imaging for Concealed Threat Detection, Gordon Research Conference: Detecting Illicit Substances, Drugs and Explosives, May 2013

C. Rappaport, A. Morgenthaler
A Simple and Accurate Means of Predicting the Locus of Constant Travel Time of an Underground

Scatterer for Air-Launched Bistatic GPR, International Geoscience and Remote Sensing Symposium (IGARS), July 2013, p 3537 - 3541

M. Hines, C. Rappaport
Localization of Anti-Personnel Landmines using Computationally Modeled Data for Bistatic Ground-Coupled Ground Penetrating Radar, (IGARSS), July 2013, p 4070 - 4073

M. Tajdini, C. Rappaport
Analytic Analysis of Ground Penetrating Radar Wave Scattering of Reinforced Concrete Bridge Decks, (IGARSS), July 2013, p 4066 - 4069

A. Morgenthaler, C. Rappaport
Fast GPR Underground Shape Anomaly Detection Using the Semi-Analytic Mode Matching Algorithm, (IGARSS)

M. Tajdini, C. Rappaport
An Efficient Forward Model of Ground Penetrating Radar for Sensing Deteriorated Bridge Decks, IEEE International Antennas and Propagation Symposium, July 2013, p 1022 - 1023

J.A. Martinez-Lorenzo, R. Obermeier, F. Quivira, C. Rappaport, R. Moore, D. Kopans
Fusing Digital-Breast-Tomosynthesis and Nearfield-Radar-Imaging Information for a Breast Cancer Detection Algorithm, IEEE International Antennas and Propagation Symposium, 2013 p. 2038-2039

J.A. Martinez-Lorenzo, A. Basukoski, F. Quivira, C. Rappaport, R. Moore, D. Kopans
Composite Models for Microwave Dielectric Constant Characterization of Breast Tissues, IEEE International Antennas and Propagation Symposium, July 2013, p 2036 - 2037

S. Mantzavinos, B. Gonzalez-Valdes, D. Busuioc, R. Miller, J.A. Martinez-Lorenzo, C. Rappaport
Low-Cost, Fused Millimeter-Wave and 3D Point Cloud Imaging for Concealed Threat Detection, IEEE International Antennas and Propagation Symposium, July 2013, p 1014 - 1015

A. García Pino, B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, C. Rappaport
Scanned Blade Beam Reflector Antenna for Nearfield Imaging, IEEE IAPS, July 2013, p 950 - 951

Y. Rodriguez-Vaqueiro, B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, C. Rappaport, Y. Álvarez, F. Las-Heras
Compressed Sensing Techniques for Multistatic Three-dimensional Millimeter-Wave Personnel Screening, IEEE International Antennas and Propagation Symposium, July 2013, p 534-535

Y. Álvarez, F. Las-Heras, B. Gonzalez-Valdes, J.A. Martínez-Lorenzo, C. Rappaport
Low Permittivity Dielectric Object on Conductor Characterization, IEEE IAPS, July 2013, p 822 - 823

Y. Álvarez, F. Las-Heras, B. Gonzalez-Valdes, J.A. Martínez-Lorenzo, C. Rappaport
Accurate Profile Reconstruction Using An Improved SAR Based Technique, IEEE International Antennas and Propagation Symposium (IAPS), July 2013, p 818 - 819

B. Gonzalez-Valdes, J.A. Martinez-Lorenzo, C. Rappaport
Dual Band SAR Processing for Low Dielectric Contrast Buried IED Detection, IEEE IAPS, p 1080

C. Rappaport, B. Gonzalez-Valdes, G. Allan, J.A. Martínez-Lorenzo
Optimizing Element Positioning in Sparse Arrays for Nearfield Mm-Wave Imaging, IEEE Phased Array Conference, October 13-16, 2013, p 333-335

Y. Álvarez, F. Las-Heras, B. Gonzalez-Valdes, J.A. Martínez-Lorenzo, C. Rappaport
Material Characterization Using A Millimeter Wave Portal-Based Imaging System for Security Screening, IEEE Homeland Security Technology Conference, October 2013, p 511 - 516

Research Projects

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

Walking Robot Based Ground Penetrating Radar Sensor for Mine and IED Detection,
Principal Investigator, National Science Foundation

Microwave Nearfield Radar Imaging (NRI) Using Digital Breast Tomosynthesis (DBT) for Non-Invasive Breast Cancer Detection,
Co-Principal Investigator, National Science Foundation

PURNIMA RATILAL

Associate Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, Massachusetts Institute of Technology, 2002. Joined Northeastern in 2004
617.373.8458 | purnima@ece.neu.edu | ece.neu.edu/faculty/purnima

Scholarship Focus

- Remote sensing
- Wave propagation and scattering in random media and multi-path environments
- Temporal and spatial signal processing
- Statistical inference theory
- Acoustical oceanography
- Fisheries and marine mammal acoustics
- Nonlinear scattering theory

Honors and Awards

- Presidential Early Career Award for Scientists and Engineers
- Office of Naval Research Young Investigator Award

Selected Recent Publications

Papers in refereed journals

Z. Gong, D. Tran, P. Ratilal
Comparing Passive Source Localization and Tracking Approaches With a Towed Horizontal Receiver Array in an Ocean Waveguide, J. Acoust. Soc. Am., vol 134, 3705-3720, 2013

Z. Gong, T. Chen, P. Ratilal, N. Makris
Temporal Coherence of the Acoustic Field Forward Propagated Through a Continental Shelf with Random Internal Waves, J. Acoust Soc. Am., vol. 134, 3476-3485, 2013

A. Jain, A. Ignisc
Feasibility of Ocean Acoustic Waveguide Remote Sensing (OAWRS) of Atlantic Cod with Seafloor Scattering Limitations, Remote Sens. vol. 6 (1), 180-208, 2013

D. Tran, W. Huang, A. Bohn, D. Wang, Z. Gong, N. Makris, P. Ratilal
Range Localization, Classification and Shallow-Water Dive Profiling of Sperm Whales With a Low-Frequency Coherent Horizontal Receiver Array, J. Acoust. Soc. Am., Vol. 135, 3352-3363, January 2014

Research Projects

Development of a Lightweight Towed Array Receiver (LTAR) for Wide-Area Ocean Monitoring and Imaging
Principal Investigator, National Science Foundation

Supemental Funding Request: Sea Test and Design of Vibration Isolation Module of National Science Foundation-MRI funded Lightweight Towed Receiver Array (LTAR)
Principal Investigator, National Science Foundation

Enhancing Long Range Sonar Performance in Range-Dependent Fluctuating Ocean Waveguides by Mitigating Biological Clutter and Environmental Reverberation
Principal Investigator, Department of Defense

Instantaneous Passive And Active Detection, Localization, Monitoring And Classification Of Marine Mammals Over Long Ranges With High-Resolution Towed Array Measurements
Principal Investigator, National Science Foundation

Unified Four-Dimensional Multi-Resolution Oceanographic, Acoustic and Atmospheric Modeling and Dynamics
Collaborator, Office of Naval Research

MATTEO RINALDI

Assistant Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Pennsylvania, 2010. Joined Northeastern in 2012
617.373.2751 | rinaldi@ece.neu.edu | northeastern.edu/nemslab

Scholarship Focus

- Micro/nano electromechanical systems (MEMS/NEMS)
- Chemical, physical and biological sensors
- Radio frequency wireless communication devices
- Piezoelectric materials
- Nano-materials and nano-structures

Honors and Awards

- National Science Foundation CAREER Award
- Defense Advanced Research Projects Agency Young Faculty Award

Selected Recent Publications

Papers in refereed journals

T. Nan, Y. Hui, M. Rinaldi, N.Sun
Self-Biased 215MHz Magnetoelectric NEMS Resonator for Ultra-Sensitive DC Magnetic Field Detection, Scientific Reports, article 1985, 2013

Y. Hui, M. Rinaldi
Fast and High Resolution Thermal Detector Based on an Aluminum Nitride Piezoelectric Micro-Electromechanical Resonator with an Integrated Suspended Heat Absorbing Element, Applied Physics Letters, 102, 093501, 2013

Y. Hui, T. Nan, N. Sun, M. Rinaldi
High Resolution Magnetometer Based on a High Frequency Magnetoelectric MEMS-CMOS Oscillator, IEEE/ASME, Journal of Microelectromechanical Systems (JMEMS), 2014

Papers in refereed conferences

Z. Qian, Y. Hui, F. Liu, S. Kar, M. Rinaldi
245 MHz Graphene-Aluminum Nitride Nano Plate Resonator, Proceedings of the 17th International Conference on Solid-State Sensors, Actuators and Microsystems, Transducers 2013, p 2005-2008

Y. Hui, T.X. Nan, N. X. Sun, M. Rinaldi
MEMS Resonant Magnetic Field Sensor Based on an AlN/FeGaB Bilayer Nano-Plate Resonator, Proceedings of the 26th IEEE International Conference on Micro Electro-Mechanical Systems (MEMS 2013), Taipei, p 721-724

G. Hummel, Y. Hui, Z. Qian, M. Rinaldi
Switchable Aluminum Nitride MEMS Resonator Using Phase Change Materials, Proceedings of the 2014 Solid-State Sensors, Actuators and Microsystems Workshop, Hilton Head, 2014, p 431-434

Y. Hui, Z. Qian, G. Hummel, M. Rinaldi
Pico-Watts Range Uncooled Infrared Detector Based on a Freestanding Piezoelectric Resonant Microplate with Nanoscale Metal Anchors, Proceedings of the 2014 Solid-State Sensors, Actuators and Microsystems Workshop,Hilton Head, 2014, p 387-390

Research Projects

Un-Cooled Nanomechanical Infrared/THz Detectors Based on Piezoelectric Resonant Nano Plates
Principal Investigator, Defense Advanced Research Projects Agency (Young Faculty Award)

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

Intrinsically Switchable and Programmable MEMS Filter Array
Principal Investigator, Defense Advanced Research Projects Agency

JEFFREY RUBERTI

Professor, Bioengineering; affiliated faculty: Mechanical and Industrial Engineering, Chemical Engineering
PhD, Tulane University, 1998. Joined Northeastern in 2004
617.373.3984 | j.ruberti@neu.edu | coe.neu.edu/~jeffr

Scholarship Focus

- Tissue engineering of load-bearing matrix (Bone, Cornea)
- Bioreactor Design
- Multi-scale Mechanobiochemistry, Statistical Mechanics, Energetics
- Microscopy, High-resolution Imaging

Honors and Awards

Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Papers in refereed journals

D. Karamichos, C.B. Rich, R. Zareian, A.E.K. Hutcheon, J.W. Ruberti, V. Trinkaus-Randall, J.D. Zieske
TGF-B3 Stimulates Stromal Matrix Assembly by Human Corneal Keratocyte-Like Cells, Invest Ophthalmol Vis. Sci., Oct. 9, 2013

H.K. Kao, Q. Li, B. Flynn, X. Qiao, J.W. Ruberti, G.F. Murphy, L. Guo
Collagen Synthesis Modulated in Wounds Treated by Pulsed Radiofrequency Energy, Plast. Reconstr. Surg., April, 131, 2013

J.A. Paten, G. Tilburey, E. Molloy, R. Zareian, C. Trainor, J.W. Ruberti
Utility of an Optically-Based Micromechanical System for Printing and Testing Collagen Fibers, Biomaterials, April, 34, 2013

B.P. Flynn, G. Tilburey, J.W. Ruberti
Single Fibril Force/Enzyme Degradation Assay Reveals Highly-Sensitive Mechanochemical Switch in Native Collagen, Biomech. Model Mechanobiol., p 291-300, 2013

Research Projects

Mechanobiology of Matrix Production by Corneal Fibroblasts
Principal Investigator, National Institutes of Health

Lipid Activated Nuclear Receptors in Age-Related Macular Degeneration
Co-Investigator, National Institutes of Health

Biomimetic Bone: from Nano to Micro
Principal Investigator, National Science Foundation

Impact of Lipids on Intestinal Mucus Transport and Structural Properties
Co-Investigator, National Institutes of Health

Dissertations Supervised

Ramin Zareian
The Effect of Mechanics on Migration, Morphology and Matrix Production by Primary Human Corneal Fibroblasts: Long-Term Dynamic Observation (see p 95)

CARMEN SCEPPA

Professor, Health Sciences; affiliated faculty, Bioengineering
PhD, Tufts University, 1994; M.D., Francisco Marroquin University, 1987. Joined Northeastern in 2008
617.373.5543 | c.sceppa@neu.edu

Scholarship Focus

- Healthy aging
- Nutrition and physical activity/exercise
- Chronic disease prevention
- Transitional research

Selected Recent Publications

Papers in refereed journals

S.M. Smith, C. Castaneda-Sceppa, K.O. O'Brien, S.A. Abrams, P. Gillman, N.E. Brooks, G.J. Cloutier, M. Heer, S. Zwart, M.E. Wastney

Calcium Kinetics During Bed Rest With Artificial Gravity and Exercise Countermeasures, Osteoporosis International, May 27, 2014

J. He, S. Bhasin, E.F. Binder, K.E. Yarasheski, C. Castaneda-Sceppa, E.T. Schroeder, R. Roubenoff, C.P. Chou, S.P. Azen, F.R. Sattler

Cardiometabolic Risks During Anabolic Hormone Supplementation in Older Men, Obesity 2013;21 (5):968-75

M.I. Van Rompay, N.M. McKeown, C. Castaneda-Sceppa, J.M. Ordovas, K.L. Tucker

Carbohydrate Nutrition Differs by Diabetes Status and is Associated with Dyslipidemia in Boston Puerto Rican Adults Without Diabetes, Journal of Nutrition 2013;143 (2):182-8

Research Projects

Modifying the Workplace to Decrease Sedentary Behavior

Co-Investigator, The National Institute for Occupational Safety and Health

Interprofessional Geriatric Education for Team Based Care

Co-Principal Investigator, Health Resources and Services Administration

Effect of Age and Physical Activity on Skeletal Muscle Transcriptional Adaptations Induced by Strength Training

Principal Investigator, Novartis

Healthy Kids, Healthy Futures

Principal Investigator, Northeastern University

Heart Healthy Initiative for Puerto Rican Adults

Project Leader, National Heart, Lung, and Blood Institute

IgnitePlay: Using Social Media and Social Games to get people to eat healthy and Adopt Exercise

Co-Investigator, Northeastern University

Designing Community-Driven Technologies for Physical Activity Promotion in Families

Co-Investigator, Northeastern University

Sarcopenia Among Puerto Rican Older Adults

Principal Investigator, The Foundation at the National Institutes of Aging

BAHRAM SHAFAI

Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, George Washington University, 1985. Joined Northeastern in 1985
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Scholarship Focus

- Control systems and signal processing
- Robust and optimal control
- Stability and control of time delay systems, positive systems, multi-agent systems

Honors and Awards

- Associate Editor of IEEE Transactions on Systems
- Senior Member, Institute of Electrical and Electronics Engineers

Selected Recent Publications

Papers in refereed journals

R. Ghadami, B. Shafai

Decomposition-Based Distributed Control for Continuous-Time Multi-Agent Systems, IEEE Transaction on Automatic Control, vol. 58, no. 1, p 258-264, Jan. 2013

Papers in refereed conferences

B. Shafai, R. Ghadami

A Two-Step Procedure for Optimal Constrained Stabilization of Linear Continuous-Time Systems, Proceedings of 21st Mediterranean Conference on Control and Automation (MED 2013), Chania, Crete, Greece, p 910-915, 2013

P.M. Nia, R. Sipahi, B. Shafai

On Controller Design for Delay-Independent Stability of Linear Time-Invariant Systems with Multiple Delays, Proceedings of 2013 European Control Conference (ECC), Zurich, Switzerland, p 4406-4411, 2013

A.B. Farjadian, M.J. Yazdanpanah, B. Shafai

Application of Reinforcement Learning in Sliding Mode Control for Chattering Reduction, Proceedings of the World Congress in Engineering 2013, London, England, p 743-747, 2013

M. Alavi, M. Saif, B. Shafai

State Estimation in Discrete-Time Nonlinear Stochastic Systems Subject to Random Data Loss, Proceeding of 2013 Asian Control Conference, Istanbul, Turkey, p 1-5, 2013

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

Vision Based Control of an Autonomous Blimp with Actuator Saturation Using Pulse-Width Modulation, Proceedings of 2013 IEEE Multi-Conference on Systems and Control (MSC), Hyderabad, India, p. 433-438, 2013

B. Shafai, R. Ghadami, A. Oghbaee

Constrained Stabilization with Maximum Stability Radius for Linear Continuous-Time Systems, Proceeding of 52nd IEEE Conference on Decision and Control, Florence, Italy, p 3415-3420, 2013

SANDRA SHEFELBINE

Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
PhD, Stanford University, 2002. Joined Northeastern in 2013
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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 Recent Publications

Papers in refereed journals

N. Rodriguez-Florez, M. L. Oyen, S.J. Shefelbine
Age Related Changes in Mouse Bone Permeability, Journal of Biomechanics, vol. 47, issue 5 , p 1110-1116

A. Carriero, M. Doube, M. Vogt, B. Busse, J. Zustin, A. Levchuk, P. Schneider, R. Müller, S.J. Shefelbine
Altered Lacunar and Vascular Porosity in Osteogenesis Imperfecta Mouse Bone as Revealed by Synchrotron Tomography Contributes to Bone Fragility, Bone, 61:116-24, 2013

W. Macdonald, S.J. Shefelbine
Characterising Neovascularisation in Fracture Healing with Laser Doppler and Micro-CT Scanning, Medical and Biological Engineering and Computing, 2013, 51 (10):1157-65, 2013

M. Vanleene, S. J. Shefelbine
Therapeutic Impact of Low Amplitude High Frequency Whole Body Vibrations on the Osteogenesis Imperfecta Mouse Bone, Bone, 53 (2):507-14, 2013

B. Poulet, T.A.T. Westerhof, R. Hamilton, S.J. Shefelbine, A.A. Pitsillides
Spontaneous Osteoarthritis In STR/ORT Mice is Unlikely Due to Greater Vulnerability to Mechanical Trauma, Osteoarthritis Cartilage, 21 (5): 756-63, 2013

N. Rodriguez, M. L. Oyen, S. J. Shefelbine
Insight into Differences in Nanoindentation Properties of Bone, Journal of the Mechanical Behavior of Biomedical Materials, 2013, 18, 90-99

RIFAT SIPAHI

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

- Stability, stabilization, and control design for systems with multiple delays
- Systems-level approach to man-machine systems, security, and biomedical applications

Honors and Awards

- College of Engineering Faculty Fellow
- Defense Advanced Research Projects Agency Young Faculty Award
- Fellow, American Society of Mechanical Engineers

Selected Recent Publications

Books and book chapters

T. Vyhlidal, J.-F. Lafay, R. Sipahi (Eds.)
Delay Systems from Theory to Numerics in Applications, in Advances in Dynamics and Delays, Springer-Verlag, October 2013

Papers in refereed journals

W. Qiao, R. Sipahi
A Linear Time-Invariant Consensus Dynamics with Homogeneous Delays: Analytical Study and Synthesis of Right-Most Eigenvalues, SIAM Journal on Control and Optimization, vol. 51, p 3971-3992, 2013

R. Sipahi, I.I. Delice
On Some Features of Core Hypersurfaces Related to Stability Switching of LTI Systems with Multiple Time Delays, IMA Mathematical Control and Information, available online, 2013

P.M. Nia, R. Sipahi
Controller Design for Delay-Independent Stability of Linear Time-Invariant Vibration Systems with Multiple Delays, Journal of Sound and Vibration, vol. 332, p 3589-3604, 2013

Research Projects

Interplay Between Network Topology and Stability of Control Systems with Delays
Principal Investigator, National Science Foundation

EAGER: Mechatronics Based Braille Writing Device for the Blind
Principal Investigator, National Science Foundation

A New Hands-on Mechatronics Course in Emerging Engineering Fields
Principal Investigator, Math Works

Model-Free Algorithms to Assist and Control Human-Task Missions against Dynamic Environments
Principal Investigator, Defense Advanced Research Projects Agency

GARDE: An Interdisciplinary Approach to Accommodate Fine Motor Control Disorders
Principal Investigator, National Science Foundation

Building Handheld Devices to Accommodate Essential Tremor
Principal Investigator, Center for Integration of Medicine and Innovative Technology

SRINIVAS SRIDHAR

Distinguished Professor, Physics; affiliated faculty, Chemical Engineering, Bioengineering
PhD, California Institute of Technology, 1984. Joined Northeastern in 1986
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Scholarship Focus

- Nanotechnology for drug delivery and multi-modal imaging
- Cancer nanotherapies
- Smart drug releasing implants

Selected Recent Publications

Papers in refereed journals

W. Ngwa, H. Korideck, A. Kassis, R. Kumar, S. Sridhar, G. Makrigiorgos, R. Cormack
In Vitro Radiosensitization by Gold Nanoparticles During Continuous Low Dose Rate Gamma Irradiation with I-125 Brachytherapy Seeds, Nanomedicine-Nanotechnology Biology and Medicine, vol. 9, p 25-27, 2013

D. Rivera-Chacon, M. Alvarado-Velez, C. Acevedo-Morantes, D. Nagesha, S. Sridhar, J. E. Ramirez-Vick, et al.
Fibronectin and Vitronectin Promote Human Fetal Osteoblast Cell Attachment and Proliferation on Nanoporous Titanium Surfaces, Journal of Biomedical Nanotechnology, vol. 9, 2013

Y. Petrov, S. Sridhar
Electric Field Encephalography: Electric Fields and their Application to Functional Brain Imaging, PLOSOne, July, 2013

S. Chapman, M. Dobrovolskaia, A. Joshi, H. Lee, T. Meade, M. Pomper, K. Ptak, J. Rao, R. Singh,
S. Sridhar, S. Stern, A. Wang, J. Weaver, G. Woloschak, L. Yang
Nanoparticles for Cancer Imaging: the Good, the Bad, and the Promise, NanoToday, vol. 8, p 454-460, 2013

S. Faegh, N. Jalili, S. Sridhar
A Self-Sensing Piezoelectric Micro Cantilever Biosensor for Detection of Ultrasmall Adsorbed Masses: Theory and Experiments, Sensors, vol.13, p 6089-6108, 2013

S. Faegh, N. Jalili, O. Yavuzcetin, D. Nagesha, R. Kumar, S. Sridhar
A Cost-Effective Self-Sensing Biosensor for Detection of Biological Species at Ultralow Concentrations, Journal of Applied Physics, vol. 113, p 224905, 2013

R. Kumar, A. Kulkarni, J. Nabulsi, D. Nagesha, R. Cormack, M. Makrigiorgos, S. Sridhar
Facile Synthesis of PEGylated PLGA Nanoparticles Encapsulating Doxorubicin and its In Vitro Evaluation as Potent Drug Delivery Vehicle, Drug Delivery and Translational Research, vol. 3, issue 4, p 299-308, 2013

G. Navarro, R. Sawant, S. Essex, S. Biswas, C. Otro, D. Nagesha, S. Sridhar, V. Torchilin
Phospholipid-Modified Polyethylenimine-Based Nanopreparations for SiRNA-Mediated Gene Silencing: Implications for Transfection and the Role of Lipid Components, Nanomedicine: Nanotechnology, Biology, and Medicine, 2013

O. Yavuzcetin, N.R. Perry, S.T. Malley, R.L. Dally, H.P. Novikov, B. Ozturk, S. Sridhar
Fabrication and Characterization of Single Mode Annealed Proton Exchanged Waveguides in -X-cut Lithium Niobate, Optical Materials, vol. 36, issue 2, p .372-375, 2013

DAGMAR STERNAD

Professor, Biology; jointly appointed: Electrical and Computer Engineering, Physics;
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Scholarship Focus

- Control and coordination of goal-directed human behavior
- Single and multi joint human movements including upper limb manipulation tasks and locomotion examined in virtual environments

Selected Recent Publications

Papers in refereed journals

S.-W. Park, T. Dijkstra, D. Sternad
Learning to Never Forget: Time Scales and Specificity of Long-Term Memory of a Motor Skill, Frontiers in Computational Neuroscience, 7:111, 2013

D. Sternad, H. Marino, M. Duarte, L. Dipietro, S. Charles, N. Hogan
Transitions Between Discrete and Rhythmic Primitives in a Unimanual Task, Frontiers in Computational Neuroscience, 7:90, 2013

N. Hogan, D. Sternad
Dynamic Primitives in the Control of Locomotion, Frontiers in Computational Neuroscience, 7:71, 2013

M.O. Abe, D. Sternad
Directionality in Distribution and Temporal Structure of Variability in Skill Acquisition, Frontiers in Human Neuroscience, 7:225, 2013

W.T.V. Chu, D. Sternad, T.D. Sanger
Healthy and Dystonic Children Compensate for Changes in Motor Variability, Journal of Neurophysiology, 109, 8, 2169-78, 2013

Papers in refereed conferences

M.E. Huber, M. Leeser, D. Sternad
Development of a Low-Cost, Adaptive, Clinician-Friendly Virtual Rehabilitation System, Proceedings for the 10th International Conference on Rehabilitation, Philadelphia, PA, August 26-29, 2013

Research Projects

Variability and Stability in Skill Acquisition
Principal Investigator, National Institutes of Health

PRISM: Attracting Students to Mathematics, Physics and Biology Through Interdisciplinary Research and Discovery
Co-Principal Investigator, National Science Foundation

Multi-Joint Intelligent Prosthesis Based on EMG Control
Co-Investigator, University of Beijing

Development of an Adaptive Clinician-Friendly Virtual Rehabilitation System and its Evaluation in Post-Operative Shoulder Therapy
Principal Investigator, Northeastern University

Prosody in Congenital and Acquired Dysarthria
Co-Investigator, National Institutes of Health

Training Dual-Task Walking After Stroke: Effects on Attentional and Locomotor Control
Co-Investigator, American Heart Association

MILICA STOJANOVIC

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Scholarship Focus

- Communications
- Signal processing
- Wireless networks

Honors and Awards

Fellow, Institute of Electrical and Electronics Engineers

Selected Recent Publications

Papers in refereed journals

E. Zorita, M. Stojanovic
Space-Frequency Block Coding for Underwater Acoustic Communications, IEEE Journal of Oceanic Engineering, Special Issue on Underwater Communications

P. Qarabaqi, M. Stojanovic
Statistical Characterization and Computationally Efficient Modeling of a Class of Underwater Acoustic Channels, IEEE Journal of Oceanic Engineering, Special Issue on Underwater Communications, vol. 38, No. 4, October 2013, p 701-717

A. Radosevic, R. Ahmed, T. Duman, J. Proakis, M. Stojanovic
Adaptive OFDM modulation for Underwater Acoustic Communications: Design Considerations and Experimental Results, IEEE Journal of Oceanic Engineering, 2013

C. Murphy, J. Walls, T. Schneider, R. Eustice, M. Stojanovic, H. Singh
CAPTURE: A Communications Architecture for Progressive Transmission via Underwater Relays with Eavesdropping, IEEE Journal of Oceanic Engineering, vol. 39, No.1, January 2014, p 120-130

F. Fazel, M. Fazel, M. Stojanovic
Random Access Compressed Sensing over Fading and Noisy Communication Channels, IEEE Transactions on Wireless Communications, vol.12, No.5, May 2013, p 2114-2125

K. Tu, T. Duman, M. Stojanovic, J. Proakis
Multiple Resampling Receiver Design for OFDM over Doppler-Distorted Underwater Acoustic Channels, IEEE Journal of Oceanic Engineering, vol.38, No.2, April 2013, p 333-346

D. Lucani, M. Medard, M. Stojanovic
Capacity Scaling Laws for Underwater Networks, Journal of Internet Mathematics, vol. 9, No. 2-3, June 2013, p 241-264

W.Y. Shin, D. Lucani, M. Medard, M. Stojanovic, V. Tarokh
On the Order Optimality of Large-Scale Underwater Networks Part I: Extended Network Model, Springer: Wireless Personal Communications, vol. 71, No. 3, August 2013, p 1683-1700

Papers in refereed conferences

B. Reed, J. Leighton, M. Stojanovic, F. Hover
Multi-Vehicle Dynamic Pursuit using Underwater Acoustics, in Proc. International Symposium on Robotics Research (ISRR), Singapore, December 2013

MILICA STOJANOVIC continued

P. Ponnavaikkoy, K. Yassiny, S.K. Wilsony, M. Stojanovicz, J. Holliday
Energy Optimization with Delay Constraints in Underwater Acoustic Networks, in Proc. IEEE Globecom Conference, Atlanta, GA, December 2013

K. Kerse, F. Fazel, M. Stojanovic
Target Localization and Tracking in a Random Access Sensor Network, invited paper, in Proc. 47th Asilomar Conference on Signals, Systems and Computers, November 2013

D. Parker, M. Stojanovic, C. Yu
Exploiting Temporal and Spatial Correlation in Wireless Sensor Networks, in Proc. 47th Asilomar Conference on Signals, Systems and Computers, November 2013

P. Qarabaqi, Y. Aval, M. Stojanovic
Computationally Efficient Simulation of Underwater Acoustic Communications, in Proc. IEEE Oceans 2013 Conference, San Diego, CA, October 2013

R. Ahmed, M. Stojanovic
Random Linear Packet Coding for Fading Channels, in Proceedings of IEEE Oceans 2013 Conference, San Diego, CA, October 2013

Y. Aval, M. Stojanovic
Partial FFT Demodulation for Coherent Detection of OFDM Signals Over Underwater Acoustic Channels, in Proceedings of IEEE Oceans'13 Europe Conference, Bergen, Norway, June 2013

F. Fazel, M. Stojanovic
Resource Allocation for Hierarchical Underwater Sensor Networks, in Proc. Information Theory and Applications Workshop (ITA), San Diego, CA, February 2013

Research Projects

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

MURI: Underwater Acoustic Propagation and Communications: A Coupled Research Program
Principal Investigator, Office of Naval Research

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

NIAN SUN

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PhD, Stanford University, 2002. Joined Northeastern in 2004
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Scholarship Focus

- Magnetic, ferroelectric and magnetoelectric materials
- RF/microwave magnetic and magnetoelectric devices design, fabrication and testing
- Materials properties at RF/microwave frequency range
- Self-assembly of magnetic nanostructure

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 Recent Publications

Books and book chapters

X. Xing, N. Sun
Nonlinear Vibration Energy Harvesting with High-Permeability Magnetic Materials, in Advances in Energy Harvesting Methods, Springer, p 437-455, 2013

Papers in refereed journals

Z. Zhou, T. Nan, Y. Gao, X. Yang, S. Beguhn, M. Li, Y. Lu, J. Wang, Y. H. Lin, C.W. Nan, M. Liu, K. Mahalingam, B. Howe, G. Brown, N. Sun
Quantification of Charge Mediated Magnetoelectric Coupling Strength in Magnetic/Dielectric Thin Film Heterostructures, Applied Physics Letters, 103, 232906, 2013

G. Wu, T. Nan, R. Zhang, N. Zhang, S. Li, N. Sun
Inequivalance of Direct and Converse Magnetoelectric Coupling Coefficients at Electromechanical Resonance, Applied Physics Letters, 103, 182905, 2013

G. Subramanyam, M. W. Cole, N. Sun, T. Kalkur, N. Sbrockey, G. Tompa, X. Guo, C. Chen, S. P. Alpay, G. A. Rossetti, Jr., K. Dayal, L.Q. Chen, D. Schlom
Challenges and Opportunities for Multi-Functional Oxide Thin Films for Voltage Tunable RF/Microwave Components, Journal of Applied Physics, 114, 191301, 2013

X. Yang, J. Wu, Y. Gao, T. Nan, Z. Zhou, S. Beguhn, M. Liu, N. Sun
Compact and Low Loss Phase Shifter With Low Bias Field Using Partially Magnetized Ferrite, IEEE Trans Mag. 2013

G.M. Yang, J. Wu, J. Lou, M. Liu, N. Sun
Low-Loss Magnetically Tunable Bandpass Filters with YIG Films, IEEE Trans. Magn. 49, 5063, 2013

X. Yang, Y. Gao, J. Wu, S. Beguhn, T. Nan, Z. Zhou, M. Liu, N.X. Sun
Dual H-and E-Field Tunable Multiferroic Bandpass Filter at Ku Band Using Partially Magnetized Spinel Ferrites, IEEE Trans. Magn., 49, 5485, 2013

F. R. Liu, N. Bai, J. J. Zhao, X. X. Han, W. P. Zhou, X. Lin, N. X. Sun
An Explanation of the Crystallization of Amorphous $Ge_2Sb_2Te_5$ Films Induced by a Short Gaussian Laser Pulse, Applied Physics Letters, 103, 051905, 2013

T. Nan, Y. Hui, M. Rinaldi, N. Sun
Self-Biased 215MHz Magnetoelectric NEMS Resonator for Ultra-Sensitive DC Magnetic Field Detection, Scientific Reports, 3, 1985, 2013

NIAN SUN continued

M. Liu, B. Howe, L. Grazulis, K.Y. Mahalingam, T. Nan, N. Sun, G. Brown
Voltage-Impulse-Induced Non-Volatile Ferroelastic Switching of Ferromagnetic Resonance for Reconfigurable Magnetoelectric Microwave Devices, Advanced Materials, 25, 4886, 2013

M. Li, Z. Zhou, M. Liu, J. Lou, D. Oates, G. Dionne, M. Wang, N. Sun
Novel Niznal-Ferrites And Strong Magnetoelectric Coupling In Niznal-Ferrite/Pzt Multiferroic Heterostructures, J. Phys. D: Appl. Phys. 46, 275001, 2013

S. Li, M. Liu, W. Shao, J. Xu, S. Chen, Z. Zhou, T. Nan, N. Sun, J.G. Duh
Large E-Field Tunability of Microwave Ferromagnetic Properties in Fe50co50-Hf/Lead Zinc Niobate-Lead Titanate Multiferroic Laminates, J. Appl. Phys.113, 17C727, 2013

Z. Zhou, O. Obi, S. Beghun, T. X. Nan, S. Stoute, M. Liu, J. Lou, X. Yang, Y. Gao, M. Li, X. Xing, N. X. Sun, J. Warzywoda, A. Sacco Jr., T. Guo, C. W. Nan
Growth Behaviors And Characteristics Of Low Temperature Spin-Sprayed Zno And Al-Doped Zno Microstructures, J Mater Sci: Mater Electron, 12, 1056, 2013

Li, M. Liu, J. Lou, X. Xing, J. Qiu, J. Lin, Z. Cai, F. Xu, N.X, Sun, J.G. Duh
Microwave Frequency Performance and High Magnetic Anisotropy of Nanocrystalline Fe70Co30-B Films Prepared by Composition Gradient Sputtering, Journal of Nanoscience and Nanotechnology 2013

X. Yang, J. Wu, S. Beguhn, T. Nan, Y. Gao, Z. Zhou, N. X. Sun
Tunable Bandpass Filter Using Partially Magnetized Ferrites With High Power Handling Capability, IEEE Microwave and Wireless Components Letters, 23, 184, 2013

S. Li, M. Liu, J. Lou, X. Xing, J. Qiu, J. Lin, Z. Cai, F. Xu, N.X. Sun, J.G. Duh
Tunable Microwave Frequency Performance of Nanocomposite Co2MnSi/PZN-PT Magnetoelectric Coupling Structure, Journal of Nanoscience and Nanotechnology, 13, 1182, 2013

X. Xing, N. X. Sun, B. Chen
High-Bandwidth Low-Insertion Loss Solenoid Transformers Using FeCoB Multilayers,IEEE Trans Power Electronics, 28, 4395, 2013

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

Papers in refereed conferences

Q. Sun, S. Patil, N.X. Sun, B. Lehman
Inductive Magnetic Harvester with Resonant Capacitive Rectifier Based on Synchronized Switch Harvesting Technique, Energy Conversion Congress and Exposition (ECCE), 2013 IEEE, 4940-4947

Shawn Beguhn, X. Yang, N. Sun
Design of a Magnetization Gradient Ferrite Substrate Integrated Waveguide Isolator to Mitigate Higher Order Mode Effects, International Microwave Symposium (IMS), June 2~6, 2013, Seattle, WA, USA

Q. Wang, J.G. McDaniel, N.. Sun, M. Wang
Road Profile Estimation of City Roads Using DTPS, Proc. SPIE 8692, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, 86923C, April 19, 2013

Y. Hui, T. Nan, N. Sun, M. Rinald
MEMS Resonator Magnetic Field Sensor Based on an AlN/FeGaB Bilayer, The 26th IEEE International Conference on Micro Electro Mechanical Systems, IEEE MEMS, January 20 - 24, 2013, Taiwan

MARIO SZNAIER

Dennis Picard Trustee Professor, Electrical and Computer Engineering; affiliated faculty, Bioengineering
PhD, University of Washington, 1989 Joined Northeastern in 2006
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Scholarship Focus

- Robust control
- Identification and model (In) validation
- Information extraction from high volume data streams
- Vision based control
- Applications of dynamical systems theory to imaging and video processing

Honors and Awards

IEEE Control Systems Society Distinguished Member Award

Selected Recent Publications

Papers in refereed journals

S. Markovic, B. Li, V. Pera, M. Sznaier, O. Camps, M. Niedre, M. Cytometry
A Computer Vision Approach to Rare Cell in Vivo Fluorescence Flow Cytometry, Dec. 2013

F. Dabbene, M. Sznaier, R. Tempo
Probabilistic Optimal Estimation and Filtering Under Uncertainty, IEEE Transactions on Automatic Control, 2014

M. Sznaier, M. Ayazoglu, T. Inanc
Fast Constrained Nuclear Norm Minimization with Applications to Control Oriented Systems Identification, IEEE Trans. Automatic Control, 2014

N. Ozay, M. Sznaier, C. Lagoa
Convex Certificates for Model (In) Validation of Switched ARX Systems with Unknown Switches, IEEE Trans. Aut. Control, 2014

Papers in refereed conferences

K. Bekiroglu, M. Sznaier, C. Lagoa, B. Shafai
Vision Based Control of an Autonomous Blimp with Actuator Saturation Using Pulse Width Modulation, Proc. 2013 IEEE Conf. Control Applications, p 1036-1041

M. Ayazoglu, B. Yilmaz, M. Sznaier, O. Camps
Finding Causal Interactions in Video Sequences, IEEE Int. Conf. on Computer Vision, Sydney, Dec. 2013

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

Y. Cheng, Y. Wang, M. Sznaier
Worst Case Optimal Estimators for Switched Linear Systems, Proc. 52 IEEE Conf. Dec. Control, Dec. 2013, p 4036-4041

B. Yilmaz, C. Lagoa, M. Sznaier
An Efficient Atomic Norm Minimization Approach to Identification of Low Order Models, Proc. 52 IEEE Conf. Dec. Control, Dec. 2013, p 5834-5839

MARIO SZNAIER continued

F. Xiong, Y. Cheng, O. Camps, M. Sznaier, C. Lagoa
Hankel Based Maximum Margin Classifiers: A Connection Between Machine Learning and Wiener Systems Identification, Proc. 52 IEEE Conf. Dec. Control, Dec. 2013, p 6005-6010

Y. Wang, M. Sznaier, F. Dabbene
A Convex Optimization Approach to Worst Case Optimal Sensor Selection, Proc. 52 IEEE Conf. Dec. Control, Dec. 2013, p 6353-6358

J. Lopez, Y. Wang, M. Sznaier
Sparse H2 Optimal Filter Design via Convex Optimization, 2014 American Control Conference, June 2014

Research Projects

Compressive Information Extraction: A Dynamical Systems Approach
Principal Investigator, AFOSR

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

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

ALERT DHS HS-STEM Career Development Program at Northeastern University
Participant, Department of Homeland Security

GILEAD TADMOR

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PhD, Weizmann Institute of Science,1984. Joined Northeastern in 1989
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Scholarship Focus

- Robust and nonlinear control
- Reduced order models
- Fluid flow control
- Applications of dynamics in imaging
- Real time video analysis
- Information extraction from massive data systems

Selected Recent Publications

Papers in refereed journals

L. Mirkin, T. Shima, G. Tadmor
Sampled-Data H2 Optimization of Systems with I/O Delays via Analog Loop Shifting, IEEE Trans. Aut. Control, July 2013

K. Aleksic´-Roeßner, R. King, O. Lehmann, G. Tadmor, M. Morzyn´ski
On the Need of Nonlinear Control for Efficient Model-Based Wake Stabilization, Theor. Comput. Fluid Dyn. (Online First) March 2013

Papers in refereed conferences

L. Mirkin, T. Shima, G. Tadmor
Analog Loop Shifting in H2 Optimization of Input-Delay Sampled-Data Systems, 52nd IEEE Conf. on Decision and Control, December 2013

VLADIMIR TORCHILIN

University Distinguished Professor, Pharmaceutical Sciences; affiliated faculty, Bioengineering
PhD, Moscow State University, 1971. Joined Northeastern in 1998
617.373.3206 | v.torchilin@neu.edu

Scholarship Focus

- Nanomedicine
- Drug delivery systems
- Drug targeting
- Lipid membranes and liposomes
- Polymeric micelles
- Imaging agents
- Experimental cancer immunology

Selected Recent Publications

Papers in refereed journals

A. Koshkaryev, A. Piroyan, V. Torchilin
Bleomycin in Octaarginine-Modified Fusogenic Liposomes Results in Improved Tumor Growth Inhibition, Cancer Lett, 2013, 334, 293-301

H. Wu, L. Zhu, V. Torchilin
pH-Sensitive Poly(histidine)-PEG/DSPE-PEG co-Polymer Micelles for Cytosolic Drug Delivery, Biomaterials, 2013

S. Biswas, P. Deshpande, G. Navarro, N. Dodwadkar, V. Torchilin
Lipid Modified Triblock PAMAM-Based Nanocarriers for siRNA Drug co-Delivery, Biomaterials, 2013

S. Biswas, N. Dodwadkar, P. Deshpande, S. Parab, V. Torchilin
Surface Functionalization of Doxorubicin-Loaded Liposomes with Octa-Arginine for Enhanced Anticancer Activity, Eur J Pharm Biopharm, 2013, 84, 517-525

S. Biswas, P.P. Deshpande, F. Perche, N.S. Dodwadkar, S.D. Sane, V.P. Torchilin
Octa-Arginine-Modified Pegylated Liposomal Doxorubicin: An Effective Treatment Strategy for Non-Small Cell Lung Cancer, Cancer Lett, 335, 191-200, 2013

S. Movassaghia, H. Moghimi, F. Shirazi, A. Koshkaryev, M. Trivedi, V. Torchilin
Efficient Down-Regulation of PKC-a Gene Expression in A549 Lung Cancer Cells Mediated by Antisense Oligodeoxynucleotides in Dendrosomes, Int. J. Pharm, 2013, 441, 82-91

R.D. Riehle, S. Cornea, A. Degterev, V.P. Torchilin
Micellar Formulations of pro-Apoptotic DM-PIT-1 Analogs and TRIAL in Vitro and in Vivo, Drug Deliv, 2013; 20:78-85

A.H. Abouzeid, N.R. Patel, I.M. Rachman, S. Senn, V.P. Torchilin
Anti-Cancer Activity of Anti-GLUT1 Antibody-Targeted Polymeric Micelles co-Loaded with Curcumin and Doxorubicin, J Drug Target, 10, 994-1000

L. Zhu, T. Wang, F. Perche, A. Taigind, V.P. Torchilin
Enhanced Anticancer Activity of Nanopreparation Containing an MMP2-Sensitive PEG-Drug Conjugate and cell-Penetrating Moiety, Proc Natl Acad Sci USA, 2013; 100:17047-17052

J. Pappalardo, C. Langellotti, S. Di Giacomo, V. Olivera, V. Quattrocchi, P. Zamorano, W. Hartner, T. Levchenko, V.P. Torchilin

In Vitro Transfection Of Bone Marrow-Derived Dendritic Cells with TATp-Liposomes, Int J Nanomedicine, 2014, 9, 963-973

A.H. Abouzeid, N.R. Patel, V.P. Torchilin
Polyethylene Glycol-Phosphatidylethanolamine (PEG-PE)/vitamin E micelles for co-Delivery of Paclitaxel and Curcumin to Overcome Multi-Drug Resistance in Ovarian Cancer, Int. J. Pharm, 2014, 464 (1-2), 178-184

R.R. Sawant, A.M. Jhaveri, A. Koshkaryev, L. Zhu, F. Qureshi, V.P. Torchilin
Targeted Transferrin-Modified Polymeric Micelles: Enhanced Efficacy in Vitro and in Vivo in Ovarian Carcinoma, Mol Pharm. 2014; 11 (2), 375-381

S. Biswas, V.P. Torchilin
Nanopreparations for Organelle-Specific Delivery in Cancer, Adv Drug Deliv Rev, 2014, 66, 26-41

A. Apte, E. Koren, A. Koshkaryev, V.P. Torchilin
Doxorubicin in TAT Peptide-Modified Multifunctional Immunoliposomes Demonstrates Increased Activity Against Both Drug-Sensitive and Drug-Resistant Ovarian Cancer Models, Cancer Biol Ther, 2014,15 (1), 69-80

G. Salzano, R. Riehle, G. Navarro, F. Perche, G. De Rosa, V.P. Torchilin
Polymeric Micelles Containing Reversibly Phospholipid-Modified Anti-Survivin siRNA: a Promising Strategy to Overcome Drug Resistance in Cancer, Cancer Letters, 2014, 343 (2), 224-231

T. Wang, W.C. Hartner, J.W. Gillespie, K.P. Praveen, S. Yang, L.A. Mei, V.A. Petrenko, V.P. Torchilin
Enhanced Tumor Delivery and Antitumor Activity in Vivo of Liposomal Doxorubicin Modified with MCF-7-Specific Phage Fusion Protein, Nanomedicine, 2014 Feb, 10 (2), 421-30

F. Perche, S. Biswas, T. Wang, L. Zhu, V.P. Torchilin
Hypoxia-Mediated siRNA Delivery, Angew Chemie, 2014, 53, 3363-3366

L. Zhu, F. Perche, T. Wang, V.P. Torchilin
Matrix Metalloproteinase 2-Sensitive Multifunctional Polymeric Micelles for Tumor-Specific co-Delivery of siRNA and Hydrophobic Drugs, Biomaterials 2014, 35, 4213-4222

E.Y. Lukianova-Hleb, X. Ren, R.R. Sawant, X. Wu, V.P. Torchilin, D.O. Lapotko
On Demand Intracellular Amplification of Chemoradiation With Cancer-Specific Plasmonic Nanobubbles, Nature Medicine, 2014

Research Projects

Nanocarriers for Intracellular Targeting
Principal Investigator, National Institutes of Health

Layer-by-Layer Technology for Poorly Soluble Drugs
Principal Investigator, National Institutes of Health

Center for Cancer Nanotechnology Excellence
Principal Investigator, National Institutes of Health

MMP-2-Sensitive Nanopreparations
Principal Investigator, National Institutes of Health

ASHKAN VAZIRI

Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
PhD, Northeastern University, 2004. Joined Northeastern in 2008
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Scholarship Focus

- Solid Mechanics, materials
- Computational Methods
- Biomechanics
- Nanotechnology

Honors and Awards

- Air Force Office of Scientific Research Young Investigator Award
- National Science Foundation CAREER Award
- Søren Buus Outstanding Research Award, College of Engineering

Selected Recent Publications

Books and book chapters

A. Vaziri, R. Ghosh
Numerical Analysis of the Response of Biomimetic Cellular Materials Under Static and Dynamic Loadings, Blast Mitigation. Springer, Edited by A. Shukla, Y. D. Rajapakse, M. E. Hynes, 2013

M.W. Moon, C. Kim, A. Vaziri
Ion Beam-Induced Self-Assembled Wrinkles, Mechanical Self-Assembly: Science and Application, Springer, Edited by X. Chen, 2013

Papers in refereed journals

J.A. Rennick, A. Nazarian, V. Entezari, J. Kimbaris, A. Tseng, A. Masoudi, H. Nayeb-Hashemi, A. Vaziri, B. Snyder
Finite Element Analysis and Computed Tomography Based Structural Rigidity Analysis of Rat Tibia with Simulated Lytic Defects, Journal of Biomechanics, 2013

B. Haghpanah, R. Oftadeh, J. Papadopoulos, A. Vaziri
Self-Similar Hierarchical Honeycombs, Proceedings of the Royal Society A, 2013, p 5322-5334

Y.T. Kim, B. Haghpanah, R. Ghosh, H. Ali, A. Hamouda, A. Vaziri
Instability of a Cracked Cylindrical Shell Reinforced by an Elastic Liner, Thin-Walled Structures, 2013 p 39-48

A. Nasto, A. Ajdari, A. Lazarus, A. Vaziri, P.M. Reis
Localization of Deformation in Thin Shells Under Indentation, Soft Matter, 2013.9, p 6796-6803

H. Ebrahimi, A. Vaziri
Metallic Sandwich Panels Subjected to Multiple Intense Shocks, Int. J. Solids and Structures, 2013, Int. J. Solids and Structures, 2013, 50, p 1164–1176

R. Oftadeh, B. Haghpanah, J. Papadopoulos, A.M. S. Hamouda, H. Nayeb-Hashemi, A. Vaziri
Mechanics of Anisotropic Hierarchical Honeycombs, Int. J. Mechanical Sciences, 81, p 126-136, 2014

H. Ebrahimi, A. Ajdari, D. Vella, A. Boudaoud, A. Vaziri
Directional Delamination of Highly Ellipsoidal Shells, Physical Review Letters, 2014, 112, 094302

J. Xiong, R. Ghosh, L. Ma, A. Vaziri, Y. Wang, L. Wu
Sandwich-Walled Cylindrical Shells with Lightweight Metallic Lattice Truss Cores and Carbon Fiber-Reinforced Composite Face Sheets, Composites Part A., 2014, 56: p.226-238

B. Haghpanah, Sh. Chiu, A. Vaziri
Adhesively Bonded Lap Joints with Extreme Interface Geometry, International Journal of Adhesion and Adhesives, 2014, 48: p. 130-138

B. Haghpanah, J. Papadopolous, A. Vaziri
Plastic Collapse of Lattice Structures Under a General Stress State, Mechanics of Materials, 2014, 68: p 267-274

J. Xiong, B. Wang, L. Ma, J. Papadopoulos, A. Vaziri, L. Wu
Three-Dimensional Composite Lattice Structures Fabricated by Electrical Discharge Machining, Experimental Mechanics, 2014, 54, p 405-412

Research Projects

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

Bioinspired Surfaces and Interfaces for Hybrid Multifunctional Structures
Principal Investigator, Air Force Office of Scientific Research

ALERT F4 Initiative
Principal Investigator, Department of Homeland Security

Mechanics of Carbon Nanotube Surface Decontamination
Principal Investigator, FM Global

Development of Novel High Friction, low Adhesion Materials
Co-Principal Investigator, Brooks Automation

New Approaches for Structural Protection in Oil and Gas Industry
Principal Investigator, National Priorities Research Program

KAI-TAK WAN

Associate Professor, Mechanical and Industrial Engineering; affiliated faculty, Bioengineering
PhD, University of Maryland, 1993. Joined Northeastern in 2007
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Scholarship Focus

- Cellular biomechanics
- Water filtration
- Thin film adhesion and characterization
- Subsurface mechano-sensing
- Shell adhesion
- Fundamental inter-surface forces

Honors and Awards

- College of Engineering Faculty Fellow
- National Science Foundation CAREER Award

Selected Recent Publications

Papers in refereed journals

Y. Li, X. Wang, A. Onnis-Hayden, K.-T. Wan, A. Z. Gu
Universal Quantifier Derived from AFM Analysis Links Cellular Mechanic Properties and Cell Surface Integration Forces with Microbial Deposition and Transport Behavior, Environmental Science & Technology, 2013

L. Sallaway, S. Magee, J. Shi, F. Quivira, K. Tgavalekos, D. Brooks, S. Muftu, W. Meleis, R. Moore, D. Kopans, K.-T. Wan
Detecting Solid Masses in Phantom Breast Using Mechanical Indentation, Experimental Mechanics, 2013

G. Li, K.-T. Wan
Adhesion Map for Thin Membranes, Journal of Applied Mechanics, 2013

J. Shi, S. Müftü, A. Gu, K.-T. Wan
Adhesion of a Cylindrical Shell in the Presence of DLVO Surface Potential, Journal of Applied Mechanics

X. Wang, Y. Li, A. Gu, K.-T. Wan
Predicting Macroscopic Colloidal Deposition and Transportation Based on Dimensionless Tabor's Parameter, Nano LIFE, 2013

G. Li, C.Yilmaz, X. An, S. Somu, Swastik Kar, Y. J. Jung, A. Busnaina, K.-T. Wan
Adhesion of Graphene Sheet on Nano-Patterned Substrates with Nano-Pillar Array, Journal of Applied Physics, 2013

M. Robitaille, J. Shi, S. McBride, K.-T. Wan
Mechanical Performance of Hydrogel Contact Lenses with a Range of Power Under Parallel Plate Compression and Central Load, Journal of the Mechanical Behavior of Biomedical Materials, 2013

S. R. Shin, S.M. Jung, M. Zalabany, K. Kim, P. Zorlutuna, S.B. Kim, M. Nikkhah, M. Khabiry, M. Azize, J. Kong, K.-T. Wan, T. Palacios, M. R. Dokmeci, H. Bae, X. S. Tang, A. Khademhosseini

Carbon-Nanotube-Embedded Hydrogel Sheets for Engineering Cardiac Constructs and Bioactuators, ACS Nano, 2013

Research Projects

A Novel Biomechanical Model of Bacterial Adhesion and Aggregation

Principal Investigator, National Science Foundation

Mechano-Lipidomics and Mechano-Cytosis of Drug Delivery Liposomes

Principal Investigator, National Science Foundation

Development of Long-Term Adhesion Test for Photovoltaic Module Components

Principal Investigator, National Institute of Standards and Technology

Mechanical Characterization and Adhesion Measurement of Hydrogel Contact Lenses

Principal Investigator, Johnson & Johnson

Dissertations Supervised

Michael Conrad Robitaille

Multi-Scaled Adhesion Mechanics of Hydrogel Contact Lenses (see p 93)

Xin Wang

Integrated Surface and Mechanical Characterization of Freestanding Bological and Other Nano-Structures Using Atomic Force Microscopy (see p 94)

THOMAS WEBSTER

Professor and Chair, Chemical Engineering; affiliated faculty, Bioengineering
PhD, Rensselaer Polytechnic Institute, 2000. Joined Northeastern in 2012
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Scholarship Focus

- Nanotechnology for inhibiting infection
- Nano-sensors
- Human toxicity of nano-materials

Honors and Awards

- Fellow, American Institute for Medical and Biological Engineers
- Fellow, American Society for Nanomedicine
- Fellow, Biomedical Engineering Society
- Fellow, Ernst Strungmann Foundation

Selected Recent Publications

Papers in refereed journals

B.M. Geilich, T. Webster
Reduced Adhesion of Staphylococcus Aureus to ZnO/PVC Nanocomposites, International Journal of Nanomedicine 2013;8:1177-1184

Q. Wang, T. Webster
Short Communication: Inhibiting Biofilm Formation on Paper Towels Through the use of Selenium Nanoparticle Coatings, International Journal of Nanomedicine 2013;8:407-411

K. Leuba, N. Durmus, E. Taylor, T. Webster
Short Communication: Carboxylate Functionalized Superparamagnetic Iron Oxide Nanoparticles (SPION) for the Reduction of S. Aureus Growth Post Biofilm Formation, International Journal of Nanomedicine 2013 (8):731-736

K. Kummer, E. Taylor, N. Durmas, K. Tarquinio, B. Ercan, T. Webster
Effects of Different Sterilization Techniques and Varying Anodized TiO_2 Nanotube Dimensions on Bacteria Growth, Journal of Biomedical Materials Research Part B: Applied Biomaterials 2013;101B (5):677-688

S. Jain, T.J. Webster, A. Sharma, A. Ashutosh
Intracellular Reactive Oxidative Stress, Cell Proliferation and Apoptosis of Schwann Cells on Carbon Nanofibrous Ssubstrates, Biomaterials, 34 (21): 4891-4901, 2013

N. Tran, T.J. Webster
Understanding Magnetic Nanoparticle Osteoblast Receptor-Mediated Endocytosis Using Experiments and Modeling, Nanotechnology, 24(18):185102, 2013

P.A. Tran, T.J. Webster
Antimicrobial Selenium Nanoparticle Coatings on Polymeric Medical Devices, Nanotechnology, 24(15):155101, 2103

T.J. Webster
Interview Nanomedicine: Past, Present and Future, Nanomedicine, 8 (4):525-529, 2013

X. Meng, D. A. Stout, L. Sun, T.J. Webster
Novel Injectable Biomimetic Hydrogels with Carbon Nanofibers and Self Assembled Rosette

Nanotubes for Myocardial Applications, Journal of Biomedical Materials Research, 101 (4), 1095-1102, 2013

S. Kalmodia, B. Basu, T.J. Webster
Gene Expression in Osteoblast Cells Treated with Submicron to Nanometer Hydroxyapatite-Mullite Eluate Particles, Journal of Biomaterials Applications, 27 (7), 891-908, 2013

Q. Wang, T.J. Webster
Nanostructured Selenium - A Novel Biologically-Inspired Material for Antibacterial Medical Device Applications, Biomimetics: Advancing Nanobiomaterials and Tissue Engineering 203-220, 2013

X. Liu, T.J. Webster
Nanoinformatics for Biomedicine: Emerging Approaches and Applications, International Journal of Nanomedicine, 8 (1), 1-5, 2013

B. Ercan, D. Khang, J. Carpenter, T.J. Webster
Using Mathematical Models to Understand the Effect of Nanoscale Roughness on Protein Adsorption for Improving Medical Devices, International Journal of Nanomedicine, 8 (1), 75-81, 2013

A. Qubaisi, M. Sadiq, R. Abdullah, M.H. Flaifel, T.J. Webster
Induction of Apoptosis in Cancer Cells by NiZn Ferrite Nanoparticles Through Mitochondrial Cytochrome C Release, International Journal of Nanomedicine, 8, 4115-4130, 2013

C. Yao, M. Hedrick, G. Pareek, T.J. Webster
Nanostructured Polyurethane-Poly-Lactic-co-Glycolic Acid Scaffolds Increase Bladder Tissue Regeneration: an in Vivo Study, International Journal of Nanomedicine, 8, 3285-3296, 2013

Q. Wang, J.M. Perez, T.J. Webster
Inhibited Growth of Pseudomonas Aeruginosa by Dextran- and Polyacrylic Acid-Coated Ceria Nanoparticles, International Journal of Nanomedicine, 8, 3395-3399, 2013

L. Zhang, T.J. Webster
Effects of Chemically Modified Nanostructured PLGA on Functioning of Lung and Breast Cancer Cells, International Journal of Nanomedicine 8, 1907-1919, 2013

P.A. Tran, T.J. Webster
Understanding the Wetting Properties of Nanostructured Selenium Coatings: the Role of Nanostructured Surface Roughness and Air-Pocket Formation, International Journal of Nanomedicine, 8, 2001-2009, 2013

L. Weng, T.J. Webster
Nanostructured Magnesium has Fewer Detrimental Effects on Osteoblast Function, International Journal of Nanomedicine, 8, 1773-1781, 2013

Completed Dissertations Supervised

George Ejiofor Aninwene II
Lubricin and Nano-BaSO4: Novel Methods to Prevent Surface Biofouling (see p 89)

Linlin Sun
Self-Assembled Rosette Nanotubes for Bone Tissue Engineering and Drug Delivery Applications (see p 93)

MARK C. WILLIAMS

Professor, Physics; affiliated faculty, Bioengineering
PhD, University of Minnesota, 1998. Joined Northeastern in 2001
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Scholarship Focus

- DNA Interactions
- Single Molecule Biophysics

Honors

Fellow, American Physical Society

Selected Recent Publications

Papers in refereed journals

K.R. Chaurasiya, C. Ruslie, M. Silva, L. Voortman, P. Nevin, S. Lone, P. Beuning, M.C. Williams
Polymerase Manager Protein UmuD Directly Regulates E. coli DNA Polymerase III a Binding to ssDNA, Nucleic Acids Research 41: 8959-8968, 2013

M.J. McCauley, E. Rueter, I. Rouzina, L.J. Maher III, M.C. Williams
Single Molecule Kinetics Reveal Microscopic Mechanism by Which HMGB Proteins Alter DNA Flexibility, Nucleic Acids Research 41: 167-18, 2013

H. Wu, M. Mitra, M.J. McCauley, J. Thomas, I. Rouzina, K. Musier-Forsyth, M.C. Williams, R. Gorelick
Aromatic Residue Mutations Reveal Direct Correlation Between HIV-1 Nucleocapsid Protein's Nucleic Acid Chaperone Activity and Retroviral Replication, Virus Research 171: 263-277, 2013

K.R. Chaurasiya, M.J. McCauley, W. Wang, D. F. Qualley, T.Wu, S. Kitamura, H. Geertsema, D.S. B. Chan, A. Hertz, Y. Iwatani, J.G. Levin, K. Musier-Forsyth, I. Rouzina, M.C. Williams
Oligomerization Transforms Human APOBEC3G from an Efficient Enzyme to a Slowly Dissociating Nucleic Acid-Binding Protein, Nature Chemistry 6: 28-33, 2014

Research Projects

Quantifying Single Molecule DNA-Ligand Interactions
Principal Investigator, National Science Foundation

Enhancement of Cellular DNA Flexibility
Principal Investigator, National Institutes of Health subcontract to Northeastern University from Mayo Clinic

Single Molecule HIV-1 NC/Gag-DNA Interactions
Principal Investigator, National Institutes of Health

GEORGE EJIOFOR ANINWENE II

PhD, 2014 Chemical Engineering
Advisors, Thomas Webster | Biomaterials

Lubricin and Nano-BaSO4: Novel Methods to Prevent Surface Biofouling

This dissertation addresses the issue of biofouling by proposing novel surface preparation methods using lubricin and/or nano-BaSO4 as non toxic agents to prevent biofouling by inhibiting initial cellular adhesion to surfaces. Preventing initial unwanted cellular attachment and accumulation will dramatically improve outcomes and reduce instances of life threatening infections and bio-adhesions.
Lubricin is a an anti-adhesive glycoprotein that is found in the synovial fluid, which acts as a natural barrier within the body, lubricating surfaces and preventing undesirable cellular adhesion on cartilage. BaSO4 is a common additive used to make medical plastics radio opaque. Nano-formulations would retain similar radiopaque properties while imbuing the medical plastic with nano surface features which would change surface interactions with biological agents.

See full dissertation at **iris.lib.neu.edu/chemical_eng_diss/20**

MARY K. BALACONIS

PhD, 2014 Mechanical Engineering
Advisors, Heather Clark | Biomedical Engineering and Bioengineering

The Development and Design of Fluorescent Sensors for Continuous in Vivo Glucose Monitoring

This dissertation details the design of novel fluorescent glucose-sensitive sensors for monitoring glucose levels non-invasively and continuously after initial implantation. Sensing components were selected for appropriate response at physiological concentrations and were fully characterized for dynamic range, sensitivity, and lifetime in vitro. In preclinical testing, glucose-sensitive sensors tracked changes in glucose levels in mice, but sensor monitoring was limited to one hour. Sensor design was further improved after these studies to prolong in vivo lifetime, increase response at hypoglycemic levels, and enhance sensor biocompatibility. These efforts resulted in in vivo lifetimes greater than one hour, incorporation of more advance sensing moieties, and a biodegradable sensor platform. Future work with these sensors will involve Clark Error Grid Analysis and biodistribution studies to address clinical application requirements.

See full dissertation at **iris.lib.neu.edu/mech_eng_diss/54**

PARNIAN BOLOORI ZADEH

PhD, 2013 Mechanical and Industrial Engineering
Advisor, Andrew Gouldstone | Biomechanical Engineering

The Evaluation of Pulmonary Surfactant Mechanics Under Different Inhaled Environments via Surface Tension Studies and Light Scattering

This dissertation focuses on the effects of using an indenter tip on the OCT images obtained from an excised lung (ii) the effects of oxygen on PS by confirming the results obtained from LW experiments using light scattering technique (iii) the effects of isoflurane (a commonly used sedative anesthetic) in reducing the toxic effect of oxygen on the function of PS and (iv) the effects of a single deep breath on the re-spreading process of PS. Findings from the last two studies can be very valuable in critical care and systematic utilization of isoflurane and deep breaths may be beneficial for patients in need of ventilator-based treatments.

See full dissertation at **iris.lib.neu.edu/mech_eng_diss/49**

BURAK EREM

PhD, 2013 Electrical and Computer Engineering
Advisor, Dana Brooks | Biomedical

Differential Geometric Models and Optimization Methods for Dynamic Analysis of Electrocardiographic Signals and the Inverse Problem of Electrocardiography

This dissertation presents work focused on algorithmic approaches that exploit the dynamical properties in the ECG signals, and to a lesser extent EEG as well. This thesis leverages ideas from differential geometry and optimization theory to model the signals as lying on trajectories confined by their biophysical origins to a subset of the space in which the measured signals reside. These trajectories can be characterized by the spatio-temporal properties of the signals. First, characterizing these geometric subsets as smooth manifolds, we apply Laplacian eigenmaps—an established manifold learning method from the machine learning literature—to these data, along with several extensions which we have developed expressly to relate the learned low-dimensional dynamic structure to the underlying physiological behavior without specifying an explicit dynamical model. We concentrate primarily on ECG signals, but also present examples of the methods applied to EEG data containing frequent episodes of interictal epileptic spiking.

See full dissertation at **iris.lib.neu.edu/elec_eng_diss/74**

SAMIRA FAEGH

PhD, 2013 Mechanical and Industrial Engineering
Advisor, Nader Jalili | Biomechanical Engineering
faegh.s@husky.neu.edu

A Novel Self-Sensing Piezoelectric Microcantilever-Based Sensor for Detection of Ultrasmall Masses and Biological Species

This dissertation presents a unique self-sensing piezoelectric MC-based sensor for the purpose of detecting ultrasmall masses and biological species. The entire developmental process is covered and presented which includes: development of comprehensive mathematical modeling framework, numerical simulation, designing, building and testing the sensor. In the beginning chapters of this dissertation, the main focus is on analytical studies investigating modeling and simulation of piezoactive MC-based systems with diverse applications along with the relative experimental verification. Sophisticated comprehensive mathematical modeling frameworks capable of describing static and dynamic behavior of MCs are presented.

See full dissertation at **iris.lib.neu.edu/mech_eng_diss/52**

SEAN HENRY KEVLAHAN

PhD, 2014 Chemical Engineering
Advisors, Shashi K. Murthy, Rebecca L. Carrier | Biochemical and Biomolecular Engineering

A Microfluidic Capture and Release Method for Isolation Intestinal Progenitor and Stem Cells from Native Rat Tissue Enabling Advances in Vasculogenic Co-Cultures

This dissertation describes a novel microfluidic cell capture and release platform to enrich for rare tissue specific stem and progenitor cells within native conditions without the need of a FACS instrument. The platform incorporates the use of a microfluidic post array coupled with an alginate-PEG moiety containing a bound capture protein which allows for selective capture and release of target cells with a simple chelation step. Illustrated in chapter 3, incorporates anti-CD133 into the hydrogel for selective intestinal progenitor cell enrichment where as chapter 4 demonstrates stem cell isolation implementing anti-GPR49 as the capture protein. This approach has lead to a novel cell separation prototype to isolate intestinal stem cells from native tissue digestate without the need for conventional genetic hybridization techniques. In addition, the approach provides a greater throughput (35,000 cells/min) and higher viability (93%) in comparison to the state of the art.

See full dissertation at **iris.lib.neu.edu/chemical_eng_diss/18**

ASANTERABI MALIMA

PhD, 2013 Electrical and Computer Engineering
Advisor, Ahmed A. Busnaina | Biomedical

Design, Fabrication and Assembly of Multiple Biomarker in-Vivo Biosensor

In this thesis, a design for highly sensitive micron scale in-vivo sensor platform device for simultaneous detection of multiple disease biomarkers is presented. The biosensor microchip is 0.25mm in diameter, based on SU-8 polymeric platform fabricated incorporating four active isolated areas as small as 70µm x 70µm. Conventional micro and nanofabrication processes were used for fabrication of these biocompatible microchips to enable large-scale production of such biosensors at lower manufacturing cost.

See full dissertation at **iris.lib.neu.edu/elec_eng_diss/70**

UMUT ORHAN

PhD, 2014 Electrical and Computer Engineering
Advisor, Deniz Erdogmus | Biomedical Devices and Instrumentation
orhan@ece.neu.edu | ece.neu.edu/~orhan

RSVP keyboard: An EEG Based BCI Typing System with Context Information Fusion

This dissertation focuses on the design of an EEG based letter-by-letter BCI typing system, RSVP KeyboardTM, which utilizes rapid serial visual presentation (RSVP). Differently from the commonly used visual BCI presentation schemes, RSVP aims to be accessible to the population with limited eye gaze control by presenting sequences of symbols on a screen over time at a fixed focal area and in rapid succession. As a response to the infrequent novel target stimulus (oddball paradigm), brain generates P300, an event related potential which is a positive deflection in the scalp voltage mainly in the centro-parietal areas with an average latency just over 300 ms. This natural novelty response allows us to design interfaces by detecting the intent using EEG.

See full dissertation at **iris.lib.neu.edu/elec_eng_diss/85**

MICHAEL CONRAD ROBITAILLE

PhD, 2014 Mechanical and Industrial Engineering
Advisor, Kai-Tak Wan | Biomedical Engineering and Bioengineering

Multi-Scaled Adhesion Mechanics of Hydrogel Contact Lenses

The first aim of this thesis focuses on macroscopic hydrogel lens adhesion characterization achieved via the Planar Adhesion Test (PAT). The PAT is a novel experimental technique that utilizes the lens native geometry to characterize both mechanical and adhesion properties...The second aim of this thesis focuses on characterizing hydrogel lens adhesion against more physiologically relevant samples; donated human corneas. Similar to the PAT, the lens is brought in contact with the cornea and retracted away, recording the "pull-off" force P* for each hydrogel material...The third and final aim of this thesis focuses on characterizing single cell adhesion behavior against the two hydrogel materials via Single Cell Force Spectroscopy (SCFS)...Additionally, this work contains an investigation into the mechanochemistry of native type I collagen via small angle light scattering (SALS), which is reviewed as an addendum at the end of this thesis.

See full dissertation at **iris.lib.neu.edu/mech_eng_diss/61**

LINLIN SUN

PhD, 2014 Chemical Engineering
Advisor, Thomas Webster | Biomedical Engineering and Bioengineering

Self-Assembled Rosette Nanotubes for Bone Tissue Engineering and Drug Delivery Applications

This thesis will first cover recent advances in fabricating and using nanostructured metals, ceramics, and polymers for numerous orthopedic applications and discuss future research that is needed for the field to progress. Then, this thesis elucidates several promising tissue engineering applications of rosette nanotubes (RNTs), a biomimetic self-assembled nanomaterial composed of DNA base-pairs. Rosette nanotubes have unique properties, including self-assembling into stable nanotubes in physiological environments, forming a viscous gel at body temperatures, and having a great affinity and enhanced bioactivity with many types of tissues (e.g., bone, cartilage, skin, heart, blood vessels, etc.). With a similarity to collagen molecules in bone and extracellular matrices in other organs, rosette nanotubes were used in this thesis for orthopedic applications in terms of enhancing bone cell functions, promoting in-vivo bone growth, delivery of bone morphogenetic protein (BMP) 7 derived short peptides, and anti-cancer drug delivery for bone cancer treatment... Moreover, RNTs combined with carbon nanofibers in polymer composites enhanced myocardial cell functions. Therefore, this thesis provided evidence that the self-assembling biomimetic material, RNT, is promising for injectable bone, skin, and heart applications.

See full dissertation at **iris.lib.neu.edu/chemical_eng_diss/24**

NIKSA VALIM

PhD, 2014 Electrical and Computer Engineering
Advisor, Mark Niedre | Biomedical

Instrumentation and Methods for Time-Resolved Diffuse Fluorescence Imaging

This dissertation focuses on the development of a novel instrument that allows simultaneous collection of spectral and temporal data sets. Chemometric analysis of joint temporal and spectral data sets allowed us to separate, quantify, and image up to five fluorochromes concurrently with 93% accuracy. This significantly outperformed more conventional methods, where only spectral or temporal information was used independently.

See full dissertation at **iris.lib.neu.edu/elec_eng_diss/90**

XIN WANG

PhD, 2013 Mechanical and Industrial Engineering
Advisor, Kai-Tak Wan | Nanoscience and Nanotechnology
coe.neu.edu/~ktwan/Xin.html

Integrated Surface and Mechanical Characterization of Freestanding Bological and Other Nano-Structures Using Atomic Force Microscopy

This dissertation is focused on surface and mechanical characterization of freestanding biological and other nano-structures using atomic force microscopy including two parts: cell mechanics and nano-structure mechanics. The main purpose of this work is to investigate how the nano- / micro-scale mechanical properties affect macro-scale function.

See full dissertation at **iris.lib.neu.edu/mech_eng_diss/47**

RAMIN ZAREIAN

PhD, 2013 Mechanical and Industrial Engineering
Advisor, Jeffrey Ruberti | Biomechanical Engineering

The Effect of Mechanics on Migration, Morphology and Matrix Production by Primary Human Corneal Fibroblasts: Long-Term Dynamic Observation

This dissertation focuses on DIC imaging, live cell fluorescent labeling, traction force microscopy and our previously designed mechanobioreactor, to locally and globally capture PHCF's behavior under cell culture conditions for up to two weeks. It directly tracks and observes the morphology and migration of PHCFs under physiological conditions in the presence of uniaxial mechanical load directly on the microscope. The behavior of human corneal fibroblasts is observed from initial seeding through matrix production. The orientation of cells, the magnitude and direction of their velocity as well as forces exerted by PHCFs were tracked on substrates every 6 minutes. The analyzed data demonstrates that corneal fibroblasts are induced to align on loaded substrates at a relatively fixed angle to the applied force while corneal fibroblasts on unloaded substrates exhibit only local alignment.

See full dissertation at **iris.lib.neu.edu/mech_eng_diss/43**

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The Interdisciplinary Science and Engineering Complex (ISEC)

at Northeastern is a 220,000 square foot complex scheduled to open in 2016. This facility will help grow Northeastern's research by providing state of the art infrastructure, and increasing the capacity to attract top students, faculty and academic leaders. The ISEC will connect the main campus to the expanded area with a fly-over pedestrian bridge. The six story building will contain wet, dry, and computational research facilities plus interactive teaching and learning spaces. The project was recently featured in ASCE's Civil Engineering Magazine (bit.ly/NU_ASCE). **Learn more at northeastern.edu/isec.**