Dear Friends,

The Department of Chemical Engineering has been on fire over the past five years. For example our undergraduate student body has tripled, our graduate student body has tripled, there has been over a 200% increase in research funding, and our faculty size has doubled. This has all culminated into our recognition by the *U.S. News and World Report* that over this five year period, we have experienced the greatest increase in graduate school rankings for any department ever on record. It is clear that our impact in chemical engineering education and research is at a record level and is poised for continual unprecedented growth in the years ahead.

We offer degrees at all levels (Bachelor of Science, Master of Science and Doctor of Philosophy) and are internationally renowned for high quality classroom-based education in conjunction with industrial work experience. Our top-rated (and one of the nation's largest) Cooperative (Co-op) Education program was one of the first in the country and the Chemical Engineering Co-op program currently places students in over 55 companies spanning the areas of consumer products, plastics, biotechnology, nanotechnology, alternative energy, and petrochemicals, to name a few. We even place students in international co-op locations in the UK, France, Switzerland, China, and Vietnam. It is not hard to see why we have been ranked four times as the Best Internship/Career Service University by the *Princeton Review*.

Our undergraduate program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc. ensuring that our program meets the quality standards established by the profession of Chemical Engineering. Our award-winning undergraduate student chapter of the American Institute of Chemical Engineers (AIChE) is very active in many outreach programs, such as the ChemE Car competition and hosting regional AIChE annual conferences. Our graduate program is very interdisciplinary and offers students opportunities to work with outstanding faculty to attain research experience and achieve their career goals in a variety of sub-fields of chemical engineering. Collectively, our graduate students and faculty have organized over 24 conferences in the past five years demonstrating our leadership across chemical engineering.

I invite you to explore our Department of Chemical Engineering through this Scholarship Report and find out why we have been listed among the top "up-and-coming national universities" by the *U.S. News and World Report*.

Sincerely,

Thomas J. Webster
Art Zafiropoulo Chair and Professor
Department Chair, Chemical Engineering
th.webster@northeastern.edu
**QUICK FACTS — Chemical Engineering**

- **100+** GRADUATE students
- **23** TENURED/TENURE-TRACK Faculty
- **32** Countries represented across both undergraduate and graduate levels
- **58%** INCREASE IN RESEARCH EXPENDITURES SINCE 2012
- **250%** INCREASE IN VISITING SCHOLARS SINCE 2013

**QUICK FACTS — College of Engineering**

- **13** MULTI-INSTITUTIONAL RESEARCH CENTERS funding by eight federal agencies
- **173** TENURED/TENURE-TRACK Faculty
- **40** NSF CAREER Awards
- **5** ENGINEERING DEPARTMENTS
  - Bioengineering
  - Chemical Engineering
  - Civil and Environmental Engineering
  - Electrical and Computer Engineering
  - Mechanical and Industrial Engineering
- **3566** UNDERGRADUATE students
- **3177** GRADUATE students
- **77** YOUNG INVESTIGATOR Awards

NEW FALL UNDERGRADUATE students 2015 — 2016: 665, 729

NEW FALL MS students 2015 — 2016: 942, 1178
Professor Laura Lewis, jointly appointed in mechanical and industrial engineering, won a Fulbright U.S. Scholar Program grant for a research project in Spain to advance her research in magnetic materials. Dr. Lewis was also selected as an American Physical Society fellow for investigations of fundamental structure-property relationships in functional magnetic materials from a unified perspective, specifically for “advancing permanent magnet, magnetic cooling, and biomedical applications.”

Professor Shashi Murthy was awarded a $300K NSF grant to create a “Bioreactor System for Autologous T-Cell Stimulation.” The cell type that is most commonly used to target cancers is the T cell, a type of white blood cell. The project addresses the manufacturing challenge associated with T cell stimulation with an interdisciplinary approach to design disposable stimulation systems that can accept dendritic cell and T cell samples, accomplish the desired stimulation in a timely and efficient manner, and generate enough T cells for a therapeutic dose.

Chair and Professor of Chemical Engineering and Art Zafiropoulo Chair in Engineering Thomas Webster was awarded a patent for “System and Method for Attaching Soft Tissue to an Implant Comprising a Nanotextured Surface.” Dr. Webster also received the International Society for Ceramics in Medicine Excellence Award for outstanding service in the field of biomaterials.

Assistant Professor Nasim Annabi’s research to solve the problem of chronic non-healing wounds has led to the development of the first elastic and adhesive wound dressing with adhesive, antimicrobial, and regenerative properties. The research findings were published in the Journal of Biomaterials.

Professor Rebecca Carrier (PI) and Assistant Professor Abigail Koppes (Co-I) were awarded a $5M National Institutes of Health Bioengineering Research Partnership grant to develop an in vitro model of the human gut that can be utilized for laboratory study. This is a collaborative project between Northeastern University, MIT, and Boston Children’s Hospital.

Associate Professor Edgar Goluch, was awarded an “In-Kind Silver Winner” prize at the 2016 MassChallenge. QSM Diagnostics uses a proprietary instrument sensor to identify common infectious bacteria in bodily fluids within one minute at the point-of-care.

QSM Diagnostics, founded by Associate Professor Edgar Goluch, was awarded an “In-Kind Silver Winner” prize at the 2016 MassChallenge. QSM Diagnostics uses a proprietary instrument sensor to identify common infectious bacteria in bodily fluids within one minute at the point-of-care.

Chair and Professor of Chemical Engineering and Art Zafiropoulo Chair in Engineering Thomas Webster developed a novel self-assembling nanomolecule that is being exclusively licensed by Audax Medical, Inc. for use in tissue regeneration. Additionally, at the 13th IASTED International Conference on Biomedical Engineering in Innsbruck, Austria, Webster was awarded the Plenary Award for his lab’s contributions to commercializing nanomedicine.
FACULTY BY RESEARCH AREAS

ADVANCED MATERIALS RESEARCH
Nasim Annabi
Debra Augustine
Sidi Bencherif
Sunho Choi
Arthur Coury
Matthew Eckelman
Adam Ekenseair
Hicham Fenniri
Joshua Gallaway
Andrew Gouldstone
Vincent Harris
Francisco Hung
Barry Karger
Lucas Landherr
Laura Lewis
Courtney Pfluger
Ming Su
Thomas Webster
Richard West
Ronald Willey
Katherine Ziemer

BIOLOGICAL ENGINEERING
Mansoor Amiji
Nasim Annabi
Anand Asthagiri
Debra Augustine
Sidi Bencherif
Rebecca Carrier
Heather Clark
Arthur Coury
Paul DiMilla
Eno Ebong
Adam Ekenseair
Hicham Fenniri
Edgar Goluch
Abigail Koppes
Ryan Koppes
Carolyn W.T. Lee-Parsons
Shashi Murthy
Nikolai Slavov
Srinivas Sridhar
Ming Su
Thomas Webster
MANSOOR AMIJI

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

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

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

SELECTED PUBLICATIONS

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

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

S. Yadav, S.K. Gandham, R. Panicucci, M.M. Amiji
Intranasal Brain Delivery of Cationic Nanoemulsion-Encapsulated TNF siRNA for Prevention of Experimental Neuroinflammation, Nanomedicine: Nanotechnology, Biology, and Medicine, 12(4), 2016, 987-1002

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

SELECTED RESEARCH PROJECTS

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

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

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

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

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

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

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

NASIM ANNABI

Assistant Professor, Chemical Engineering
PhD, University of Sydney, Australia, 2010
che.neu.edu/people/annabi-nasim

Scholarship focus: advanced biomaterials; soft tissue engineering; 3D microfabrication; vascularized 3D tissues; nanocomposite hydrogels

SELECTED PUBLICATIONS

Highly Elastic and Conductive Human-Based Protein Hybrid Hydrogels, Advanced Materials, 28(1), 2016, 40-49

Y. Zhang, R. Avery, Q. Vallmajó Martín, A. Assmann, A. Vegh, A. Memic, B.D. Olsen, N. Annabi, A. Khademhosseini

25th Anniversary Article: Rational Design and Applications of Hydrogels in Regenerative Medicine, Advanced Materials, 26(1), 2014, 85-124

N. Annabi, A. Tamayol, S. Shin, A.M. Ghaemmaghami, N.A. Peppas, A. Khademhosseini

N. Annabi, K. Tsang, S.M. Mithieux, M. Nikkhah, A. Ameri, A. Khademhosseini, A.S. Weiss
Highly Elastic Micropatterned Hydrogels for Engineering Functional Cardiac Tissues, Advanced Functional Materials, 23(39), 2013, 4950-4959

SELECTED RESEARCH PROJECTS

Engineering a Sprayable Multifunctional Wound Dressing
Principal Investigator, Northeastern University

Engineering Bioprintable Cardiac Tissues
Principal Investigator, American Heart Association

Smart Wound Dressing for Treating Chronic Diabetic Ulcers
Co-Investigator, National Institutes of Health
ANAND ASTHAGIRI
Associate Professor, Bioengineering; affiliated faculty, Chemical Engineering
PhD, Massachusetts Institute of Technology, 2000
bioe.neu.edu/people/asthagiri-anand

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

SELECTED PUBLICATIONS
Positive Quantitative Relationship Between EMT and Contact-Initiated Sliding on Fiber-Like Tracks, Biophysical Journal, 111(7), 2016, 1569-1574

Regulators of Metastasis Modulate the Migratory Response to Cell Contact Under Spatial Confinement, Biophysical Journal, 110(8), 2016, 1886-1895

Cell Chemotaxis on Paper for Diagnostics, Analytical Chemistry, 87(11), 2015, 5505-5510

M.L. Lalli, A.R. Asthagiri
Collective Migration Exhibits Greater Sensitivity but Slower Dynamics of Alignment to Applied Electric Fields, Cellular and Molecular Bioengineering, 8(2), 2015, 247-257

K. Bologovic, E.S. Gong, D.F. Milano, R.J. Natividad, A.R. Asthagiri
Engineering Cell-Cell Signaling, Current Opinion in Biotechnology, 24(5), 2013, 940-947

K. Kushiro, A.R. Asthagiri
Modular Design of Micropattern Geometry Achieves Combinatorial Enhancements in Cell Motility, Langmuir, 28(9), 2012, 4357-4362

J.H. Kim, A.R. Asthagiri
Matrix Stiffening Sensitizes Epithelial Cells to EGF and Enables the Loss of Contact Inhibition of Proliferation, Journal of Cell Science, 124, 2011, 1280-1287

J.H. Kim, L.J. Dooling, A.R. Asthagiri
Intercellular Mechatransduction During Multicellular Morphodynamics, Royal Society Interface, 7(3), 2010, 341-350

C.A. Giurumescu, P.W. Sternberg, A.R. Asthagiri
Predicting Phenotypic Diversity and the Underlying Quantitative Molecular Transitions, PLoS Computational Biology, 5(4), 2009, 1-13

J.H. Kim, K. Kushiro, N.A. Graham, A.R. Asthagiri
Turnable Interplay Between Epidermal Growth Factor and Cell-Cell Contact Governs the Spatial Dynamics of Epithelial Growth, Proceedings of the National Academy of Sciences USA, 106(27), 2009, 11149-11153

DEBRA AUGUSTE
Professor, Chemical Engineering
PhD, Princeton University, 2005
d.che.neu.edu/people/auguste-debra

Scholarship focus: bioresponsive drug delivery; cell and tissue engineering; tissue architecture; targeted therapeutics

Honors and awards: National Science Foundation CAREER Award; NIH Director’s New Innovator Award; Presidential Early Career Award in Science

SELECTED PUBLICATIONS
ICAM-1-Targeted, Lcn2 siRNA-Encapsulated Liposomes are Potent Anti-Angiogenic Agents for Triple Negative Breast Cancer, Theranostics, 6, 2016, 1-13

D. Liu, D.T. Auguste
Cancer Targeted Therapeutics: From Molecules to Drug Delivery Vehicles, Journal of Controlled Release, 219, 2015, 632-643

B. Wang, P. Guo, D.T. Auguste
Mapping the CXCR4 Receptor on Breast Cancer Cells, Biomaterials, 57, 2015, 161-8

T.T. Ho, J.O. You, D.T. Auguste
siRNA Delivery Impedes the Temporal Expression of Cytokine-Activated VCAM1 on Endothelial Cells, Annals of Biomedical Engineering, 2015, 1-8

pH-Responsive Scaffolds Generate a Pro-Healing Response, Biomaterials, 57, 2015, 22-32

D. Almeda, B. Wang, D.T. Auguste
Minimizing Antibody Surface Density on Liposomes While Sustaining Cytokine-Activated EC Targeting, Biomaterials, 47, 2015, 37-44

ICAM-1 as a Molecular Target for Triple Negative Breast Cancer Cell Migration Via the Synergy of Targeted, pH-Triggered siRNA Delivery and Chemokine Axis Blockade, Molecular Pharmaceutics, 11(3), 2014, 755-765

J. You, P. Guo, D.T. Auguste
SIDI A. BENCHERIF

Assistant Professor, Chemical Engineering
PhD, Carnegie Mellon University, 2009
che.neu.edu/people/bencherif-sidi

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

Honors and awards: FACE Foundation Award to Strengthen French-American Collaborative Research Activities

SELECTED PUBLICATIONS
O. Gsib, C. Egles, S.A. Bencherif
Fibrin: An Underrated Biopolymer for Skin Tissue Engineering, Journal of Molecular Biology and Biotechnology, 2(1), 2017

O. Chaudhuri, L. Gu, D. Klumpers, M. Darnell, S.A. Bencherif, J.C. Weaver, N. Huebsch, H. Lee, E. Lippens, G.N. Duda, D.J. Mooney
Hydrogels with Tunable Stress Relaxation Regulate Stem Cell Fate and Activity, Nature Materials, 15, 2016, 326-334

SELECTED RESEARCH PROJECTS
Unlocking the Full Potential of Cryogel-based Cancer Vaccines
Principal Investigator, Northeastern University

Cryogel-Integrated Biochips for Ex-vivo Hepatotoxicity and Anti-Cancer Drug Screening of 3D Biomimetic Liver Microtissues
Principal Investigator, Thomas Jefferson Fund/FACE Foundation

REBECCA L. CARRIER

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

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

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

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

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

O. Rezho, L. Speciner, R.L. Carrier

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

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

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

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

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

Uncovering Regeneration-Permissive Cues in Lower Vertebrate Retina to Inform Retinal Regenerative Medicine
Principal Investigator, National Science Foundation
SUNHO CHOI
Assistant Professor, Chemical Engineering
PhD, University of Minnesota, 2008
che.neu.edu/people/choi-sunho

Scholarship focus: demonstrating innovative processing strategies for nanostructured materials and functional hybrids engineered for challenging applications in clean and renewable energy

SELECTED PUBLICATIONS
D. Andirova, C.F. Cogswell, Y. Lei, S. Choi
Effect of the Structural Constituents of Metal Organic Frameworks on Carbon Dioxide Capture, Microporous and Mesoporous Materials, 219, 2016, 276-305

D. Andirova, Y. Lei, X. Zhao, S. Choi
Functionalization of Metal-organic Frameworks for Enhanced Stability under Humid Carbon Dioxide Capture Conditions, ChemSusChem, 8, 2015, 3405

S.A. Didas, S. Choi, W. Chaikittisilp, C.W. Jones
Amine-Oxide Hybrid Materials for CO2 Capture from Ambient Air, Accounts of Chemical Research, 48, 2015, 2680-2687

C.F. Cogswell, H. Jiang, J. Ramberger, D. Accetta, R.J. Willey, S. Choi

S. Choi, T. Watanabe, T-H. Bae, D.S. Sholl, C.W. Jones
Modification of Mg/DOBDC with Amines to Enhance CO2 Adsorption from Ultradilute Gases, Journal of Physical Chemistry Letters, 3, 2012, 1136-1141

S. Choi, M. L. Gray, C.W. Jones

S. Choi, J. Drese, M. Gray, R.R. Chance, P. Eisenberger, C. Jones
Application of Amine-Tethered Solid Sorbents for Direct CO2 Capture from the Ambient Air, Environmental Science and Technology, 45(6), 2011, 2420-2427

W. Kim, S. Choi, S. Nair

SELECTED RESEARCH PROJECTS
Amino-Pillared Nanosheet (APN) Adsorbents for High Performance CO2 capture
Principal Investigator, Northeastern University

HEATHER CLARK
Professor, Bioengineering; joint appointment in College of Science; affiliated faculty, Chemical Engineering
PhD, University of Michigan, 1999
bioe.neu.edu/people/clark-heather

Scholarship focus: optical nanosensors for biological analysis

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

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

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

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

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

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

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

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

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

ARTHUR COURY

University Distinguished Professor, Chemical Engineering
PhD, University of Minnesota, 1965
che.neu.edu/people/coury-arthur

Scholarship focus: polymeric biomaterials for medical products such as implantable electronic devices, hydrogel-based devices and drug delivery systems

Honors and awards: Fellow, American Chemical Society; Fellow, American Institute for Medical and Biological Engineering; Fellow, Biomaterials Science and Engineering; Member, National Academy of Engineering

SELECTED PUBLICATIONS
A. Coury
Forces and Imperatives in Translating Medical Concepts to the Marketplace, BE 502 “From Lab Bench to Marketplace”
Department of Bioengineering, University of Pennsylvania, 2013

A. Coury
Issues in Translation of Advanced Composites from the Bench to the Medical Marketplace, MRS Conference, Boston, MA, 2013

A. Coury

A. Coury
Organic Chemistry: Passport to a “Hybrid” Career, Presentation to Department of Chemistry, University of Minnesota, upon Receipt of Distinguished Alumni Award, 2013

A. Coury
Technology, Service and Bucking Convention: A Prescription for a Rewarding Biomaterials Career, Transactions of Society for Biomaterials, 2(3), 101S-110S, in conjunction with receipt of 2013 C. William Hall Award, Boston, MA, 2013

A. Coury, P. Jarrett

A. Coury

ENO EBONG

Assistant Professor, Chemical Engineering affiliated faculty, Bioengineering
PhD, Rensselaer Polytechnic Institute, 2006
che.neu.edu/people/ebong-eno

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

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

SELECTED PUBLICATIONS
Fluid Shear Stress Induces Upregulation of COX-2 and PGI(2) Release in Endothelial Cells via a Pathway Involving PECAM-1, PI3K, FAK, and p38, American Journal of Physiology- Heart and Circulatory Physiology, 312(3), 2017, 485-500

Targeted Delivery of Shear Stress-Inducible Micrornas by Nanoparticles to Prevent Vulnerable Atherosclerotic Lesions, Methodist Debakey Cardiovascular Journal, 12(3), 2016, 152-156

Endothelial Glycocalyx, Apoptosis and Inflammation in an Atherosclerotic Mouse Model, Atherosclerosis, 252, 2016, 136-146

M.J. Cheng, R. Kumar, S. Sridhar, T.J. Webster, E.E. Ebong

Shear-Induced Endothelial NOS Activation and Remodeling via Heparin Sulfate, Glypican-1, and Syndecan-1, Integrative Biology: Quantitative Biosciences from Nano to Macro, 6(3), 2014, 338-347

M. Thi, E. Ebong, D. Spray, S. Suadicani

E. Ebong, N. Depaola

SELECTED RESEARCH PROJECTS
Atheroprotective vs Atherogenic Glycocalyx Mechanotransduction Mechanisms
Principal Investigator, National Institutes of Health
MATTHEW ECKELMAN
Assistant Professor, Civil and Environmental Engineering; affiliated faculty, Chemical Engineering, Marine and Environmental Sciences, Public Policy and Urban Affairs
PhD, Yale University, 2009
civ.neu.edu/people/eckelman-matthew

Scholarship focus: environmental engineering and sustainability; life cycle assessment; energy efficiency and emissions modeling; environmental assessment of bio and nanomaterials; material and energy use in urban buildings and infrastructure

Honors and awards: National Science Foundation CAREER Award; International Laudise Prize in Industrial Ecology

SELECTED PUBLICATIONS
R. Phillips, L. Troup, D.J. Fannon, M.J. Eckelman

M.J. Eckelman, J.S. Sherman

Life-Cycle Assessment of Advanced Nutrient Removal Technologies for Wastewater Treatment, Environmental Science and Technology, 50(6), 2016, 3020-3030

M.J. Eckelman
Life-Cycle Inherent Toxicity: A Novel LCA-Based Algorithm for Evaluating Chemical Synthesis Pathways, Green Chemistry, 18(11), 2016, 3257-3264

M. Montazeri, L. Soh, P. Pérez-López, J.B. Zimmerman, M.J. Eckelman
Time-Dependent Life Cycle Assessment of Microalgal Biorefinery Co-Products, Biofuels, Bioproducts, and Biorefining, 2016

M. Saha, M.J. Eckelman
Geospatial Assessment of Potential Bioenergy Crop Production on Urban Marginal Land, Applied Energy, 159, 2015, 540-547

SELECTED RESEARCH PROJECTS
Air Climate and Energy Center—SEARCH: Solutions for Energy Air Climate and Health
Senior Personnel, Environmental Protection Agency
CAREER: Building Chemical Synthesis Networks for Life Cycle Hazard Modeling
Principal Investigator, National Science Foundation
Ethics Education in Life Cycle Design, Engineering, and Management
Principal Investigator, National Science Foundation
RSB: A Decision and Design Framework for Multi-Hazard Resilient and Sustainable Buildings
Co-Principal Investigator, National Science Foundation

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

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

SELECTED PUBLICATIONS
O.M. Pehlivaner Kara, A.K. Ekenseair
Free Epoxide Content Mediates Encapsulated Cell Viability and Activity through Protein Interactions in a Thermoresponsive, In Situ Forming Hydrogel, Biomacromolecules, 18(5), 2017, 1473-1481

O.M. Pehlivaner Kara, A.K. Ekenseair

In Vitro and In Vivo Evaluation of Self-Mineralization and Biocompatibility of Injectable, Dual-Gelling Hydrogels for Bone Tissue Engineering, Journal of Controlled Release, 205, 2015, 25-35


M.J. Eckelman, F.K. Kasper, A.G. Mikos

Structure-Property Evaluation of Thermally and Chemically Gelling Injectable Hydrogels for Tissue Engineering, Biomacromolecules, 13, 2012, 2821-2830

SELECTED RESEARCH PROJECTS
Biomanufactured Nerve Guidance Channels for Complex Nerve Repair
Co-Principal Investigator, Northeastern University
Injectable, Multifunctional Polymeric Nanocomposites for Osteochondral Tissue Repair
Principal Investigator, Northeastern University
Solid Supported Lipase Inhibitors for the Treatment of Acute Pancreatitis
Co-Principal Investigator, Northeastern University
HICHAM FENNIRI
Professor, Chemical Engineering
PhD, Université Louis Pasteur, 1994
che.neu.edu/people/fenniri-hicham

**Scholarship focus:** nanomaterials science and engineering, supramolecular chemistry, theranostics, targeted drug delivery, sensors

**Honors and awards:** National Science Foundation CAREER Award, Cottrell Teacher-Scholar Award, Canada Foundation for Innovation Leaders Award, Xerox UAC Award, 3M Young Investigator Award, Visiting Professor at: College de France, Université de Strasbourg, Regensburg University, Taiwan National Normal University, and University of Colorado

**SELECTED PUBLICATIONS**

J.E. Fitzgerald, T.H.E. Bui, N.M. Simon, H. Fenniri
Artificial Nose Technology: Status and Prospects in Diagnostics, Trends in Biotechnology, 35, 2016, 33-42

J.E. Fitzgerald, H. Fenniri
Biomimetic Cross-Reactive Sensor Arrays: Prospects in Diagnostics, RSC Advances, 6, 2016, 80468-80484

J.E. Fitzgerald, J. Zhu, J.-P. Bravo-Vasquez, H. Fenniri
Cross-Reactive, Self-Encoded Polymer Film Arrays for Sensor Applications, RSC Advances, 6, 2016, 82616-82624

R.L. Beingessner, Y. Fan, H. Fenniri
Molecular and Supramolecular Chemistry of Rosette Nanotubes, RSC Advances, 6, 2016, 75820-75838


**SELECTED RESEARCH PROJECTS**

RNA Nanoparticles as Carriers of Therapeutic miRNAs for the Treatment of Inflammation and Atherosclerotic Plaques
Principal Investigator, Kostas

JOSHUA GALLAWAY
DiPietro Assistant Professor, Chemical Engineering
PhD, Columbia University, 2007
che.neu.edu/people/gallaway-joshua

**Scholarship focus:** electrochemical engineering, batteries and energy storage, energy sustainability

**SELECTED PUBLICATIONS**

G.G. Yadav, J.W. Gallaway, D.E. Turney, M. Nyce, J. Huang, X. Wei, S. Banerjee
Regenerative Cu-Intercalated MnO$_2$ Layered Cathode for Highly Cyclable Energy Dense Batteries, Nature Communications, 8, 2017, 14424

Operando Identification of the Point of [Mn$_2$]O$_4$ Spinel Formation During γ-MnO$_2$ Discharge Within Batteries, Journal of Power Sources, 321, 2016, 135-142


N.D. Ingale, J.W. Gallaway, M. Nyce, A. Couzis, S. Banerjee
Rechargeability and Economic Aspects of Alkaline Zinc-Manganese Dioxide Cells for Electrical Storage and Load Leveling, Journal of Power Sources, 276, 2015, 7-18


EDGAR GOLUCH

Associate Professor, Chemical Engineering; affiliated faculty, Bioengineering, Civil and Environmental Engineering
PhD, University of Illinois, 2007
che.neu.edu/people/goluch-edgar

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

SELECTED PUBLICATIONS

H.J. Sismaet, A.J. Pinto, E.D. Goluch
Electrochemical Sensors for Identifying Pyocyanin Production in Clinical Pseudomonas Aeruginosa Isolates, Biosensors and Bioelectronics, 97, 2017, 65–69


T.A. Webster, H.J. Sismaet, I.J. Chan, E.D. Goluch
Electrochemically Monitoring the Antibiotic Susceptibility of Pseudomonas aeruginosa Biofilms, Analyst, 140, 2015, 7195-7201

P.N. Abadian, N. Yildirim, A.Z. Gu, E.D. Goluch
SPRi-Based Adenovirus Detection Using a Surrogate Antibody Method, Biosensors and Bioelectronics, 74, 2015, 808-814

K. Mathwig, T. Albrecht, E.D. Goluch, L. Rassaei
Challenges of Biomarker Detection at the Nanoscale: Nanopores and Microelectrodes, Analytical Chemistry, 87, 2015, 5470-5475

T.A. Webster, H.J. Sismaet, A.F. Sattler, E.D. Goluch
Improved Monitoring of P. aeruginosa on Agar Plates, Analytical Methods, 7, 2015, 7150-7155 *emerging investigator themed issue


P.N. Abadian, E.D. Goluch
Using Surface Plasmon Resonance Imaging (SPRi) to Evaluate Bacterial Adhesion on Surface Coatings, Analytical Methods, 7, 2015, 115-122, *featured as a hot article in Analytical Methods

SELECTED RESEARCH PROJECTS

EAGER: Bio-Inspired Electrochemical Sensing of Small Molecules Using Antibodies
Principal Investigator, National Science Foundation

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

ANDREW GOLDSSTONE

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

Scholarship focus: biomechanics; material science; engineering mechanics

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

SELECTED PUBLICATIONS


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

J.H. Kim, A. Gouldstone, C.S. Korach
Analysis of Spherical Indentation of an Elastic Bilayer Using a Modified Perturbation Approach, MEMS and Nanotechnology, 4, 2011, 53-57

B. Choi, Y. Wu, S. Sampath, A. Gouldstone
Modified Indentation Techniques to Probe Inelasticity in Ni-5%Al Coatings from Different Processes, Journal of Thermal Spray Technology, 18(1), 2009, 65-74

L.H. Weng, A. Gouldstone, Y.H. Wu, W.L. Chen
Mechanically Strong Double Network Photocrosslinked Hydrogels from N,N-Dimethylacrylamide and Glycidyl Methacrylated Hyaluronan, Biomaterials, 29(14), 2008, 2153-2163

SELECTED RESEARCH PROJECTS

GARDE: An Interdisciplinary Approach to Accommodate Fine Motor Control Disorders
Co-Principal Investigator, National Science Foundation
Vincent G. Harris

University Distinguished Professor, William Lincoln Smith Professor, Electrical and Computer Engineering; affiliated faculty, Chemical Engineering
PhD, Northeastern University, 1990
ece.neu.edu/people/harris-vincent

Scholarship focus: design and processing of advanced materials with emphasis on high frequency device applications for radar, communication, and sensing

Honors and awards: Fellow, American Association for the Advancement of Science, Distinguished Scientist Award, The Materials, Minerals, and Metals Society; Fellow, Institute of Electrical and Electronics Engineers; Fellow, American Physical Society; Fellow, Institute of Physics; Fellow, Institute of Engineering and Technology; Institute of Metal Research’s Lee Hsun Lecture Award; Fulbright Senior Fellow; Søren Buus Outstanding; Research Award, College of Engineering

Selected publications

A.S. Sokolov, M. Geiler, V.G. Harris

P. Taheri, R. Barua, J. Hsu, M. Zamanpour, Y. Chen, V.G. Harris

X. Wu, S. Yan, W. Liu, Z. Feng, Y. Chen, V.G. Harris

M. Bi, X. Wang, H. Lu, L. Deng, K.J. Sunday, M.L. Taheri, V.G. Harris

F. Chen, X. Wang, Y. Nie, Q. Li, J. Ouyang, Z. Feng, Y. Chen, V.G. Harris
Ferromagnetic Resonance Induced Large Microwave Magnetodielectric Effect in Cerium Doped Y3Fe5O12 Ferrites, Scientific Reports, 6, 2016, 28206

Z. Su, Q. Li, X Wang, B. Hu, Z. Feng, Y. Chen, V.G. Harris

Selected research projects

Accelerated Development of Magnetodielectrics Having Equivalent Permeability and Permittivity for RF Applications
Principal Investigator, Rogers Corp

Magnetodielectric Heterostructures and Composites
Principal Investigator, Rogers Corp

Nonlinear Properties of Ferrite Materials
Principal Investigator, Raytheon

Francisco Hung

Associate Professor, Chemical Engineering
PhD, North Carolina State University, 2005
che.neu.edu/people/hung-francisco

Scholarship focus: molecular modeling and theory of interfacial and solvated systems relevant to materials, biomaterials, energy and the environment

Honors and awards: NSF CAREER Award; ORAU Ralph E. Powe Award

Selected publications


X. He, Y. Shen, F.R. Hung, E.E. Santiso

X. He, Y. Shen, F.R. Hung, E.E. Santiso
Molecular Simulation of Homogeneous Nucleation of Crystals of an Ionic Liquid from the Melt, Journal of Chemical Physics, 143, 2015, 124506

Y. Shen, X. He, F.R. Hung


N.N. Rajput, J. Monk, F.R. Hung

R. Singh, N.N. Rajput, X. He, J. Monk, F.R. Hung
Molecular Dynamics Simulations of the Ionic Liquid [EMIM]+[TFMSI-] Confined Inside Rutile (110) Slit Nanopores, Physical Chemistry Chemical Physics, 15, 2013, 16090-16103

Selected research projects

CAREER: Molecular Modeling of Solidification of Nanoconfined Ionic Liquids
Principal Investigator, National Science Foundation

Accelerated Development of Magnetodielectrics Having Equivalent Permeability and Permittivity for RF Applications
Principal Investigator, Rogers Corp

Magnetodielectric Heterostructures and Composites
Principal Investigator, Rogers Corp

Nonlinear Properties of Ferrite Materials
Principal Investigator, Raytheon
BARRY KARGER

Professor and Director, Barnett Institute; affiliated faculty, Bioengineering, Chemical Engineering
PhD, Cornell University, 1963
coe.neu.edu/people/karger-barry

Scholarship focus: analytical chemistry, 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 PUBLICATIONS
Z. Liu, S. Dai, B.L. Karger, J.J. Li, et al.
A Quantitative Proteomic Analysis of Cellular Responses to High Glucose Media in Chinese Hamster Ovary Cells, Biotechnology Progress, 31(4), 2015, 1026-1038
S. Li, B.D. Plouffe, B.L. Karger, A.R. Ivanov, et al.
An Integrated Platform for Isolation, Processing and Mass Spectrometry-Based Proteomic Profiling of Rare Cells in Whole Blood, Molecular and Cellular Proteomics, 14(6), 2015, 1672-1683
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, 290(1), 2015, 18880-18892
S. Li, T. Nakayama, A. Akinc, S.-L. Wu, B.L. Karger
S. Rodig, J.L. Kutok, E.K. Jackson, B.L. Karger, et al.
Immunological Mechanisms of the Antitumor Effects of Supplemental Oxygenation, Science Translational Medicine, 7(277), 2015, 277

SELECTED RESEARCH PROJECTS
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

ABIGAIL KOPPES

Assistant Professor, Chemical Engineering
PhD, Rensselaer Polytechnic Institute, 2013
che.neu.edu/people/koppes-abigail

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

SELECTED PUBLICATIONS
Complex, Multi-Scale Small Intestinal Topography Replicated in Cellular Growth Substrates Fabricated via Chemical Vapor Deposition of Parylene C, Biofabrication, 8, 2016, 035011
D. Ventre, A.N. Koppes
The Body Acoustic: Ultrasonic Neuromodulation for Translational Medicine, Cells, Tissues, and Organs, 202, 2015-16, 23-41
S. Hosic, S.K. Murthy, A.N. Koppes
A.N. Koppes, D.M. Thompson
Neural Innervation of Engineered Musculoskeletal Tissues, Regenerative Engineering of Musculoskeletal Tissues and Interfaces, 2015, 293-323
D.M. Thompson, A.N. Koppes, J.G. Hardy, C.E. Schmidt
Electrical Stimuli in the Central Nervous System Microenvironment, Annual Review of Biomedical Engineering,16, 2014, 397-430
Neurite Outgrowth on Electrospun PLLA Fibers is Enhanced by Exogenous Electrical Stimulation, Journal of Neural Engineering, 11(4), 2014, 046002
D.M. Thompson, A.N. Koppes, J.G. Hardy, C.E. Schmidt
Electrical Stimulation of the CNS Microenvironment, Annual Review of Biomedical Engineering, 16, 2014, 397-430

SELECTED RESEARCH PROJECTS
Biomanufactured Nerve Guidance Channels for Complex Nerve Repair Co-Principal Investigator, Northeastern University
GUIMI: New In Vitro Platforms to Parse the Human Gut-Epithelial-Microbiome-Immune Axis Co-Principal Investigator, National Institute of Health
FACULTY

RYAN KOPPES
Assistant Professor, Chemical Engineering
PhD, Rensselaer Polytechnic Institute, 2013
che.neu.edu/people/koppes-ryan
Scholarship focus: neural interface technology; tissue engineering; musculoskeletal biomechanics

SELECTED PUBLICATIONS
The Influence of Specimen Thickness and Alignment on the Material and Failure Properties of Electrospun Polycaprolactone Nanofiber Mats, J. Biomedical Materials Research A, 107(11), 2016, 2794-2800
Thermally Drawn Fibers as Nerve Guidance Scaffolds, Biomaterials, 81, 2016, 27-35
Multimodality Fibers for In-Vivo Simultaneous Optical, Electrical and Chemical Communications with Neural Circuits, Nature Biotechnology, 33(3), 2015, 277-282
Optogenetic Control of Nerve Growth, Scientific Reports, 5(9669), 2015
P. Anikeeva, R.A. Koppes
Restoring the Sense of Touch, Science, 350(6258), 2015, 274-275
Polymer Fiber Probes Enable Optical Control of Spinal Cord and Muscle Function in Vivo, Advanced Functional Materials, 24(42), 2014, 6594-6600 *Cover Art
N. Schiele, R. Koppes, D. Chrisey, D.T. Corr

LUCAS LANDHERR
Associate Teaching Professor, Chemical Engineering
PhD, Cornell University, 2010
che.neu.edu/people/landherr-lucas
Scholarship focus: STEM module development for K-12 classrooms; science comics as novel teaching tools for K-12 and undergraduate education

Honors and awards: Fostering Engineering Innovation in Education Award; American Society for Engineering Education Northeast Section 2016 Outstanding Teacher Award; Omega Chi Epsilon Faculty Member of the Year Award; Dick Sioui Teaching Award

SELECTED PUBLICATIONS
L. Landherr, M. Keszler
Drawn to Engineering: Humor in Exams, Chemical Engineering Education, 51(3), 2017, 126-127
L. Landherr, M. Lubchansky
Drawn to Engineering: Problem-Solvers, Chemical Engineering Education, 51(2), 2017, 62-63
C. Cogswell, D. Shepard, C. Pietsch
Assumptions*, Boston, MA: Northeastern University, 2016 [8 1/2” X 11” comic. 1-8]
D. Shepherd, J. Cooke
Fugacity*, Boston, MA: Northeastern University, 2016 [8 1/2” X 11” comic. 1-10]
D. Shepherd, M. Lubchansky
Heat Exchangers*, Boston, MA: Northeastern University, 2016 [8 1/2” X 11” comic. 1-6]
D. Shepherd, M. Lubchansky
Purge and Recycle Streams*, Boston, MA: Northeastern University, 2016 [8 1/2” X 11” comic. 1-8]
L.J.T. Landherr
The Production of Science Comics To Improve Undergraduate Engineering, Paper presented and published in the Proceedings of the ASEE Northeast Section Conference, 2016
D. Shepherd, B. Sparks
Data Analysis*, Boston, MA: Northeastern University, 2015 [8 1/2” X 11” comic. 1-5]
D. Shepherd, M. Lai
Feedback Controls*, Boston, MA: Northeastern University, 2015 [8 1/2” X 11” comic. 1-8]
D. Shepherd, A. Kahl
Uncertainty*, Boston, MA: Northeastern University, 2015 [8 1/2” X 11” comic. 1-6]

*All articles listed here are independently published science comics for educational distribution. Note that Dante Shepherd is the pseudonym for creative work for Lucas James Landherr
CAROLYN LEE-PARSONS
Associate Professor, Chemical Engineering; jointly appointed, Chemistry; affiliated faculty, Bioengineering
PhD, Cornell University, 1995
che.neu.edu/people/lee-parsons-carolyn

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

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

SELECTED PUBLICATIONS

L. Kirchner, A. Wirshing, L. Kurt, T. Reinard, J. Glick, E.J. Cram, H-J. Jacobsen, C.W.T. Lee-Parsons
Identification, Characterization, and Expression of Diacylglycerol Acyltransferase Type-1 from Chlorella vulgaris, Algal Research, 13, 2016, 167-181

N.F. Rizvi, J. Weaver, E.J. Cram, C.W.T. Lee-Parsons
Silencing the Transcriptional Repressor, ZCT1, Illustrates the Tight Regulation of Terpenoid Indole Alkaloid Biosynthesis, PLoS ONE, 11(7), 2016, e0159712

N. Rizvi, M. Cornejo, K. Stein, J. Weaver, E.J. Cram, C.W.T. Lee-Parsons
An Efficient Transformation Method for Estrogen-Inducible Transgene Expression in Catharanthus roseus Hairy Roots, Plant Cell, Tissue and Organ Culture (PCTOC), 120(2), 2015, 475-487

J. Weaver, S. Goklany, N. Rizvi, E.J. Cram, C.W.T. Lee-Parsons
Optimizing the Transient Fast Agro-Mediated Seedling Transformation (FAST) Method in Catharanthus roseus Seedlings, Plant Cell Reports, 33(1), 2014, 89-97

S. Goklany, N. Rizvi, R.H. Loring, E.J. 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), 2013, 1367-1376

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

SELECTED RESEARCH PROJECTS

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

LAURA H. LEWIS
Cabot Professor, Chemical Engineering; jointly appointed, Mechanical and Industrial Engineering
PhD, University of Texas, 1993
che.neu.edu/people/lewis-laura

Scholarship focus: structure-property relationships in magnetofunctional materials for energy transformations including advanced permanent magnet materials and magnetocaloric materials; strategic materials for technological application

Honors and awards: Fulbright Scholar (2018, 2019); Fellow, American Physical Society; Northeastern University Excellence in Research and Creative Activity Award; Chair, Technical Committee of the IEEE Magnetics Society; Conference Editor, IEEE Transactions on Magnetics, NATO Technical Team Member of AVT-231 on “Scarcity of Rare Earth Materials for Electrical Power Systems,” appointed by U.S. National Coordinator

SELECTED PUBLICATIONS

B.D. Plouffe, S.K. Murthy, L.H. Lewis
Fundamentals and Application of Magnetic Particles in Cell Isolation and Enrichment: A Review, Reports on Progress in Physics, 78(1), 2015, 016601

L.H. Lewis, F.E. Pinkerton, et al.

R. McCallum, L.H. Lewis, R. Skomski, M.J. Kramer, I.E. Anderson

L.H. Lewis, F. Jiménez-Villacorta


SELECTED RESEARCH PROJECTS

Promotion and Control of L10, FeNi Phase Formation for Permanent Magnet Applications
Principal Investigator, Rogers Corporation
Program in Engineered Mat’ls and Materials Design of Engineered Mat’ls
Co-Principal Investigator, Army Research Office
Sustainable Permanent Magnets For Advanced Applications
Principal Investigator, National Science Foundation
Rapid Assessment of A1T2X2 (T = Fe, Co, Ni, X = B, C) Layered Materials for Sustainable Magnetocaloric Applications
Principal Investigator, Department of Energy
STEVE LUSTIG

Associate Professor, Chemical Engineering

PhD, Purdue University, 1989
che.neu.edu/people/lustig-steve

Scholarship focus: design and manipulation of molecular/materials chemistry and structure for new property discovery, new functionality and technology development by combining theoretical and experimental methods; high performance computing, quantum chemistry, statistical mechanics, polymer physics, materials and biomolecular engineering

Honors and awards: American Institute of Chemical Engineers Industrial Research and Development Institute Award; DuPont Central Research & Development Accomplishment Award (9 awards); DuPont TechCon Award; DuPont Materials Science and Engineering Accomplishment Award (3 awards); Phi Lambda Upsilon; Sigma Xi; Plastics Institute of America National Fellowship; Purdue University Fellowship

SELECTED PUBLICATIONS

M.B. Shiflett, B.A. Elliott, S.R. Lustig, S. Sabesan, M.S. Kelkar, A. Yokozeki

Long Range Interactions in Nanoscale Science, Reviews of Modern Physics, 82(2), 2010

J.S. Meth, S.R. Lustig

C. Gu, S. Lustig, C. Jackson, B.L. Trout

S.R. Lustig, A. Jagota, C. Khrimpin, M. Zheng


S. Wang, E.S. Humphreys, S.Y. Chung, D.F. Delduco, S.R. Lustig, H. Wang, K.N. Parker, N.W. Rizzo, S. Subramoney, Y.M. Chiang

GREGORY MILLER

Associate, Center for Drug Discovery; Associate Professor, Pharmaceutical Sciences; affiliated faculty, Chemical Engineering

PhD, Mount Sinai School of Medicine, New York, 1986
che.neu.edu/people/miller-gregory

Scholarship focus: addiction sciences, neuropsychiatric disorders

SELECTED PUBLICATIONS

D.K. Grandy, G.M. Miller, J.X. Li,

Trace Amine Associated Receptor 1 Modulates Behavioral Effects of Ethanol, Substance Abuse: Research and Treatment, 7, 2013, 117-126

M.W. Panas, Z. Xie, H.N. Panas, M.C. Hoener, E.J. Vallender, G.M. Miller
Trace Amine Associated Receptor 1 Signaling in Activated Lymphocytes, Journal of Neuroimmune Pharmacology, 7(4), 2012, 866-876

Z. Xie, G.M. Miller
A Receptor Mechanism for Methamphetamine Action in Dopamine Transporter Regulation in Brain, Journal of Pharmacology and Experimental Therapeutics, 330(1), 2009, 316-325

Z. Xie, G.M. Miller
SANJEEV MUKERJEE

College of Science Distinguished Professor, Chemistry and Chemical Biology; affiliated faculty, Bioengineering, Chemical Engineering

PhD, Texas A&M University, 1994
bioe.neu.edu/people/mukerjee-sanjeev

Scholarship focus: physical/materials chemistry

SELECTED PUBLICATIONS

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

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

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


Highly Active Oxygen Reduction Non-Platinum Group Metal Electro catalyst Without Direct Metal–Nitrogen Coordination, Nature Communications, 6, 2015, 7343

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

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

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

SHASHI MURTHY

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

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

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

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

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

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

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

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

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

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

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

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

**Assistant Teaching Professor, Chemical Engineering**

PhD, Northeastern University, 2011

coe.neu.edu/people/pfluger-courtney

**Scholarship focus:** engineering education, globalization in the classroom and international educational experiences, sustainable energy and clean water technologies

### SELECTED PUBLICATIONS


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


C. Pfluger

Maximizing the Global Experience: Lessons Learned from Running a Month Long Faculty-Led Program to Brazil, *American Society for Engineering Education Annual Meeting*, Seattle, WA, 2015

S. Freeman, D. Goldthwaite, B.K. Jaeger-Helton, C. Pfluger, K. Schulte-Graham, R. Whalen


C. Pfluger, K. Schulte-Graham


B. McMahon, C.A. Pfluger, B. Sun, K. Ziemer, D. Burkey, R. Carrier


C.A. Pfluger, D.D. Burkey, L. Wang, B. Sun, K. Ziemer, R. Carrier


C.A. Pfluger, R. Carrier, B. Sun, K. Ziemer, D.D. Burkey

Cross-linking and Degradation Properties of Plasma Enhanced Chemical Vapor Deposited Poly(2-hydroxyethyl methacrylate), *Macromolecular Rapid Communications*, 30(2), 2009, 126-132

C.A. Pfluger, R. Carrier, D.D. Burkey

Plasma Enhanced Chemical Vapor Deposited Poly (2-hydroxyethyl methacrylate) for Fabricating a Degradable, Biocompatible Intestinal Tissue Culture Substrate, *AIChE Annual Meeting*, 2008

## MRITYUNJAY SINGH

**PhD, Indian Institute of Technology, 1983**

che.neu.edu/people/singh-mrityunjay

**Scholarship focus:** aerospace materials, alternative and renewable energy materials and systems, energy storage and thermal management, bioinspired materials, additive manufacturing, advanced ceramics and composites

### Honors and awards:

Fellow, American Ceramic Society; Fellow, ASM International; Fellow, American Association for Advancement of Science; Fellow, National Academy of Inventors; Honorary Fellow, European Ceramic Society; W.D. Kingery Award, American Ceramic Society; Honorary Doctorate, Slovak Academy of Sciences; ACerS Global Ambassador Award; JFCA 30th Anniversary Special Award; International Keramos Award

### SELECTED PUBLICATIONS

M.C. Vera, J. Martínez-Fernandez, M. Singh, J. Ramírez-Rico

High Temperature Compressive Strength and Creep Behavior of Si-Ti-C-O Fiber-Bonded Ceramics, *Journal of the European Ceramic Society*, 2017


J. Martínez-Fernandez, R. Asthana, M. Singh, F.M. Varela

Active Metal Brazing of Silicon nitride Ceramics Using a Cu-Based Alloy and Refractory Metal Interlayers, *Ceramics International*, 42(4), 2016, 5447-5454

T. Kim, D. Singh, M. Singh


M.C. Vera, J. Ramírez-Rico, J. Martínez-Fernandez, M. Singh


M.C. Vera, J. Ramírez-Rico, J. Martínez-Fernandez, M. Singh


M.C. Halbig, M. Singh, R. Asthana

Diffusion Bonding of SiC Fiber-Bonded Ceramics using Ti/Mo and Ti/Cu Interlayers, *Ceramics International*, 41(2), 2015, 2140-2149

K.L. Lin, M. Singh, R. Asthana

SRINIVAS SRIDHAR

University Distinguished Professor, Physics; affiliated faculty, Bioengineering, Chemical Engineering
PhD, California Institute of Technology, 1984

che.neu.edu/people/sridhar-srinivas

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

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

SELECTED PUBLICATIONS

P. Baldwin, S. Tangutoori, S. Sridhar
Generation of Dose-Response Curves and Improved IC50s for PARP Inhibitor Nanoformulations, Cancer Nanotechnology: Methods and Protocols, 2017, 337-342

J. Barlow, K. Gozzi, C.P. Kelley, B.M. Geilich, T.J. Webster, Y. Chai, S. Sridhar, A.L. Van De Ven

Nanoformulation of Olaparib Amplifies PARP Inhibition and Sensitizes PTEN/TP53-Deficient Prostate Cancer to Radiation, Molecular Cancer Therapeutics, 16(7), 2017, 1279-1289

J. Belz, N. Castilla-Ojo, S. Sridhar, R. Kumar
Radiosensitizing Silica Nanoparticles Encapsulating Docetaxel for Treatment of Prostate Cancer, Cancer Nanotechnology: Methods and Protocols, 2017, 403-409

M.J. Cheng, R. Kumar, S. Sridhar, T.J. Webster, E.E. Ebong

SELECTED RESEARCH PROJECTS

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

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

Nanoscale Magnetism in Next Generation Magnetic Nanoparticles Sub-project II: Organically Modified Magnetic Nanoparticles
Principal Investigator, Asian Office of Aerospace Research and Development

PARP Inhibitor Nanotherapy for Ovarian Cancer
Principal Investigator, Department of Defense, Ovarian Cancer Research Program

MING SU

Associate Professor & Associate Chair of Graduate Studies, Chemical Engineering
PhD, Northwestern University, 2004

che.neu.edu/people/su-ming

Scholarship focus: phase change nanoparticles, nanomedicines, biomarker detections, nanoparticle-enhanced radiation therapy, heat transfer, covert barcodes

Honors and awards: National Science Foundation CAREER Award; National Institute of Health Director’s New Innovator Award

SELECTED PUBLICATIONS

S. Hou, W. Zheng, B. Duong, M. Su
All-Optical Decoder for Rapid and Noncontact Readout of Thermal Barcodes, Journal of Physical Chemistry C, 120, 2016, 22110

D. Ning, B. Duong, G. Thomas, Y. Qiao, L. Ma, Q. Wen, M. Su
Mechanical and Morphological Analysis of Cancer Cells on Nanostructured Substrates, Langmuir, 32, 2016, 2718

L. Ma, Y. Qiao, R. Jones, N. Singh, M. Su
Single Cell HaloChip Assay on Paper for Personalized Medicine, Analytical Bioanalytical Chemistry, 408 2016, 7753

C. Wang, A. Sun, Y. Qiao, P. Zhang, L. Ma, M. Su

M. Wang, B. Duong, H. Fenniri, M. Su
Nanoparticle-Based Barcodes, Nanoscale, 7, 2015, 11240

P. Zhang, Y. Qiao, C. Wang, L. Ma, M. Su
Enhanced Radiation Therapy with Internalized Gold Nanoparticles, Nanoscale, 6, 2014, 10095

Y. Qiao, P. Zhang, C. Wang, L. Ma, M. Su
Reducing X-Ray Induced Oxidative Damages in Fibroblasts with Graphene Oxide, Nanomaterials, 4, 2014, 522

B. Duong, H. Liu, L. Ma, M. Su
Covert Thermal Barcodes Based on Phase Change Nanoparticles, Nature Scientific Reports, 4, 2014, 5170

SELECTED RESEARCH PROJECTS

Adsorption Cooling With Nanoporous Monolithic Adsorbents
Principal Investigator, National Science Foundation

CAREER: Biosensing in Thermal Space
Principal Investigator, National Science Foundation

Enhanced Radiation Therapy with Nanoscale Frequency Modulator
Principal Investigator, National Institutes of Health

Phase Change Nanoparticles as Thermally Readable Taggants
Principal Investigator, National Institute of Justice
**LINLIN SUN**

Research Assistant Professor, Chemical Engineering  
PhD, Northeastern University, 2014  
che.neu.edu/people/sun-linlin  

Scholarship focus: self-assembling nanomaterials in the field of tissue engineering, drug delivery and antibacterial therapy for bone, cartilage, skin, and eye applications

**SELECTED PUBLICATIONS**

F. Chai, L. Sun, Y. Ding, X. Liu, Y. Zhang, T.J. Webster, C. Zheng  
A Solid Self-Nanoemulsifying System of the BCS Class IIb Drug Dabigatran Etexilate to Improve Oral Bioavailability, Nanomedicine, 11(14), 2016, 1801-1816

L. Sun, C. Zheng, T.J. Webster  

R. Chang, L. Sun, T.J. Webster  
Selective Inhibition of MG-63 Osteosarcoma Cell Proliferation Induced by Curcumin-Loaded Self-Assembled Arginine-Rich-RGD Nanospheres, International Journal of Nanomedicine, 10, 2015, 3351-3365

L. Sun, S. Ni, T.J. Webster  

L. Sun, L. Zhang, U.D. Hemraz, H. Fenniri, T.J. Webster  

**VLADIMIR TORCHILIN**

University Distinguished Professor, Pharmaceutical Sciences; affiliated faculty, Bioengineering, Chemical Engineering  
PhD, Moscow State University, 1971  
DSc, Moscow State University, 1980  
che.neu.edu/people/torchilin-vladimir

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

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

**SELECTED PUBLICATIONS**

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

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

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

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

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

**SELECTED RESEARCH PROJECTS**

Combination On-Demand Cancer Therapy  
Co-Investigator, National Institutes of Health

Dendrimer-Based Nanomedicines  
Principal Investigator, National Institutes of Health

Multifunctional Matrix Metalloprotease-2-Sensitive Anti-Cancer Nanopreparations  
Principal Investigator, National Institutes of Health

Targeted PEG-PE-Based Polymeric Micelles Co-Loaded with Curcumin and Doxorubicin  
Principal Investigator, Immix Biopharma, LLC
THOMAS WEBSTER

Professor and Department Chair, Chemical Engineering; Art Zafiropoulo Chair in Engineering; affiliated faculty, Bioengineering
PhD, Rensselaer Polytechnic Institute, 2000
che.neu.edu/people/webster-thomas

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

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

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

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

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

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


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

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

Long-term Prevention of Peri-Implantitis via Nano-Textured, TiO/Ag Surfaces
Co-Principal Investigator, National Institutes of Health Nanomedicine Academy of Minority Serving Institutions
Co-Principal Investigator, National Science Foundation

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

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

RICHARD WEST

Assistant Professor, Chemical Engineering
PhD, University of Cambridge, 2009
che.neu.edu/people/west-richard

Scholarship focus: development of detailed microkinetic models for complex reacting systems; automating the discovery and calculation of reaction pathways; heterogeneous catalysis

Honors and awards: American Chemical Society Doctoral New Investigator

SELECTED PUBLICATIONS
C.F. Goldsmith, R.H. West

K. Han, W.H. Green, R.H. West
On-the-fly Pruning for Rate-Based Reaction Mechanism Generation, Computers & Chemical Engineering, 100, 2017, 1-8

F. Seyedzadeh Khanshan, R.H. West
Developing Detailed Kinetic Models of Syngas Production from Bio-Oil Gasification Using Reaction Mechanism Generator (RMG), Fuel, 163, 2016, 25-33

B.L. Slakman, H. Simka, H. Reddy, R.H. West
Extending Reaction Mechanism Generator to Silicon Hydride Chemistry, Industrial & Engineering Chemistry Research, 55(49), 2016, 12507-12515

C.W. Gao, J.W. Allen, W.H. Green, R.H. West
Reaction Mechanism Generator: Automatic Construction of Chemical Kinetic Mechanisms, Computer Physics Communications, 203, 2016, 212-225


P.L. Bhoorasingh, R.H. West
Transition State Geometry Prediction Using Molecular Group Contributions, Physical Chemistry Chemical Physics, 17(48), 2015, 32173-32182

A. Jalan, R.H. West, W.H. Green

SELECTED RESEARCH PROJECTS
Resolving Discrepancies in Detailed Kinetic Models of Combustion via Automated Transition State Theory Calculations
Principal Investigator, National Science Foundation
RONALD WILLEY
Professor and Vice Chair, Chemical Engineering
PhD, University of Massachusetts, Amherst, 1984
che.neu.edu/people/willey-ronald

Scholarship focus: process safety and catalysis (industrial)

Honors and awards: Fellow, American Institute of Chemical Engineers; Norton H. Walton/Russell L. Miller Award in Safety/Loss Prevention, American Institute of Chemical Engineers

SELECTED PUBLICATIONS
R.J. Willey

Why Major Accidents are Still Occurring, Current Opinion in Chemical Engineering, 14, 2016, 1-8

J. Murphy, D. Hendershot, S. Berger, A.E. Summers, R.J. Willey
Bhopal Revisited, Process Safety Progress, 33(4), 2014, 310-313

R.J. Willey
Consider the Role of Safety Layers in the Bhopal Disaster, Chemical Engineering Progress, 110(12), 2014, 22-27

R. J. Willey
Layer of Protection Analysis, Procedia Engineering, 84, 2014, 12-22

R. J. Willey

R. Willey, J. H.-C. Hsiao, R. E. Sanders, A. Kossoy, C.-M. Shu
A Focus on Fire Fundamentals Including Emergency Response Training at the National Fire Agency in Taiwan, Process Safety Progress, 32(1), 2013, 2-7

R. Willey, J. Murphy
Process Safety Progress, American Institute of Chemical Engineers, 32(3), 2013, 229-229

T.O. Spicer, R. J. Willey, D.A. Crowl, W. Smades
The Safety and Chemical Engineering Education Committee—Broadening the Reach of Chemical Engineering Process Safety Education, Process Safety Progress, 32(2), 2013, 113-118

KATHERINE ZIEMER
Professor, Chemical Engineering; Vice Provost for Curriculum
PhD, West Virginia University, 2001
che.neu.edu/people/ziemer-katherine

Scholarship focus: engineering surfaces in order to integrate wide bandgap semiconductors with functional and multifunctional oxides, organic molecules, and/or biomaterials

Honors and awards: Fellow, American Institute of Chemical Engineers; Fellow, College of Engineering Faculty

SELECTED PUBLICATIONS
G.M. Uddin, G. Moeen, K.S. Ziemer, A. Zeid, S. Kamarthi

E. Alpaslan, H. Yazici, N. Golshan, K.S. Ziemer, T.J. Webster
Dextran Coated Cerium Oxide Nanoparticles for Inhibiting Bone Cancer Cell Functions, Biomaterials Science: Processing, Properties and Applications V, Ceramic Transactions, 254, 2015, 187

S. Ni, L. Sun, B. Erkan, L. Lui, K.S. Ziemer, T.J. Webster

Magnetocrystalline Anisotropy and FMR Linewidth of Zr and Zn-Doped Ba-Hexaferrite Films Grown on MgO (111), IEEE Transactions on Magnetics, 49(7), 2013, 4234-4237

G.M. Uddin, K.S. Ziemer, B. Sun, A. Zeid, S. Kamarthi

Dynamically Stabilized Growth of Polar Oxides: The Case of MgO (111), Physical Review Letters, 107(5), 2011, 056101
Dona Doureid Abou-Chakra
PhD 2016, Chemical Engineering; Advisor, Ronald Willey

**DYNAMIC MODELING OF INBREATHING REQUIREMENTS FOR LOW-PRESSURE STORAGE TANKS**

This study aims at calculating the maximum thermal inbreathing rate by performing dynamic simulations for different tanks using ioMosaic’s SuperChems Expert™ software. The first objective of this research was comparing the detailed SuperChems Expert™ single-phase and two-phase wall dynamics model to existing large scale test data and models. The results were successfully reproduced using this software with error margins between ±5%. Previous to this work, the software had not been evaluated for this important modeling.

See full dissertation at coe.neu.edu/17/DonaDoureidAbou-Chakra

Dinara Andirova
PhD 2016, Chemical Engineering; Advisor, Sunho Choi

**STRUCTURAL MODIFICATION OF METAL ORGANIC FRAMEWORKS FOR APPLICATIONS IN CARBON DIOXIDE CAPTURE**

In the first part of this work structural optimization of MOFs for practical CO₂ capture processes have been studied. It has been reported that the adsorption properties of MOFs in practical CO₂ capture tend to be harmed by the presence of moisture possibly due to the hydrophilic nature of the coordinatively unsaturated sites (CUSs) present within the frameworks. Here, the CUSs were functionalized with amine-containing molecules to prevent its structural degradation in a humid CO₂ capture environment. Specifically, it was demonstrated that amine groups could be grafted on the metal sites of the magnesium dioxybenzenedicarboxylate (Mg/DOBDC) without changing the framework structure of the material. The amine modified framework showed better structural preservation and retained CO₂ capture capacity after exposure to strident humid conditions.

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

Pierre Lennox Bhoorasingh
PhD 2016, Chemical Engineering; Advisor, Richard West

**AUTOMATED CALCULATION OF REACTION KINETICS VIA TRANSITION STATE THEORY**

The work in this thesis was initially developed for hydrogen abstraction reactions, and has been extended to scission and intra-hydrogen migration reactions. The automatically determined kinetics and state-of-the-art estimation methods were compared to high accuracy theoretical calculations, and the automated calculations were shown to outperform the estimation methods. This enables improved mechanism generation, where high-fidelity complex chemical models can be constructed with minimal human intervention.

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

Daniel James Hickey
PhD 2016, Chemical Engineering; Advisor, Thomas Webster

**NANOSTRUCTURED SURFACE MODIFICATIONS TO DECREASE INFECTION AND IMPROVE BONE CELL RESPONSES ON ORTHOPEDIC BIOMATERIALS**

In this work, cell- and bacteria-substrate interactions were investigated on two common (but very different) orthopedic biomaterials with the objective of finding common parameters that may improve the performance of all biomaterials. First, a newly-developed severe shot peening (SSP) treatment was performed on 316L stainless steel, inducing increased nanoscale surface roughness and a network of overlapping slip bands (contributing to surface work hardening and substantial nanoscale grain refinement). Separation of the effects of nanoscale surface roughness and grain size was achieved by performing a secondary grinding/polishing step to remove differences in roughness between sample groups. Experiments with cells and bacteria revealed that the expression of vinculin focal adhesion contacts from osteoblasts was inversely related to grain size, while the adhesion of gram-positive bacteria (S. aureus and S. epidermidis) was inversely related to nanoscale surface roughness.

See full dissertation at coe.neu.edu/17/DanielJamesHickey
Mark Louis Lalli
PhD 2016, Chemical Engineering; Advisor, Anand Asthagiri

THE INFLUENCE OF THE BIOPHYSICAL ENVIRONMENT AND CELL-CELL INTERACTIONS ON EPITHELIAL CELL ELECTROTAXIS

In this study, we sought to investigate the interactions between electric fields and intercellular connections on the electrotaxis of epithelial cells. We found that the non-transformed mammary epithelial cell line, MCF-10A, cells migrate toward the anode of an applied electric field. Although cells in isolation will display electrotaxis, they require an electric field at or above a threshold of 0.26 V/cm in order to migrate toward the anode. Increasing the strength of the stimulating field increased the degree to which the cells migrate toward the anode. However, when adjacent to other cells in a cell cluster, they not only migrate toward the anode with more directed paths, but also require no threshold of electric field to begin migration. Analysis of these migration paths indicated that being in the clustered cell state inhibited reorientation for migration.

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

Luting Liu
PhD 2017, Chemical Engineering; Advisor, Thomas Webster

FABRICATION OF NANOSTRUCTURES ON IMPLANTABLE BIOMATERIALS FOR BIOCOMPATIBILITY ENHANCEMENT AND INFECTION RESISTANCE

In this study, we sought to employ various nanofabrication techniques for tailoring implant surfaces to minimize bacteria and promote mammalian cell functions without using drugs. Titanium (Ti) and polyetheretherketone (PEEK) are commonly used biomaterials in orthopedic implants. Further surface modification is needed to support osseointegration while inhibiting bacteria attachment. Herein, temperature controlled atomic layer deposition (ALD) was utilized to provide unique nanostructured TiO2 coatings on commercial Ti. In vitro bacteria experiments revealed that the nano-TiO2 coatings showed promising antimicrobial efficacy towards Gram-positive bacteria (S. aureus), Gram-negative bacteria (E. coli) and antibiotic-resistant bacteria (MRSA). Impressively, cell results indicated that this nano-TiO2 coating stimulated osteoblast (or bone forming cell) adhesion and proliferation while suppressing undesirable fibroblast functions.

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

Avinash Raj Kola
PhD 2016, Chemical Engineering; Advisor, Elizabeth Podlaha-Murphy

ELECTRODEPOSITION OF NI-W, AG-W AND AG-NI-W ALLOYS FROM THIOUREA-CITRATE ELECTROLYTES

The objective of this research is to investigate the electrodeposition behavior of binary Ni-W, Ag-W and ternary Ag-Ni-W alloys from a cyanide free electrolyte. First, electrolyte deposition conditions; pH, applied current density, concentration of additives and temperature on the deposit composition and thickness of Ni-W thin films are examined. Electrolyte pH is a crucial variable, as it affects the metallic species present in the electrolyte. Increasing the electrolyte pH increases the W wt % in the alloy, while increasing the electrolyte temperature resulted in improved metal deposition rates, thereby increasing the deposit thickness, as characterized by XRF. The effect of additives: sodium gluconate, boric acid and 2-butyne-1,4-diol (BD), in the Ni-W electrolyte is examined using factorial design to increase the W wt % in the alloy, thickness and improve deposit appearance.

See full dissertation at coe.neu.edu/17/AvinashRajKola
COVER IMAGE

Mian Wang, PhD’17, develops new nanoparticles to kill bacteria and grow tissue in the Egan Engineering Research Center.