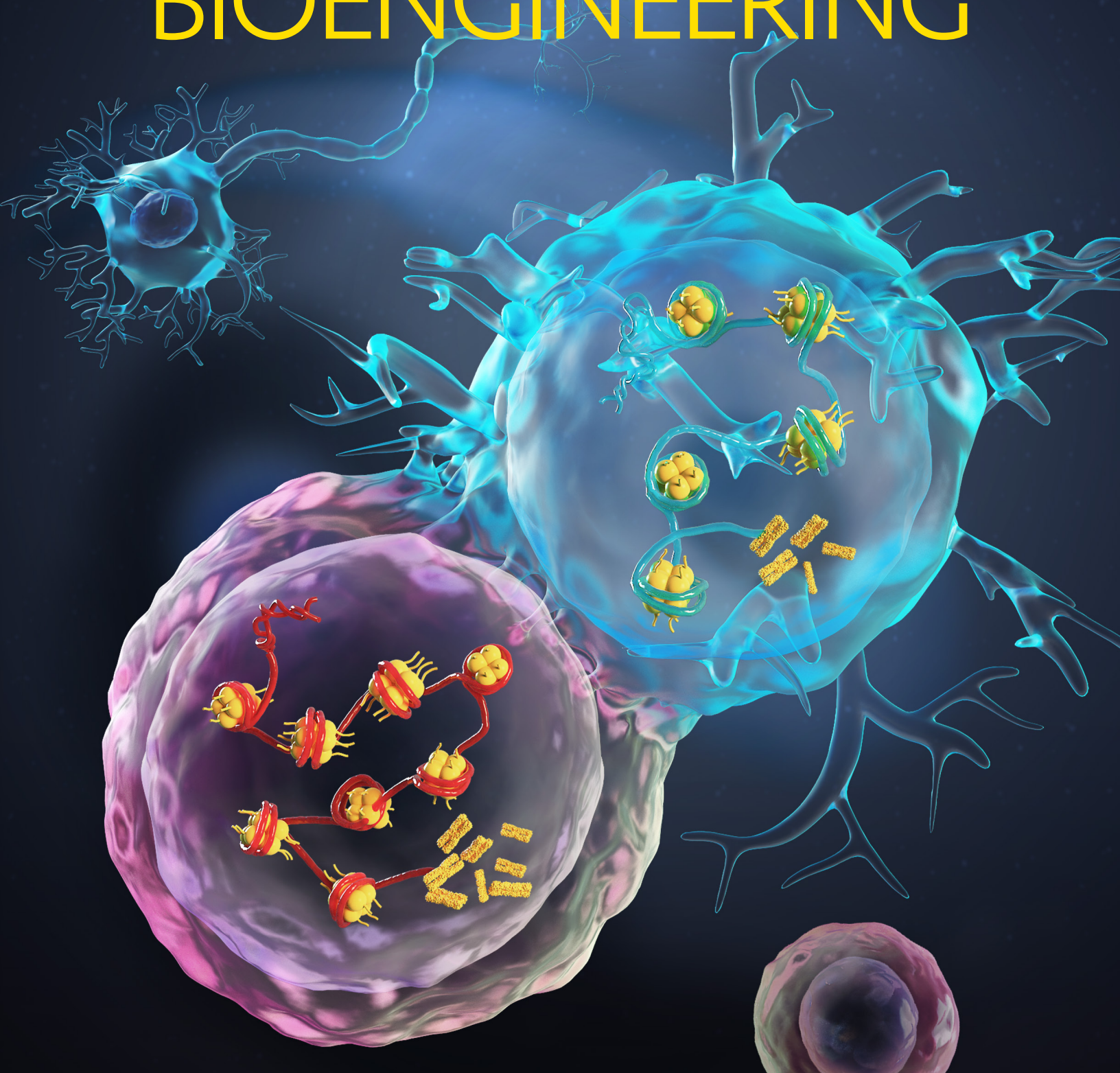


BIOENGINEERING



**Performing cutting-edge research that
benefits society and
training future leaders in the wide range of
possible bioengineering careers.**



Message from the chair



The pandemic has affected every aspect of our lives. Although we faced many challenges during this pandemic, we continued to advance research frontiers and improve the quality and diversity of our educational programs. With the outstanding multidisciplinary and collaborative environment at UCLA, our bioengineering researchers have developed innovative technologies to fight COVID-19, and performed cutting-edge research in cell engineering, biomaterials, biomedical devices, imaging, and computational biology. Our students and alumni have been recognized with many achievements and awards, and our Industrial Advisory Board has offered excellent advice to our program and students. We will continue to expand our department in the next few years, recruit new talent, and strive for diversity, equity, and inclusion in our working environment. Go Bruins!

A handwritten signature in black ink, appearing to read "Song Li".

Song Li, Ph.D.

Chancellor's Professor and Chair



40

Core and joint faculty

6

PECASE and NIH Director's
New Innovator Award

3

National Academy members

192

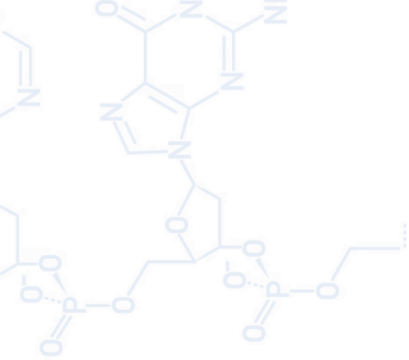
Graduate students

23

AIMBE members

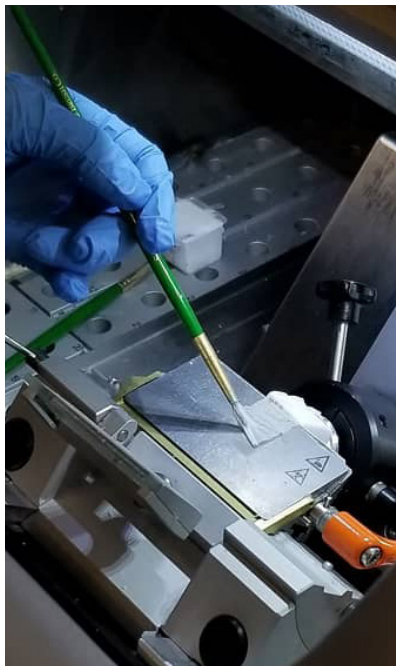
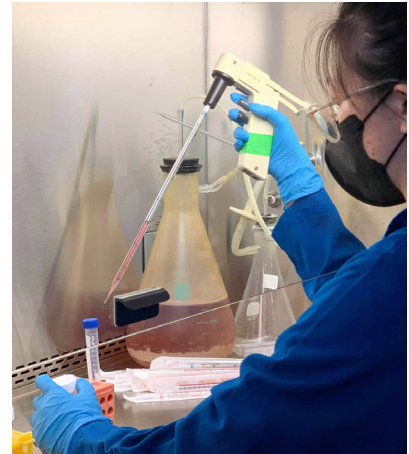
314

Undergraduate students

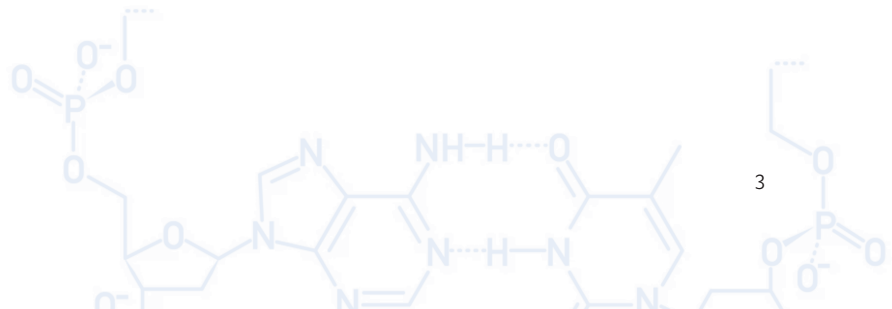
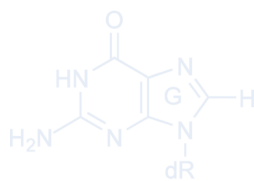


THE MISSION OF THE BIOENGINEERING DEPARTMENT

at the University of California, Los Angeles is to perform cutting-edge research that benefits society and to train future leaders in the wide range of possible bioengineering careers by producing graduates who are well-grounded in the fundamental sciences, adept at addressing open-ended problems, and highly proficient in rigorous analytical engineering tools necessary for lifelong success.



Over the past few years, our Bioengineering Department has established a vibrant under-graduate degree program and has recruited excellent faculty with diverse backgrounds who are directing innovative research programs. Our bioengineering faculty bring an extensive range of expertise to the department, with specialties including bioengineering, chemistry, materials science, chemical engineering, physics, electrical engineering, and medicine. This broad range of experience has proved to be extremely valuable in preparing and teaching our undergraduate curriculum. Our faculty and students have been recognized by many awards at national and international levels.



OUR CORE FACULTY

BIOENGINEERING RESEARCH AREAS:

Molecular, Cellular, and
Tissue Engineering

Biomedical Devices and
Instrumentation

Biomedical Imaging

Biomedical Data Sciences

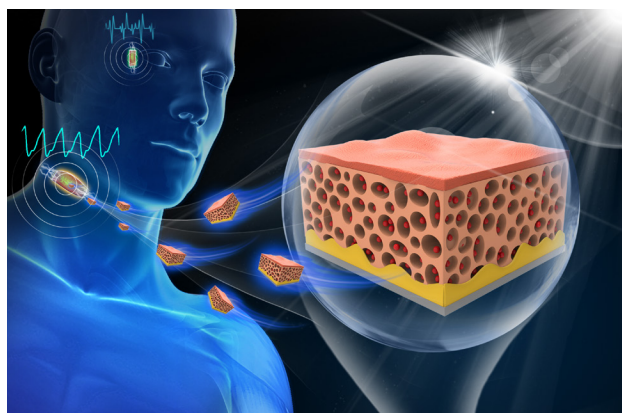
NeuroEngineering

Jun Chen

Assistant Professor



Research in the Chen Lab is focused on nanotechnology and bioelectronics for energy, sensing, and therapeutic applications in the form of smart textiles, wearables, and body area networks. With a current h-index of 80, Chen Group published 2 books, 200 journal articles and 110 of them are as corresponding contributions in Chemical Reviews, Chemical Society Reviews, Nature Materials, Nature Electronics, Nature Communications, Science Advances, Joule, Matter, Advanced Materials, and many others. The group also filed 14 US patents and licensed 1. The group effort is recently recognized by Vebleo Fellow, 30 Life Sciences Leaders to Watch by Informa, UCLA Society of Hellman Fellows Award, Advanced Materials Rising Star; ACS Nano Rising Stars Lectureship Award; Chemical Society Reviews Emerging Investigators Award. and many others. Beyond research, he is an associate editor of Biosensors and Bioelectronics.



RESEARCH AREA/SPECIALTY:

Bioelectronics, biosensors, smart textiles,
nanotechnology, personalized healthcare

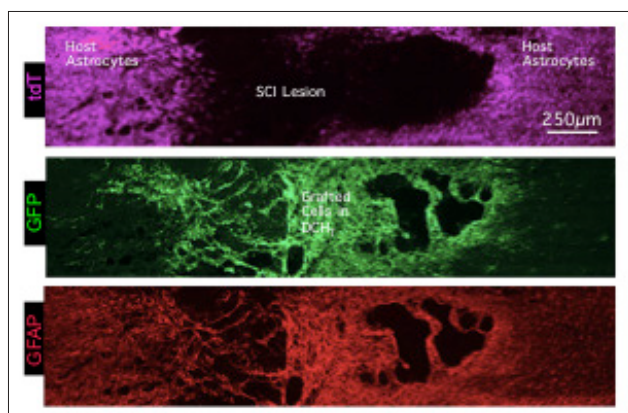
Tim Deming

Professor



Research in the Deming Lab is focused on synthesis, processing, characterization and evaluation of biological and biomimetic materials based on polypeptides. These materials are being studied since they

can be prepared from renewable resources, they can be biocompatible and biodegradable, and possess unique self-assembling properties. We utilize innovative chemistry techniques to synthesize materials with properties that rival the complexity found in biological systems. The polymers are then processed into ordered assemblies, which are characterized for both nanoscale structure as well as biological function. Current efforts are focused on commercialization of polypeptide hydrogels for treatment and prevention of infection, and for cosmetic applications.



RESEARCH AREA/SPECIALTY:

Biinspired materials, polymers, functional polypeptides

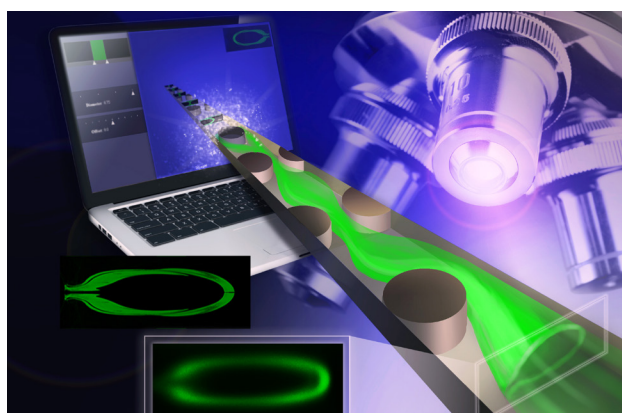
Dino DiCarlo

Armond and Elena Hairapetian Chair in Engineering & Medicine



The Di Carlo Lab works at the intersection of micro-, nano- and information technology and biology – spanning fundamental investigations in fluid flow and single-cell behavior to

clinical and industrial applications. Prof. Di Carlo has been pioneering the field of “Inertial Microfluidics.” The group has used inertial fluid dynamic effects to manipulate particles, cells, and fluids in precise ways, enabling the isolation and preparation of samples of blood and other fluids, and performing single-cell analysis. His group also pioneered new approaches to quantify single-cell mechanical properties at high rates.



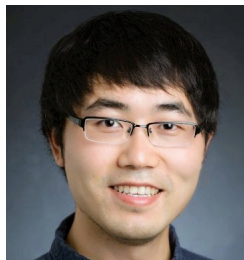
RESEARCH AREA/SPECIALTY:

Lab on a particle, Smart Biomaterials, Microfluidics

OUR CORE FACULTY

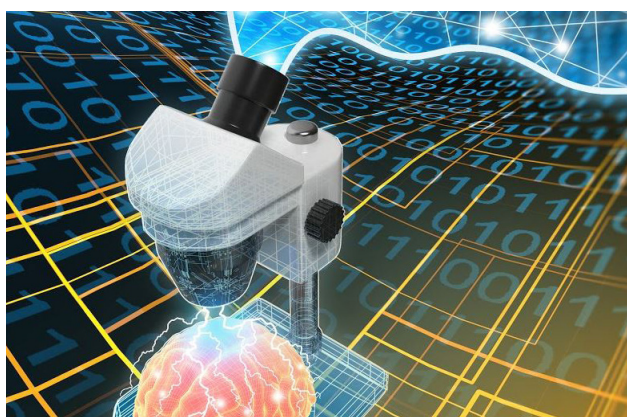
Liang Gao

Assistant Professor



The Gao Lab specializes in developing novel optical imaging technologies to improve our fundamental understanding of cell and tissue biology and to directly impact disease diagnosis. His current

research interests encompass multidimensional optical imaging, computational optical imaging, ultrafast imaging, and biomedical optics. His lab holds the world record for fastest 2D and 3D imaging.



RESEARCH AREA/SPECIALTY:

Biophotonics, Biomedical imaging instrumentation, Computational optical imaging

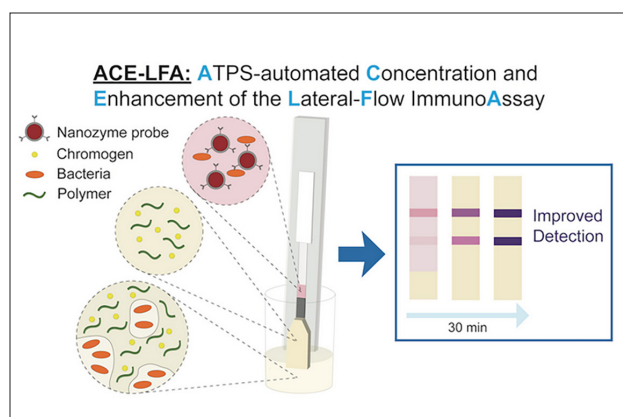
Daniel Kamei

Professor



Professor Kamei's research is in the area of colloid and interface science, focusing on the application of nanoparticles as well as surfactant and polymer systems. His research group was the first to demonstrate that

an aqueous two-phase system (ATPS) could be used to concentrate a target biomarker into a smaller volume before application to a lateral-flow immunoassay (LFA) strip. The Kamei Laboratory also became the first to recognize that paper could accelerate the macroscopic ATPS phase separation process, thereby significantly decreasing user interaction and assay time. They recently expanded upon this discovery by pioneering the automation of biomarker concentration, capture, and signal enhancement on a paper-based device. His research group has continued to develop innovative point-of-care devices and also maintains its efforts in using their expertise in colloid and interface science for designing novel drug delivery systems.



RESEARCH AREA/SPECIALTY:

Colloid and interface science; aqueous two-phase systems; point-of-care diagnostics; drug delivery

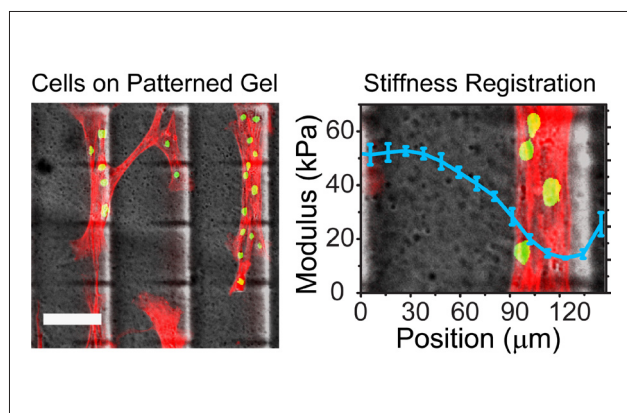
Andrea Kasko

Professor



The Kasko Lab's research is centered on developing polymeric materials for bioengineering applications. The group is specifically interested in designing stimuli-responsive

biomaterials for applications in drug delivery and tissue engineering, and in making biomimetic materials that recapture biological function. The Kasko research group focuses on the synthesis of new complex polymeric biomaterials. Their goals are to develop materials that can be manipulated spatially and dynamically in a predictable manner using different (chemical) mechanisms, and to incorporate increasing levels of biomimicry into synthetic materials for use as biomaterials and/or as wholly synthetic therapeutics. Within these themes, they have three separate projects – dynamically responsive biomaterials, novel antimicrobials and new glycomimetics.



RESEARCH AREA/SPECIALTY:

Developing polymeric materials for bioengineering applications

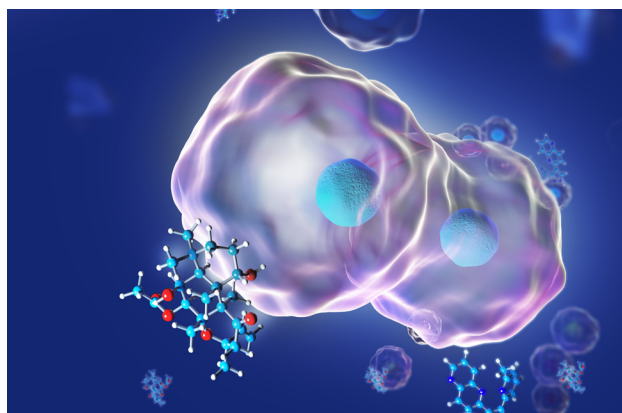
Song Li

Chancellor Professor and Chair of Bioengineering



The Li Lab is focused on cell engineering, mechnobiology, biomaterials and tissue engineering. Stem cells and reprogrammed cells have broad applications in regenerative medicine,

disease modeling, and drug screening. We integrate bioengineering technologies and molecular analysis to study how biophysical factors, such as mechanical cues and the micro/nano structure of biomaterials, regulate cell fate determination and epigenetic changes, with the goal of translating fundamental findings into cell engineering technologies. At tissue level, the regeneration process requires the coordination of immune cells, stem cells, and resident cells in the microenvironment. We investigate the mechanisms of tissue remodeling, and develop multidisciplinary approaches to engineer cells, biomaterials, drug delivery systems, and biophysical factors to promote the regeneration of functional tissues.



RESEARCH AREA/SPECIALTY:

Cell Engineering, Mechanobiology, Biomaterials

OUR CORE FACULTY

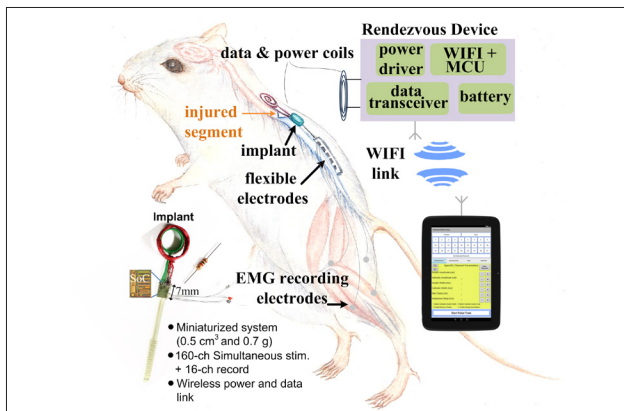
Wentai Liu

Professor



The Liu Lab (Biomimetic Research Laboratory (BRL)) engages in interdisciplinary research of bionic engineering and neural prosthesis. The integration of science, engineering, and technology

supports the aims of 1) regaining eyesight for the blind; restoring motor function for the paralyzed; 3) replenishing the cognition impaired; 4) reanimating automatic nerves; 5) brain-to-brain communication. Since the early stages of retinal prosthesis in 1988, BRL has led the engineering efforts for vision restoration in blind patients. Notably, BRL has the unique credential of retinal prosthesis development from conception to the final implant. These efforts led to successful commercial implants (code name Argus-II by Second Sight) for blind patients, receiving both CE Mark in 2011 and US FDA approval in 2013.



RESEARCH AREA/SPECIALTY:

Neuroengineering, neural prosthesis

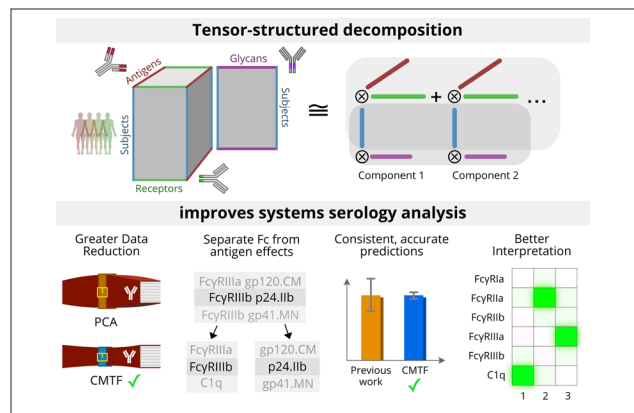
Aaron Meyer

Assistant Professor



The Meyer lab integrates machine learning and experiments to study cell-to-cell communication and signal transduction. They are interested in how extracellular cues operate

alone and in combination to influence cell behavior. In cancer, cells often use parallel signaling pathways to evade therapy. Conversely, the immune system uses combinations of signals to direct its responses to cancer and infection. Both situations have created similar challenges in the design of biotherapeutics. The group operates from the perspective that we need better tools to measure, model, and manipulate these processes most effectively. The lab has led the development of multi-modal analysis tools to study antibody responses, proteomics, and data integration.



RESEARCH AREA/SPECIALTY:

Immune engineering, systems biology, machine learning

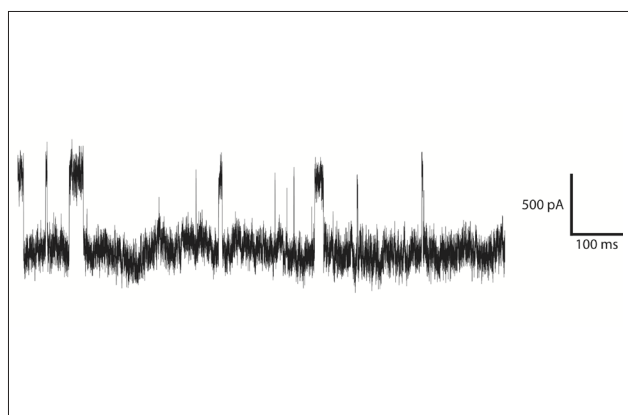
Jacob Schmidt

Undergraduate Vice Chair and Professor



The Schmidt lab has a device-centered focus, primarily covering sensor and instrumentation development. The group has studied the use of protein and inorganic nanopores for single

specifically sensing of nucleic acids and proteins. In these measurements, changes in the electrical conductance of an electrolyte-filled nanopore are monitored to detect individual molecules and other small objects entering or occluding the pore. The size, shape, and identity of these molecules can be inferred from analysis of the measured conductance signals. Detecting single molecules enables use of very small analyte volumes—a long term goal is single cell protein characterization.



RESEARCH AREA/SPECIALTY:

Sensor and instrumentation development

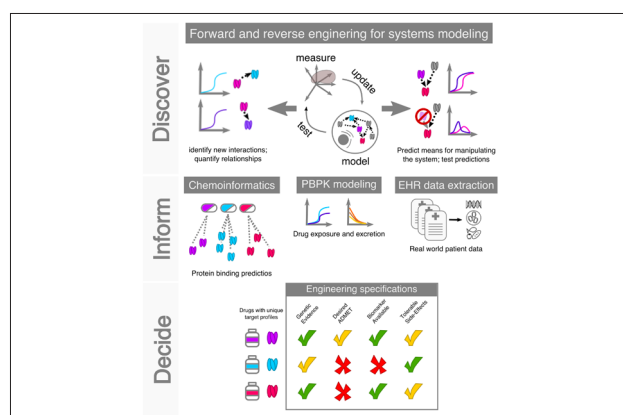
Jennifer Wilson

Assistant Professor



The Lab for the Understanding of Network Effects (LUNE), studies how proteins downstream of drug targets affect drug-induced phenotypes – the ability to mitigate disease or cause side

effects. Drugs are traditionally developed to alter the function of proteins within cells – usually proteins that are malfunctioning and have causal relationships to disease. However, proteins in the cell exist in large, complex networks – they interact with each other and rarely exist in isolation. Even well designed drugs that alter the function of a target protein have ripple effects through protein networks. It's widely appreciated that drug effects propagate through protein networks, but the downstream effects are not routinely considered during target protein selection. We aim to design models that anticipate downstream drug effects during initial therapeutic design.



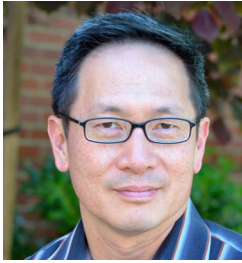
RESEARCH AREA/SPECIALTY:

Protein interaction networks, drug pathways, computational models

OUR CORE FACULTY

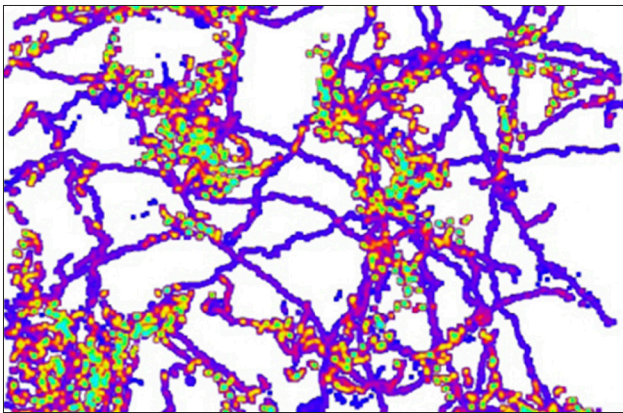
Gerard Wong

Professor



The Wong Lab uses multidisciplinary approaches to solve problems in infectious diseases, auto-immune disorders and inflammation, with implications for respiratory diseases, heart disease,

and cancer. Wong's honors include: the Beckman Young Investigator Award, Alfred P Sloan Fellowship, and Sackler Distinguished Speaker. He is a Fellow of the American Physical Society, a Fellow of the American Academy of Microbiology, and a Fellow of the American Institute for Medical and Biological Engineering. His group has produced 11 professors since 2006. The lab's interests include Bacterial biofilm communities, innate immunity, autoimmune diseases, antibiotic design, machine learning, neurodegenerative diseases, viral replication, programmed cell death, and immunotherapy of cancer.



RESEARCH AREA/SPECIALTY:

Immunity and antimicrobials, biofilms, fundamental science

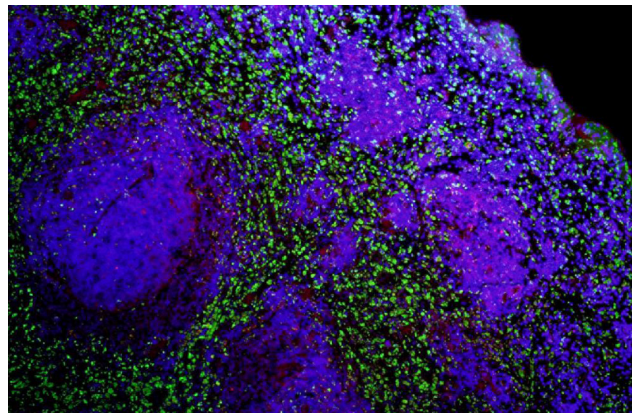
Benjamin Wu

Professor



The Wu Lab uses cutting-edge bioengineering strategies to address unmet needs and open-ended problems. His group has extensively analyzed the effects of processing parameters on the formation

of biomimetic apatites and this fundamental understanding has led to applications in the areas of art conservation, drug delivery, separations, and biosensors. Additionally, his group has also shed light on the interplay between orthobiologic growth factors and adult stem cells in the area of bone repair. The group has developed practical methods to effectively deliver the bone-forming molecule, NELL-1, for bone and cartilage repair. Systemic delivery of NELL-1 is currently being studied in zero-G environment on the International Space Station as a potential strategy to slow and/or reverse bone loss during spaceflight.



RESEARCH AREA/SPECIALTY:

Advanced manufacturing, orthobiologics, biomaterials

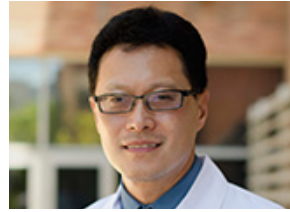
OUR JOINT FACULTY



Denise Aberle
Professor, Radiology



Mark Cohen
Professor, Psychiatry and
Biobehavioral Sciences



Tzung Hsiai
Professor, Department of
Medicine



Pirouz Kavehpour
Professor, Mechanical and
Aerospace Engineering



Corey Arnold
Professor, Radiological
Sciences



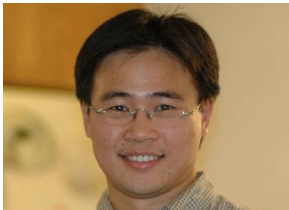
Linda Demer, MD PhD
Professor and Executive
Vice Chair, Departments of
Medicine



William Hsu
Associate Professor,
Radiological Sciences



Chang-Jin "CJ" Kim
Distinguished Professor,
Mechanical and Aerospace
Engineering



Pei-Yu "Eric" Chiou
Professor and Vice Chair,
Mechanical and Aerospace
Engineering



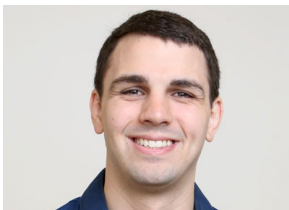
Elisa Franco
Associate Professor,
Mechanical and Aerospace
Engineering



Bahram Jalali
Professor, Electrical &
Computer Engineering



Debiao Li
Professor, Department of
Medicine



Tyler Clites
Assistant Professor,
Mechanical and Aerospace
Engineering



Chih-Ming Ho
Distinguished Professor
Emeritus, Mechanical and
Aerospace Engineering



Shantanu H. Joshi
Associate Professor,
Neurology



Arash Naeim
Professor, Department of
Medicine

OUR JOINT FACULTY



Aydogan Ozcan
Chancellor's Professor,
Electrical & Computer
Engineering



Sophia Sangiorgio
Professor, Orthopaedic
Surgery



Yi Tang
Professor, Chemical and
Biomolecular Engineering



Paul Weiss
Distinguished Professor,
Chemistry and
Biochemistry



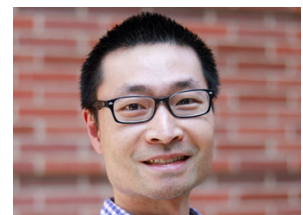
Jacob Rosen
Professor, Mechanical and
Aerospace Engineering



Kalyanam Shivkumar
Professor, Department of
Medicine



Michael Teitell
Professor, Pathology and
Laboratory Medicine



Holden Wu
Associate Professor,
Department of Radiology



Dan Ruan
Associate Professor,
Radiation Oncology



Maie St. John
Professor and Chair,
Department of Head and
Neck Surgery



Cun Yu Wang
Chair and No-Hee Park-
Endowed Professor,
Division of Oral Biology and
Medicine



Yang Yang
Professor, Materials Science
and Engineering

OUR STAFF



Lili Bulhoes
Graduate Student Affairs
Officer



Daphne-Jane Dizon
Management Services
Officer



Sarah Matautia
Purchasing Coordinator



Emilia Rodriguez-Vera
Administrative Specialist

AWARDS AND RECOGNITION (2020-2021)

2020

- Edward K. Rice Outstanding Doctoral Student Award (2020): **Parinaz Abiri**, PhD '19, MD '21
- Northrop Grumman Excellence in Teaching Award (2020): **Stephanie Seidlits**
- Society for Laboratory Automation and Screening Innovation Award (2020): **Joseph de Rutte**
- IEEE Fellow (2020): **Paul Weiss**
- BMES Fellow (2020): **Tzung Hsiai, Walt Baxter**
- UCLA-CalTech integrated Cardiovascular Medicine for Bioengineers (iCMB) and Caltech/UCLA individualized Theranostic Engineering to Advance Metabolic System (iTEAM): (PD: **Tzung Hsiai**, Co-PD: **Song Li, Dino Di Carlo, Paivi Pajukanta, Zhaoping Li, Y. C Tai**)
- National Defense Science and Engineering Graduate Fellowship (2020): **Trinny Tat**
- Shu Chien Early Career Award (2020): **Stephanie Seidlits**
- National Academy of Inventors (2020): **Bahram Jalali**
- Web of Sciences 2020 Highly cited Researchers: **Jun Chen, Aydogan Ozcan, Yang Yang**

2020 Commencement Awards

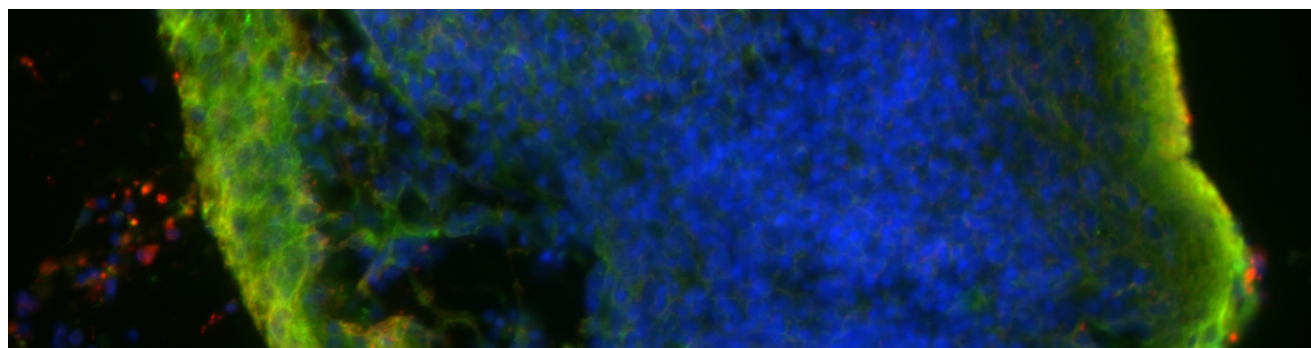
- School-Wide Outstanding Bachelor of Science Award: **Mariam Sheyda Carson**
- Chancellor's Service Award: **Nicole Marie Kuntjoro, Savannah Sealy-Anna Shumock**
- Engineering Achievement Award in Student Welfare: **Mariam Sheyda Carson, Jessica "Jessii" Morgan Chun, Nicole Marie Kuntjoro, LeeAnn Kai-Yin Li, Kajal Maran, Izabella Krystyna Samuel**
- Bioengineering Outstanding Students: **Joseph de Rutte** (Ph.D.), **Michael Chen** (MS), **Mariam Sheyda Carson** (B.S.)

2021

- Northrop Grumman Excellence in Teaching Award (2021): **Aaron Meyer**
- UC Big Ideas Winners (2021): **Xuexiang Zhang, Crystal Xiao, Mahdi Hasani**
- ACS Nano Rising Stars (2021): **Jun Chen**
- Shu Chien Early Career Award (2021 Finalist): **Liang Gao**
- 30 Life Sciences Leaders To Watch by In Vivo (2021): **Jun Chen**
- 2nd Influential Researcher globally in the field of Nanogenerator (2021): **Jun Chen**
- BMES Outstanding Outreach Award (2021): **UCLA BMES Student Chapter**
- International Academy of Medical and Biological Engineering Fellow (2021): **Zhen Gu**
- Lab on a Chip Widmer Poster Award @ MicroTAS 2021 (2021): **Sohyung Lee**
- Biomicrofluidics Best Paper Award @ MicroTAS 2021 (2021): **Doyeon Koo**
- James Willerson Lectureship Award (2021) **Linda Demer**

2021 Commencement Awards

- Engineering Achievement Award in Student Welfare (2021): **Linnet Y Chang, Griffith Collwyn Hesketh Hughes, Sami Rafeedie, Nina Angelique Tittensor, Yilian Wang**
- Bioengineering Outstanding Students: **Reyhaneh Nazarian** (Ph.D.), **Cole David Benyshek** (M.S.), **Mayilone Sathialingam** (B.S.)





UCLA Bioengineering Alumni Advisory Board (AAB)

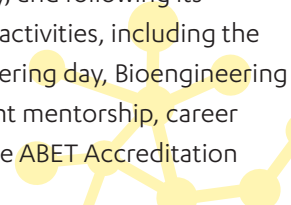
The UCLA Bioengineering Alumni Advisory Board's mission is to promote the communication, growth, and shared activities of the UCLA Bioengineering alumni, faculty, and students.

The AAB members offer unique inputs to help the Department understand the needs of industry, academia, and the medical professions, insights into how well the department is meeting the bioengineering needs of the future, and knowledge of current trends in the industry, including suggestions for keeping the curriculum and degree programs current. They

also provide input to academics, research, outreach, advocacy, and development.

The members represent a cross-section of the alumni of the Department, and of the major areas of the bioengineering field.

The AAB meets annually, and following its mission, is involved in several activities, including the annual Discover UCLA Engineering day, Bioengineering Research Day, ongoing student mentorship, career development advising, and the ABET Accreditation process every six years.



BME Industrial Advisory Board

The Bioengineering department is supported by the industrial advisory board. This board has diverse representation from career paths that need bioengineering graduates, including Biotech (Amgen and Genentech), Medtech (Edwards and Medtronic), entrepreneurs, patent attorneys, etc. Many of the members are UC alums as well!

The goal of the IAB is to increase interactions between industry and students and faculty. This includes participating in department events, providing input for curriculum development, mentoring students, providing opportunities for students to obtain industrial experience, and establishing collaborations with faculty.



Bioengineering Graduate Association (BGA)

The Bioengineering Graduate Association (BGA) at UCLA was established to facilitate communication between graduate students and department faculty, encourage the involvement of students in the graduate community, and establish platforms for the academic and professional development of its members.

BGA coordinates with the department to provide resources of outreach for graduate students, including arranging lunch with the guest faculty who present at our department's weekly seminar series, organize the department's annual recruiting event and research showcase, BE Research Day, and provide other opportunities for student involvement. BGA also works to enrich the life of graduate students and form close bonds within the department.

In addition to promoting academic success, BGA facilitates opportunities to network with industry professionals through special seminars and alumni panel events. These quarterly events provide BE graduate students with opportunities to learn about careers in industry and network with industry professionals from a wide variety of companies.

As BGA looks towards the 2021 – 2022 academic year, we are excited to help welcome a new cohort of graduate students to our department and will continue to facilitate connections between our students and academic and career opportunities.



BGA hosted the Bioengineering Symposium in February 2020.



BGA leadership team at Bioengineering Research Day in February 2020.

Biomedical Engineering Society (BMES)

The Biomedical Engineering Society (BMES) at UCLA aims to connect students interested in Bioengineering and support them through professional, outreach, technical, and social opportunities and events.

The professional aspect encompasses academic guidance opportunities, through class planning workshops and career exploration panels, as well as connections to industry, via biotechnology-focused career fairs, industry information sessions, and resume building workshops.

BMES provides outreach opportunities through our recently established Reaching and Inspiring Students in Engineering (RISE) program and annual fundraisers to local food banks. RISE connects volunteers with middle and high school students from Title I schools to introduce and teach concepts such as circuits, Arduino coding, and Computer Aided Design (CAD). Recently, BMES at UCLA was also nationally recognized and awarded the Outstanding Outreach Award for our efforts in giving back to the community.

Students may also choose to expand their technical knowledge by joining one of our project teams. These teams focus on a variety of skills: from learning wet lab techniques to applying their knowledge towards a specific medical or engineering problem. To complement these projects, BMES plans to incorporate a new workshop series next year to introduce technical skills without the commitment of a yearlong project.

In addition to promoting professional and academic success, BMES facilitates bonding through mentorship activities and social events. These include game nights and study nights through the mentorship



(top) BMES Cell Team presents their research during poster presentations at the annual Spring Banquet (2019).

(bottom) BMES Board for the 2019-2020 academic year.



family system as well as quarterly club-wide events such as BMES Banquet and Fall BBQ.

As BMES looks towards the 2021-2022 academic year, our organization hopes to achieve several goals. We want to further incorporate mental health within the diversity & inclusion conversation, increase accessibility to our technical skills workshops, and encourage more interpersonal connections between students and leaders in Industry.

**Producing graduates who are well-grounded
in the fundamental sciences, adept at
addressing open-ended problems, and highly
proficient in rigorous analytical engineering
tools necessary for lifelong success.**



UCLA Samueli
School of Engineering

Department of Bioengineering

420 Westwood Plaza
5121 Engineering V
University of California
Los Angeles, CA 90095-1600



www.bioeng.ucla.edu