PRITZKER SCHOOL OF MOLECULAR ENGINEERING

at the University of Chicago

Faculty Guide 2022–2023

The Pritzker School of Molecular Engineering (PME) at the University of Chicago is the first school in the nation dedicated to molecular engineering. Through the innovative application of molecular-level science, our faculty and students are pioneering novel solutions to critical global challenges.

PME's work is organized into interdisciplinary, problem-solving themes focused on innovation, including quantum engineering, materials for sustainability, and immunoengineering—driving solutions for real-world problems such as unhackable communications, clean energy and water, and better health. PME also explores the intersection of science and art to promote public understanding and to cultivate collaboration between both fields. Our uniquely close relationship with Argonne National Laboratory also engenders world-class opportunities.

Fundamentally collaborative, PME and our network of global partners are empowering consequential, real-world discoveries to engineer a better future.

Visit **pme.uchicago.edu** to learn more.

THE UNIVERSITY OF CHICAGO
PRITZKER SCHOOL OF MOLECULAR ENGINEERING

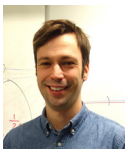
Quantum Engineering

David Awschalom

Liew Family Professor of Molecular Engineering; Vice Dean for Research and Infrastructure; Senior Scientist, Argonne National Laboratory; Founding Director, Chicago Quantum Exchange

Research areas: Spintronics, Semiconductor and Molecular Quantum Information Processing, Quantum Sensing and Communication, Nanomagnetism, Magneto-optical Imaging and Spectroscopy

Awschalom works in the fields of spintronics and quantum information engineering, where he develops new methods to explore the behavior of individual electrons, nuclei, and photons in semiconductors and molecules. His research includes implementations of information processing with applications in quantum computing, communication, and sensing. He has received numerous awards, including the American Physical Society Oliver Buckley Prize, Julius Edgar Lilienfeld Prize, and the Materials Research Society David Turnbull Lectureship.



Hannes Bernien

Assistant Professor of Molecular Engineering

Research areas: Quantum Information, Quantum Many-Body Physics, Quantum Networks

Bernien studies quantum information processing and quantum networks with trapped atoms, seeking to develop new ways of engineering large, complex quantum systems. He has published in numerous journals, including *Nature* and *Science*, and has received a Sloan Research Fellowship. He has been listed as a 2021 highly cited researcher (top 1 percent) in physics by Clarivate.

Andrew Cleland

John A. Maclean Sr. Professor for Molecular Engineering Innovation and Enterprise; Director, Pritzker Nanofabrication Facility

Research areas: Quantum Computing, Quantum Communication, Quantum Sensing

Cleland specializes in quantum information, with research efforts in quantum computing, quantum communication, and hybrid quantum systems. His research focuses on exploiting properties of quantum mechanical systems that cannot be duplicated in classical (non-quantum) systems, including the use of quantum entanglement and the superposition of quantum states. He is a fellow of the American Association for the Advancement of Science and the American Physical Society.

Quantum Engineering

Aashish Clerk
Professor of Molecular Engineering

Research areas: Quantum Sensing, Quantum Control, Quantum Computing, Quantum Optics, Quantum Condensed Matter Physics

Clerk focuses on understanding complex phenomena in quantum systems that are both strongly driven and subject to dissipation. Such effects can enable quantum technologies to transcend the limitations of purely classical systems. He was appointed a Simons Investigator in Theoretical Physics in 2020, and received a Sloan Research Fellowship and an E.W.R. Steacie Memorial Fellowship from Canada's National Sciences and Engineering Research Council.

Alex High
Assistant Professor of Molecular Engineering

Research areas: 2D Semiconductors, Spin Qubits in Diamond, Precision Fabrication, Nanophotonics, Plasmonics

High studies optical and quantum science in solid-state systems. He explores new physics and applications that emerge when optical systems are controlled at a nanoscale level. He is developing optical quantum circuits and realizing new technologies based on engineered light/matter interactions.

Liang Jiang
Professor of Molecular Engineering

Research areas: Quantum Communication, Quantum Computing, Quantum Sensing, Quantum Simulation, Quantum Control, Quantum Machine Learning, Quantum Error Correction

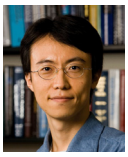
Jiang theoretically investigates quantum systems and explores various quantum applications, such as quantum sensing, quantum transduction, quantum communication, and quantum computation. His research focuses on using quantum control and error correction to protect quantum information from decoherence to realize robust quantum information processing. He has worked on modular quantum computation, global-scale quantum networks, room-temperature nano-magnetometer, sub-wavelength imaging, micro-optical quantum transduction, and error-correction-assisted quantum sensing and simulation.

Quantum Engineering

Peter Maurer
Assistant Professor of Molecular Engineering

Research areas: Quantum Optics, Quantum Sensing, Solid-State Spin Systems, Single-Molecule Biophysics, Physical Chemistry

Maurer focuses on the development and application of novel imaging and sensing modalities that enable the investigation of biological systems that are not accessible by conventional techniques. He explores coherent control techniques and quantum algorithms that harness solid state spin systems of increasing complexity, and combines them with state-of-the-art biophysics tools. Such novel technologies include the development of a nanoscale quantum sensor for NMR spectroscopy of individual biomolecules, a single-molecule platform for quantum sensing, and the establishment of new nanophotonics techniques for bio-imaging.



Jiwoong Park
Professor, Department of Chemistry, Pritzker School of Molecular Engineering, James Franck Institute, and the College

Research areas: Nanoscale Materials, Chemical Physics

Park's research focuses on the science and technology of atomically thin solids. Using these materials, including electrically conducting graphene, insulating hBN, and semiconducting transition metal dichalcogenides, his research group builds advanced quantum materials and atomically thin integrated circuitry by combining advanced growth, characterization, and device fabrication methods.

Shuolong Yang
Assistant Professor of Molecular Engineering

Research areas: Experimental Condensed Matter Physics, Quantum Materials Engineering, Thin-Film Deposition, Ultrafast Photoemission Spectroscopy

Yang utilizes molecular beam epitaxy to engineer quantum materials layer by layer, and characterizes the electronic properties of these materials using equilibrium and non-equilibrium photoemission spectroscopies. He is primarily interested in the quantum phenomena emerging at material interfaces, such as interfacial superconductivity and topological orders.

Tian Zhong
Assistant Professor of Molecular Engineering

Research areas: Quantum Photonics, Quantum Information, Quantum Networking, Solid-State Quantum Technologies

Zhong focuses on developing enabling nanoscale photonic and molecular (e.g., rare-earth-ion-doped crystals) technologies for building quantum hardware to realize an efficient, scalable quantum internet.

Materials Systems for Sustainability

Paul Alivisatos

President, The University of Chicago; John D. MacArthur Distinguished Service Professor, Department of Chemistry, Pritzker School of Molecular Engineering, James Franck Institute, and the College

Research areas: Nanomaterials, Nanocrystals, Biomedicine, Renewable Energy, Quantum Information Systems, Catalysis, Opto-electronics, Advanced Electron Miscopy Methods

Alivisatos has pioneered breakthroughs in nanomaterials, contributing to the fundamental physical chemistry of nanocrystals. His inventions are widely used in biomedicine and QLED TV displays.

Chibueze Amanchukwu

Neubauer Family Assistant Professor of Molecular Engineering

Research areas: Energy, Electrochemistry, Batteries, Electrolytes, Carbon Dioxide Capture

Amanchukwu's research is focused on sustainable energy, and involves the design, synthesis, and understanding of ion transport in electrolytes for batteries and electrocatalysis. His team focuses on advanced energy storage devices and carbon capture technology. His work has been recognized with the NSF CAREER award, CIFAR Azrieli Global Scholar award, 3M Non-Tenured Faculty Award, and ECS-Toyota Young Investigator Fellowship, among others.

Junhong Chen

Crown Family Professor of Molecular Engineering; Lead Water Strategist, Argonne National Laboratory

Research areas: Hybrid Nanomaterials, 2D Nanomaterials, Chemical and Biological Sensors, Energy Devices

Chen researches nanomaterials and nanodevices, particularly hybrid nanomaterials featuring rich interfaces and nanodevices for sustainable energy and environment. He has made seminal contributions to hybrid nanomaterials and molecular engineering, having published 270 journal papers, and is listed as a 2017–2021 highly cited researcher (top 1 percent) in materials science or cross-field by Clarivate. His research has led to nine issued US patents, five pending patents, and 13 licensing agreements.

Andrew Cleland

John A. MacLean Sr. Professor for Molecular Engineering Innovation and Enterprise; Director, Pritzker Nanofabrication Facility

Research areas: Quantum Computing, Quantum Communication, Quantum Sensing

Cleland specializes in quantum information, with research efforts in quantum computing, quantum communication, and hybrid quantum systems. His research focuses on exploiting properties of quantum mechanical systems that cannot be duplicated in classical (non-quantum) systems, including the use of quantum entanglement and the superposition of quantum states. He is a fellow of the American Association for the Advancement of Science and the American Physical Society.

Materials Systems for Sustainability

Juan de Pablo

Liew Family Professor of Molecular Engineering; Executive Vice President for Science, Innovation, National Laboratories, and Global Initiatives, The University of Chicago; Senior Scientist, Argonne National Laboratory

Research areas: Protein Folding, Protein Aggregation, DNA Folding and Hybridization, Glassy Materials, Block Copolymers, Liquid Crystals, Development of Advanced Sampling Methods

De Pablo's work entails conducting supercomputer simulations to understand and design new materials from scratch and to find applications for them. He is a leader of simulations of polymeric materials, including DNA dynamics—how DNA molecules arrange and organize themselves and interact with other DNA molecules. He also studies protein aggregation and its poorly understood relationship to various diseases, including type 2 diabetes and neurodegenerative disorders.

Greg Engel

Professor, Department of Chemistry, Pritzker School of Molecular Engineering, James Franck Institute, and the College

Research areas: Excited State Dynamics, Quantum Sensing, Quantum Coherence, Spectroscopy, Biophysics

Engel's research focuses on new strategies to observe, measure, and control excited state reactivity and quantum dynamics. Using spectrometers of his own design, he explores bio-inspired design principles for steering excitonic transport, open quantum dynamics, and photochemical reaction dynamics.

Laura Gagliardi

Richard and Kathy Leventhal Professor, Department of Chemistry, Pritzker School of Molecular Engineering, James Franck Institute, and the College; Senior Scientist, Argonne National Laboratory; Director, Chicago Center for Theoretical Chemistry

Research areas: Quantum Chemical Methods Development, Catalysis, Spectroscopy, Photochemistry, Gas Separation, Actinides, Quantum Materials

Gagliardi develops novel wave-function-based quantum chemical methods and applies them to study problems related to renewable energies. She combines multireference theories with density functional theory. She develops force-fields from first principles to be used in classical simulations. She employs these methods to explore molecular systems and materials relevant to catalysis, carbon dioxide separations, photochemical processes, spectroscopy, and heavy-element chemistry. Among other awards, she has received the Faraday Lectureship Prize of the Royal Society of Chemistry in 2021 and the Peter Debye Award in Physical Chemistry of the American Chemical Society in 2020.

Materials Systems for Sustainability

Giulia Galli

Liew Family Professor, Pritzker School of Molecular Engineering, Department of Chemistry, and the College; Senior Scientist, Argonne National Laboratory; Director, Midwest Integrated Center for Computational Materials (MICCoM)

Research areas: Theoretical and Computational Modeling of Materials for Renewable Energy Sources and Quantum Information Technologies

Galli develops theoretical and computational methods to predict and engineer material and molecular properties from first principles. She focuses on problems relevant to the development of sustainable energy sources and quantum technologies. She has received numerous awards, including the Materials Research Society Materials Theory Award, American Physical Society David Adler Lectureship Award in Materials Physics and Rahman Prize for Computational Physics, Feynman Prize in Nanotechnology (Theory), the Medal of the Schola Physica Romana, and the Tomassoni-Chisesi Prize. She is a member of the National Academy of Sciences, American Academy of Arts and Sciences, and International Academy of Quantum Molecular Science, and a fellow of the American Association for the Advancement of Science and the American Physical Society.

Supratik Guha

Professor of Molecular Engineering; Senior Advisor to Argonne Physical Sciences and Engineering

Research areas: Semiconductor Materials Science, Nanofabrication, Materials for Quantum and Classical Information Processing, Sensors

Guha's research focuses on the discovery science of new materials, devices, and their nanofabrication for future information processing, including quantum information processing, next-generation microelectronics, and distributed sensor-based information processing. He focuses on applied research that connects oxide and semiconductor materials research with working systems and sub-systems. He is also deeply interested in how such device-based sensor networks can impact environmental issues such as water and agricultural management.

Po-Chun Hsu

Assistant Professor of Molecular Engineering

Research areas: Dynamic Metamaterials, Electrochemistry, Heat Transfer, Carbon Capture, Nanofibers, Artificial Intelligence

Hsu's research focuses on innovating new materials with dynamic tunability for photon and phonon management by interrogating the fundamental light-matter interaction and structure-synthesis-property correlation. He is particularly interested in electrochemical methods that involve mixed carrier phenomena, which have potentials for energy and sustainability applications.

Chong Liu

Neubauer Family Assistant Professor of Molecular Engineering

Research areas: Materials Science, Electrochemistry, Water, Energy, Separation

Liu's research focuses on design and synthesis of materials, as well as the development of electrochemical and optical tools to address the challenges in water-energy nexus. These include resource extraction from water systems, separation in liquid and gas phases, and catalysis. She studies phenomena that span enormous length scales from molecular interaction to mass transport.

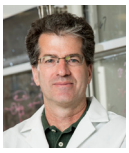
Materials Systems for Sustainability

Y. Shirley Meng

Professor of Molecular Engineering; Chief Scientist, Argonne Collaborative Center for Energy Storage Science (ACCESS)

Research areas: Batteries, Energy Materials, Cryogenic Microscopy

Meng is a pioneer in the discovery and design of better materials for energy storage through the combination of first-principles computation guided materials discovery and design, and advanced characterization with electron/neutron/photon sources. She has received the Faraday Medal of the Royal Society of Chemistry (2020), International Battery Materials Association Research Award (2019), C.W. Tobias Young Investigator Award of the Electrochemical Society (2016), Science Award Electrochemistry by BASF and Volkswagen (2014), and NSF CAREER Award (2011). She was a finalist for the Blavatnik Awards for Young Scientists (2018).



Paul Nealey

Brady W. Dougan Professor of Molecular Engineering; Vice Dean for Education and Outreach; Senior Scientist, Argonne National Laboratory

Research areas: Nanoscale Soft Materials, Block Copolymers, Polymer Design, Synthesis and Characterization, Directed Self-Assembly (DSA), Nanolithography, Clean Energy

Nealey's research focuses on multifunctional nanostructured polymeric materials. Directed self-assembly is often employed to impose perfection in material structure over device-relevant dimensions to enable assessment of intrinsic material properties or to impart function. Technological applications include nanolithography for the manufacture of integrated circuits and the development of ion-transporting polymers for batteries, fuel cells, and electrolyzes.

Shrayesh Patel

Assistant Professor of Molecular Engineering

Research areas: Functional Polymers, Block Copolymers, Batteries, Thermoelectrics, Organic Electronics

Patel's research focuses on functional polymers (e.g., electronic conductors, ion conductors, redox-active) for energy conversion and storage applications. His current efforts center on batteries and thermoelectrics. His group frequently leverages synchrotron X-ray scattering and spectroscopy techniques to advance their understanding of functional polymers at the molecular, nano-, and micro-scales.

Stuart Rowan

Barry L. MacLean Professor for Molecular Engineering Innovation and Enterprise, Pritzker School of Molecular Engineering and the College; Director, University of Chicago Materials Research Science and Engineering Center (MRSEC)

Research areas: Polymeric Materials, Polymer Synthesis, Polymer Sustainability, Supramolecular Chemistry, Dynamic Covalent Chemistry

Rowan focuses on studying the chemistry of non-covalent interactions (supramolecular chemistry). This is embodied by studying the synthesis of metallosupramolecular and stimuli-responsive polymers; isolation and utilization of cellulose nanocrystals in biomimetic and porous systems; and finally, reversible covalent chemistry.

Materials Systems for Sustainability

Dmitri V. Talapin

Ernest DeWitt Burton Distinguished Service Professor, Department of Chemistry, Pritzker School of Molecular Engineering, and the College

Research areas: Self-Assembly, Surface Chemistry, Device Applications of Inorganic Nanomaterials

Talapin's research focuses on inorganic nanomaterials, from synthetic methodology to self-organization to charge transport and device applications. His accolades include the American Chemical Society Inorganic Nanoscience Award, Materials Research Society Outstanding Early Career Investigator Award, Top 100 chemists of the decade based on citation impact by Thomson Reuters, and Packard Fellowship in Science and Engineering.

Matthew Tirrell

D. Gale Johnson Distinguished Service Professor, Pritzker School of Molecular Engineering and the College; Dean, Pritzker School of Molecular Engineering

Research areas: Biomolecular Engineering, Nanotechnology, Polymer Properties

Tirrell is a pioneering researcher in the fields of biomolecular engineering and nanotechnology, specializing in the manipulation and measurement of the surface properties of polymers, materials that consist of long, flexible chain molecules. His work combines microscopic measurements of intermolecular forces with the creation of new structures. His work has provided new insight into polymer properties, especially surface phenomena, such as adhesion, friction, and biocompatibility, and new materials based on self-assembly of synthetic and bio-inspired materials.

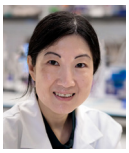
Sihong Wang

Assistant Professor of Molecular Engineering

Research areas: Functional Polymers, Bioelectronics, Polymer Electronics, Energy Harvesting, Nanotechnology

Wang's research takes inspiration from biological systems to develop a new generation of electronics for interfacing with the human body as wearable and implantable devices. Innovating in the space from material development to device engineering, the overarching goal is to realize the continuous, efficient, and long-term stable acquisition and processing of health data for efficient physiological monitoring and disease treatment. The specific research directions include soft biosensors, immune-compatible electronics, stretchable optoelectronics, neuromorphic computing, and soft robotics.

Immunoengineering



Huanhuan Joyce Chen

Assistant Professor, Pritzker School of Molecular Engineering, Ben May Department for Cancer Research, and the College

Research areas: Molecular Engineering, Cellular Engineering, Tissue Engineering, Stem Cell Biology, Cancer Biology

Chen works to address long-unanswered questions in cancer research, stem cell biology, and regenerative medicine, integrating stem-cell-based disease modeling and single cell analysis to study organ damage repair, cancer, and other genetic diseases. She has received numerous awards, including a National Institutes of Health Pathway to Independence Award and a National Cancer Institute Physical Sciences in Oncology Young Investigator award.

Nicolas Chevrier

Assistant Professor of Molecular Engineering

Research areas: Immunology, Systems Biology

Chevrier develops interdisciplinary approaches and tools to study how the immune system functions across biological scales, ranging from individual molecules and cells to mammalian organisms. He aims to characterize the multi-scale processes at play during protective immune responses and use this information to manipulate immunity against disease.

Aaron Esser-Kahn

Professor of Molecular Engineering

Research areas: Immunoengineering, Vaccine Adjuvants, Piezo-electricity, Adaptive Materials, Polymer Chemistry, Carbon Capture

Esser-Kahn's primary area of research focuses on immune engineering and improving innate immune responses. He works on improving vaccines and cancer immunotherapies by better understanding and engineering innate immunity. His lab also focuses on materials that respond to their environment to improve performance using electricity and vibration. His lab is also interested in improving methods for carbon capture.

Andrew Ferguson

Associate Professor of Molecular Engineering; Vice Dean of Equity, Diversity, and Inclusion

Research areas: Molecular Simulation, Statistical Thermodynamics, Machine Learning, Materials Design, Enhanced Sampling, Protein Folding, Self-Assembly, Computational Immunology

Ferguson uses molecular simulation, statistical thermodynamics, and artificial intelligence to understand and design molecules and materials, including functional proteins, self-assembling peptides, DNA oligomers, vaccine immunogens, and immunomodulators. He collaborates closely with experimentalists to realize these designs and run virtuous molecular design-build-test cycles. His group also actively develops new computational methods for collective variable discovery and enhanced sampling in molecular simulation.

Immunoengineering

Margaret L. Gardel

Horace B. Horton Professor, Department of Physics, Pritzker School of Molecular Engineering, James Franck Institute, and the College; Director, James Franck Institute

Research areas: Cell and Tissue Mechanics, Polymer Physics, Cell Adhesion and Migration

Gardel is interested in how collections of biological molecules build soft materials that enable cell and tissue-scale physiological processes of adhesion, migration, and shape change. She approaches these questions both through "top down" engineering and biophysical approaches to study the mechanics of epithelial cells, and through "bottom up" reconstitution of these force-activated materials in synthetic constructs.

Jun Huang

Assistant Professor of Molecular Engineering

Research areas: T Cell Immunology, CAR T-Cell Engineering, mRNA Immunotherapies

Huang's research focuses on human immunology. His laboratory performs basic and translational research with the objective of developing effective vaccines and cell immunotherapies for the treatment of cancer, infection, and autoimmunity. He carries out basic immunological research, focusing on molecular mechanisms of T cell recognition and signaling at the single-molecule level. He performs systems immunology, studying the differentiation, exhaustion, and metabolism of T cells at the single-cell level. He engineers CAR T-cells, aiming at the treatment of cancer and autoimmunity. He develops new biomaterials, enabling the detection, profiling, and manipulation of T cells and other immune cells for diagnosis and treatment.

Jeffrey Hubbell

Eugene Bell Professor in Tissue Engineering; Vice Dean and Executive Officer

Research areas: Immunotherapy, Immune Response, Auto-Immune Diseases, Growth Factor Variants

Hubbell designs materials to assemble in such a way that they can stimulate the immune system to fight infection or malignancy or turn off some aspects of the immune system to address auto-immune diseases, such as type 1 diabetes. He has coined the term "immuno-modulatory materials" to describe this newly emerging field of research. Along with his associates, he holds 77 patents.

Juan Mendoza

Assistant Professor, Pritzker School of Molecular Engineering, Department of Biochemistry and Molecular Biology, and the College

Research areas: Protein Engineering, Structural Biology, Computational Biology, Immunology, Cell Signaling

Mendoza's research focuses on understanding basic principles of protein function relevant to human health and disease. Protein families of interest include the interferon (IFN) superfamily of cytokines, which are an essential part of the innate immune system, protecting against the spread of viral infections and cancerous growths. Further work in his lab focuses on developing platforms for drug discovery and computational tools to accelerate protein engineering efforts and extend our understanding of the protein sequence-structure-function paradigm to other protein superfamilies.

Immunoengineering

Mark Mimee

Assistant Professor, Department of Microbiology, Pritzker School of Molecular Engineering, and the College

Research areas: Synthetic Biology, Microbiome, Host-Pathogen Interactions, Antimicrobials, Biosensors

Mimee's research focuses on developing strategies to precisely engineer the activity and composition of the microbiota. By genetically manipulating commensal microbes, he seeks to create living devices that can serve as biosensors to probe the structure and function of the microbiome and as cell-based therapeutics for infectious and inflammatory disease. Additionally, he develops approaches to augment the natural properties of viruses that infect bacteria, called bacteriophages, to create novel therapies for antibiotic-resistant bacterial infections.

Cathryn R. Nagler

Bunning Food Allergy Professor, Department of Pathology, Pritzker School of Molecular Engineering, Department of Medicine, Department of Pediatrics, and the College

Research areas: Microbiome, Food Allergy, Oral Tolerance, Epithelial Barrier, Microbiome Modulation, Microbiome Therapeutics

Nagler studies the mechanisms governing tolerance to dietary antigens. She was one of the first to identify a link between resident intestinal bacteria and the regulation of mucosal immunity. During the last 15 years, her work has focused on examining how commensal bacteria regulate susceptibility to allergic responses to food. She has proposed that the striking generational increase in food allergies can be explained, in part, by alterations in the composition and function of the commensal microbiome.

Rama Ranganathan

Joseph Regenstein Professor, Department of Biochemistry and Molecular Biology, Pritzker School of Molecular Engineering, and the College

Research areas: Bioengineering, Protein Folding

Ranganathan uses a combination of statistical genomics, biochemistry, genetics in several model organisms, structural biology, and physical theory to understand the evolutionary design of proteins and macromolecular complexes.

Samantha Riesenfeld

Assistant Professor, Pritzker School of Molecular Engineering, Department of Medicine, and the College

Research areas: Systems Biology, Immunology, Genomics, Data Science

Riesenfeld leads a highly interdisciplinary research group that develops and applies genomics-based machine learning methods to investigate the cellular components, transcriptional circuitry, and dynamics underlying complex biological systems. Areas of focus include inflammatory immune responses, neuroimmune interactions, and solid tumor cancer.

Immunoengineering

Allison Squires

Neubauer Family Assistant Professor of Molecular Engineering

Research areas: Single-Molecule Biophysics, Biomedical Devices, Fluorescence Spectroscopy and Imaging, Nanoscale Manipulation and Sensing

Squires's research interests center on manipulating, measuring, and understanding the properties and behavior of single molecules. Her lab employs single-molecule fluorescence spectroscopy and single-molecule manipulation and confinement to develop sensing platforms that report on spectroscopic identity, molecular dynamics, and nanoscale energy transfer. These approaches are useful in a wide range of scientific contexts, from observation of nanoscale biomolecular interactions in cellular signaling pathways to photoadaptation in photosynthetic systems.

Melody Swartz

William B. Ogden Professor of Molecular Engineering; Vice Dean for Faculty Affairs

Research areas: Lymphatic Physiology, Cancer Research, Immunotherapy

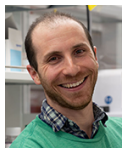
Swartz's research focuses on elucidating and exploiting the roles of lymphatic function as it relates to cancer and chronic inflammatory diseases, including asthma, using a variety of interdisciplinary approaches from bioengineering, immunobiology, physiology, cell biology, and biomechanics. Her lab works in both basic hypothesis-driven research as well as in translational applications.

Savas Tay

Professor of Molecular Engineering

Research areas: Single-Cell Analysis, Microfluidics, Systems Biology, Cellular Information Processing, Microengineering, Nanotechnology, Optics

Tay is a systems biologist and bioengineer who works at the interface of biology, physics, and engineering. His overarching goal is to understand how biological systems work from an engineer's perspective and use this knowledge to manipulate cells and gene pathways to help cure diseases. On the technology front, his lab develops high-throughput and high-content single-cell analysis devices by integrating microfluidics and optics.



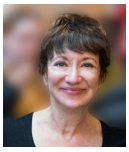
Joshua Weinstein

Assistant Professor, Pritzker School of Molecular Engineering, Department of Medicine, Section of Genetic Medicine

Research areas: Biophysics, Numerical Analysis, Molecular Biology

Weinstein develops new modalities of biological measurement, drawing from tools in molecular biology, physics, and applied mathematics. The group builds on the premise that technological mastery of DNA synthesis, manipulation, and sequence-readout over the past few decades provides fundamentally new opportunities to deepen our understanding and command of the microscopic world.

STAGE—Scientists, Technologists, and Artists Generating Exploration



Nancy Kawalek
Professor and Distinguished Fellow in the Arts, Sciences, and Technology

Research areas: Theatre and Performance, Science/Art Integration and Collaboration

Kawalek is an artist and innovator specializing in the creation and development of multimedia theatre inspired by science and technology. She is the founder and director of STAGE—Scientists, Technologists, and Artists Generating Exploration—a full-scale laboratory at the helm of the PME's core theme of "Arts, Sciences, and Technology." The lab's distinct research focuses on creating and developing new theatre, film, games, and other artistic endeavors inspired by science and technology. Rather than disguise science lectures as art, STAGE utilizes subtle parallels and metaphors between scientific themes and human experience to translate the richness and nuances of science into relatable, emotionally engaging, entertaining forms of expression. The lab harnesses the power of storytelling to promote understanding of the sciences in the public arena, catalyze the development of art that depicts the scientific and technological age in which we live, and cultivate appreciation and collaboration between the two cultures of science and art.