BIOENGINEERING RESEARCH

2017-2018

UNIVERSITY OF CALIFORNIA
UC RIVERSIDE

Marlan and Rosemary Bourns
College of Engineering
Bioengineering

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Xiaoping Hu
Chair, UCR Bioengineering
Provost Fellow

Dear Colleagues,

The year 2017 marked a significant period of growth for the Department of Bioengineering at UC Riverside. We welcomed four new tenure-track faculty to our ranks, each with an expertise that continues to strengthen our program through quality education and research. Our 15 faculty members are joined by 50 interdisciplinary faculty who contribute to the BIG program.

In addition, we opened our doors to the campus' newest research center – UC Riverside's Center for Advanced Neuroimaging (UCR-CAN), for which I serve as the Founding Director. With the acquisition of a new 3 Tesla Siemens Prisma MRI machine, our faculty and students will partake in cutting-edge research and answer diverse questions related to bioengineering, psychology and neuroscience, education and medicine, and statistics and physics, among other areas.

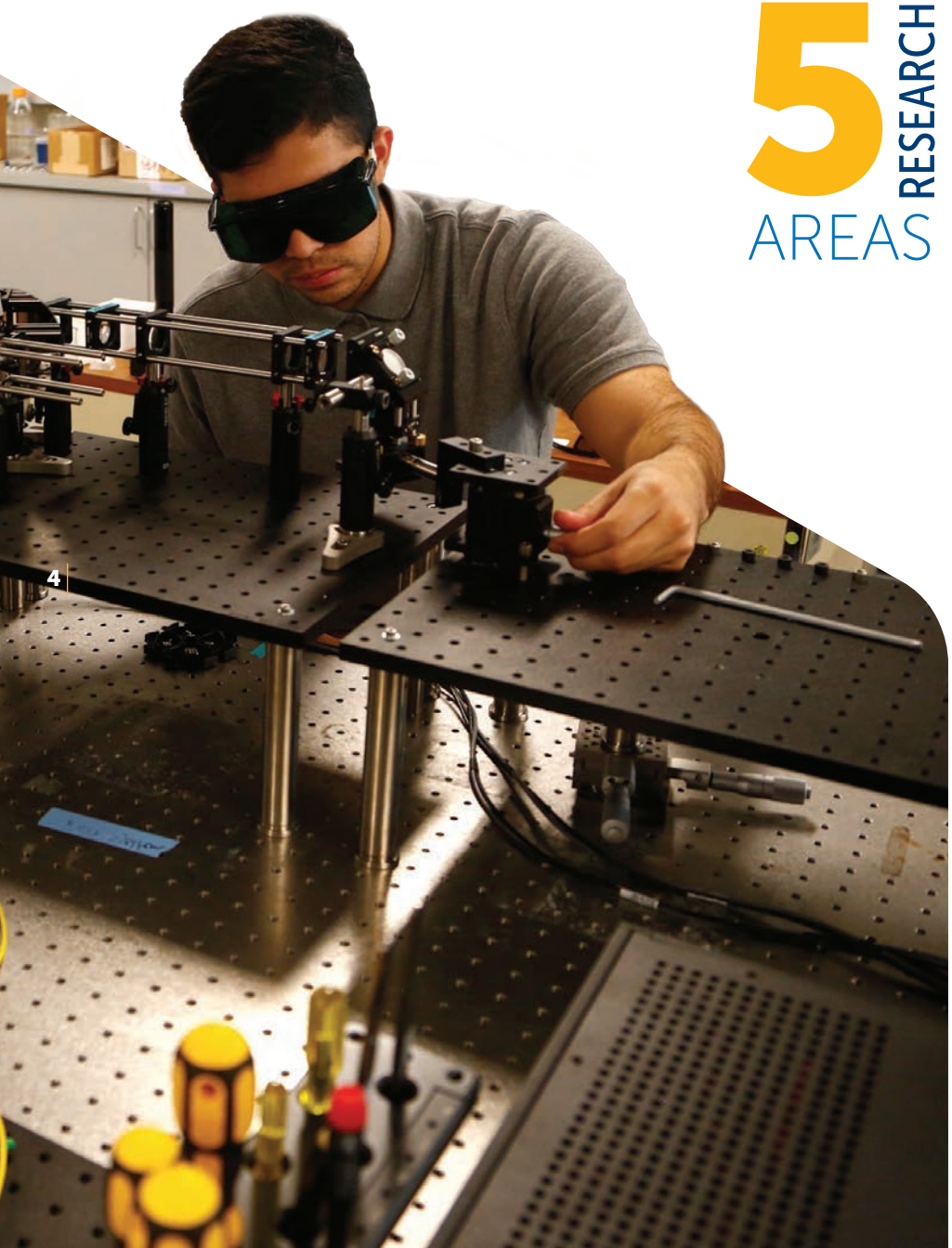
In the meantime, our faculty continue to excel, securing large research grants and being recognized by colleagues through their professional organizations. We now have:

- **3** AAAS Fellows
- **4** AIMBE Fellows
- **1** BMES Fellow
- **1** IEEE Fellow
- **1** SPIE Fellow
- **1** ISMRM Fellow
- **1** California Council Distinguished Educator Awards
- **1** NIH Pathway to Independence Award
- **1** NSF BRIGE
- **2** Hellman Fellows

This brochure highlights the research accomplishments by our faculty and students. We welcome you to learn more about the Department of Bioengineering at UCR by visiting our website at www.bioeng.ucr.edu. We have many plans to continue our impressive and ambitious growth trajectory. Here's to another successful year of education and research!

Regards,

Xiaoping Hu
Chair, UCR BIEN
Provost Fellow



5 RESEARCH AREAS

BIOMATERIALS AND REGENERATIVE MEDICINE

Optical nano-materials; polymeric scaffolding; high-throughput screening; 3D biomaterials; 3D tissue engineered scaffolds and bioreactors; vascular nanotherapeutics, biodegradable implants

BIOMEDICAL IMAGING

Optical coherence tomography; biophotonic technologies; non-invasive monitoring; image guided spectroscopy; optical neuroimaging; nonlinear optical microscopy and spectroscopy; MRI; neuroimaging

COMPUTATIONAL BIOENGINEERING

Bioinformatics; modeling of biomolecular structure, dynamics and interactions; protein and peptide design; crowded protein osmotic pressure; modeling of cellular signaling pathways; image processing and analysis; computational drug discovery

MOLECULAR AND CELLULAR ENGINEERING

Cellular biomechanics; mechanotransduction; signal transduction pathways; regulation of immune system; vascular inflammation; metabolic controls; intracellular biosensors; biomolecules/biomolecular interactions

NEUROENGINEERING

Modeling of the neural system; processing of neurophysiological signals and neuroimaging data; modulation and intervention of the neural system; engineering of devices, constructs, and therapeutics for treating brain disorders

BY THE NUMBERS

DEGREES OFFERED
B.S., M.S.
B.S./M.S.
MS Online
Ph.D.

RESEARCH AREAS
5

GRADUATE STUDENT TO FACULTY RATIO
6.2:1

BIG PARTICIPATING FACULTY REPRESENT
4 Colleges

BIG FACULTY
50

FACULTY
15

AFFILIATED CENTERS
9

INCREASE IN RESEARCH EXPENDITURES FROM 15/16 TO 16/17
30%

STUDENTS
→ **350** Undergraduate
→ **16** Master's
→ **50** Ph.D.

FELLOWS OF PROFESSIONAL ORGANIZATIONS
11

15 CORE FACULTY

Bahman Anvari, Professor
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Ph.D.: Bioengineering, Texas A&M

Postdoctoral Training:
Beckman Institute, UC Irvine

Fellow: BMES, SPIE, AAAS, AIMBE

Research Focus

Anvari lab focuses on the engineering and development of light-based theranostic constructs derived from biological materials for clinical translation, and use of optical methods to study cellular mechanobiology

Summary

Research is focused on the development and application of optical methods for biological measurements, imaging, and therapy as well as using optical trapping methods to study mechanobiology. Learn more: www.anvaribiophotonicslab.org

Selected Publications

- Burns JM, Saager R, Majaron B, Jia W, Anvari B (2017) Optical properties of biomimetic probes engineered from erythrocytes, *Nanotechnology*, 28: 035101.
- Guerrero Y, Singh SP, Mai T, Murali RK, Tanikella L, Zahedi A, Kundra V, Anvari B (2017) Optical characteristics and tumor imaging capabilities of near infrared dyes in free and nano-encapsulated formulations comprised of viral capsids, *ACS Appl. Mater. Interfaces*, 9: 19601-19611.

Justin W. Chartron, Assistant Professor

MSE 239
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Ph.D.: Biochemistry and Molecular Biophysics, California Institute of Technology

Postdoctoral Training: Stanford University

Highlight: Research featured on cover of *Nature* magazine

Research Focus

Quantitative systems biology, biophysics of protein maturation, molecular and cellular engineering, biotechnology, and biopharmaceutical production

Summary

The Chartron group uses experimental and computational systems biology to understand how cells assemble complex proteins in order to develop new materials and therapeutics.

Selected Publications

- Chartron JW, Hunt KCL, Frydman J (2016) Cotranslational signal-independent SRP preloading during membrane targeting, *Nature*, 536, 224–228.
- Pechmann S, Chartron JW, Frydman J (2014) Local slowdown of translation by nonoptimal codons promotes nascent-chain recognition by SRP in vivo, *Nat. Struct. Mol. Biol*. 21, 1100–1105.

Kevin Freedman, Assistant Professor

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Ph.D.: Chemical and Biological Engineering, Drexel University

Postdoctoral Training: Imperial College London, Joint Genome Institute

Highlight: Global Viral Fellows Program Recipient at Lawrence Berkeley's Joint Genome Institute in the Microscale Applications Group

Research Focus

Single molecule methods, nano-sensors and molecular manipulation, biophysics, device characterization and device physics, microfluidics, molecular kinetics, and electrical and optical recordings

Summary

The Freedman Lab integrates single molecule methods with microfluids for studying fundamental biology as well as developing diagnostic and prognostic tools and devices.

Selected Publications

- Freedman K, Otto L, Ivanov A, Oh S, Edel J (2016) Nanopore sensing at ultra-low concentrations using single molecule dielectrophoretic trapping, *Nature Communications*, 7, 10217.
- Freedman K, Crick C, Albella P, Barik A, Ivanov A, Maier S, Oh SH, Edel J (2016) On-demand surface and tip enhanced raman spectroscopy using dielectrophoretic trapping and nanopore sensors, *ACS Photonics*, 3 (6), 1036-1044.

Kaustabh Ghosh, Assistant Professor

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Ph.D.: Biomedical Engineering, State University of New York, Stony Brook

Postdoctoral Training: Boston Children's Hospital, Harvard University

Highlight: Macular Degeneration Grant, BrightFocus Foundation

Research Focus

Vascular mechanobiology, inflammation, and nanomedicine

Summary

The Ghosh Research Group aims to integrate the principles of mechanobiology and nanotechnology to tackle vascular inflammation associated with diabetes and aging.

Selected Publications

- Cabrera A, Bhaskaran A, Xu J, Yang X, Scott HA, Mohideen U, Ghosh K (2016) Senescence increases choroidal endothelial stiffness and susceptibility to complement injury: implications for choriocapillaris loss in AMD, *Investigative Ophthalmology and Visual Science*, 57: 5910-5918.
- Yang X, Scott HA, Monickaraj F, Xu J, Ardekani S, Nitta CF, Cabrera A, McGuire PG, Mohideen U, Das A, Ghosh K (2016) Basement membrane stiffening promotes retinal endothelial activation associated with diabetes, *The FASEB Journal*, 30:601-611.

William Grover, Assistant Professor

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Ph.D.: Chemistry, University of California, Berkeley

Postdoctoral Training: Massachusetts Institute of Technology

Highlight: Future Technology Leaders Award, The Engineers' Council

Research Focus

Instrumentation, sensors, medical diagnostics, single-cell analysis, microfluidics, biomaterials, and design automation

Summary

The Grover Lab develops "meta-instrumentation," a framework of hardware and software components that supports many different instruments and applications in research, healthcare, and education.

Selected Publications

- Mesbah Oskui S, Bhakta HC, Diamante G, Liu H, Schlenk D, Grover WH (2017) Measuring the mass, volume, and density of microgram-sized objects in fluid, *PLoS ONE*, 12(4): e0174068.
- Hill DA, Anderson LE, Hill CJ, Mostaghim A, Rodgers VGJ, Grover WH (2016) MECs: "Building blocks" for creating biological and chemical instruments, *PLoS ONE*, 11(7): e0158706.

Xiaoping Hu, Provost Fellow
Department Chair and Professor

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Ph.D.: Medical Physics,
University of Chicago

Postdoctoral Training:
University of Chicago

Fellow: IEEE, AIMBE, ISMRM

Research Focus

Biomedical imaging, magnetic resonance imaging, neuroimaging, neuromodeling, neuroengineering, and molecular imaging

Summary

The Hu group works on the development of in vivo magnetic resonance imaging/spectroscopy techniques, applications of these techniques for studying the brain of normal subjects and patients, modeling the brain with imaging measures and developing methods to modulate the brain.

Selected Publications

- Langley J, Huddleston DE, Sedlacik J, Boelmans K, and Hu X (2017) Parkinson's disease related increase of T2*-weighted hypointensity in substantia nigra pars compacta, *Movement Disorder*, 32(3): 441-449.
- He N, Langley J, Huddleston DE, Ling H, Xu H, Liu C, Yan F, and Hu X (2017) Improved neuroimaging atlas of the dentate nucleus, *Cerebellum*, 10.1007/s12311-017-0872-7.

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University of California, Los Angeles

Postdoctoral Training:
Scripps Research Institute

Fellow: AIMBE

Research Focus

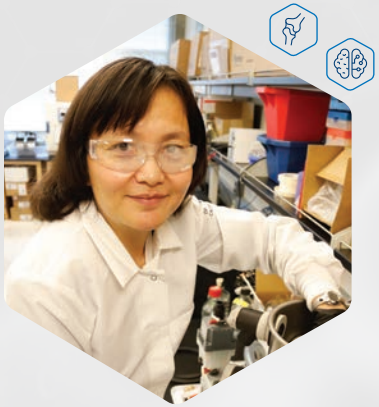
Molecular engineering, drug discovery, and translational medicine

Summary

Liao's group develops molecular engineering and high-throughput technologies for quantitative systems biology and translational research/development.

Selected Publications

- de Graaf C, Donnelly D, Wootten D, Lau J, Sexton PM, Miller LJ, Ahn J, Liao J, Fletcher MM, Yang D, Alastair J, Brown H, Zhou C, Deng J, Wang MW (2016) Glucagon-like peptide-1 and its class B G protein–coupled receptors: a long march to therapeutic successes, *Pharmacological Reviews*, 68:954-1013.
- Wiryawan H, Dan K, Etuale M, Shen Y, Liao J (2015) Determination of SUMO1 and ATP affinity for the SUMO E1 by quantitative FRET technology, *Biotechnol Bioeng*, 112:652-8.



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Ph.D.: Biomedical Engineering, Brown University

Postdoctoral Training: Nanomech LLC, University of Pittsburgh

Highlight: Hellman Family Foundation Fellow

Research Focus

Biomaterials, medical implants, and regenerative medicine

Summary

Liu Lab is interested in fundamental studies and applied research in the world of biomaterials and nanomaterials for tissue repair, drug delivery, medical implants and devices.

Selected Publications

- Cipriano AF, Sallee A, Tayoba M, Cortez-Alcaraz MC, Lin A, Guan RG, Zhao ZY, Tayoba M, Sanchez J, Liu H (2017) Cytocompatibility and early inflammatory response of human endothelial cells in direct culture with Mg-Zn-Sr alloys, *Acta Biomaterialia*, 48: 499-520.
- Zhang N, Lock J, Sallee A, and Liu H (2015) Magnetic nanocomposite hydrogel for potential cartilage tissue engineering: synthesis, characterization, and cytocompatibility with bone marrow derived mesenchymal stem cells, *ACS Applied Materials and Interfaces*, 7(37): 20987-20998, 10.1021/acsami.5b06939.

Joshua Morgan, Assistant Professor

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Postdoctoral Training: University of California, Davis, University of Delaware

Highlight: 2016 Best Mentor by Proteintech Group

Research Focus

Aging-associated disease, tissue engineering, and cell and tissue mechanotransduction

Summary

The Morgan research group fuses engineering and molecular biology techniques to better understand, slow, and reverse the aging process.

Selected Publications

- Morgan JT, Raghunathan VK, Chang Y, Murphy CJ, Russell P (2015) The intrinsic stiffness of human trabecular meshwork cells increases with senescence, *Oncotarget*, 6(17):15362-74.
- Morgan JT, Kwon HS, Wood JA, Borjesson DL, Tomarev SI, Murphy CJ, Russell P (2015) Thermally labile components of aqueous humor potently induce osteogenic potential in adipose-derived mesenchymal stem cells, *Experimental Eye Research*, 135:127-33.

Dimitrios Morikis, Professor

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Ph.D.: Physics, Northeastern University

Postdoctoral Training: University of Cailfornia, San Diego, Scripps Research Institute

Fellow: AAAS, AIMBE

Research Focus

Biocomputation, immune physics and immunoengineering, biomarker and drug discovery, structural and translational bioinformatics, and systems biology

Summary

The Morikis group uses physics and engineering methods to understand molecular mechanisms of immunology and to design new drugs for autoimmune and inflammatory diseases.

Selected Publications

- Zewde N, Gorham RD Jr, Dorado A, Morikis D (2016) Quantitative modeling of the alternative pathway of the complement system, *PLOS ONE*, 11:e0152337, 10.1371/journal.pone.0152337.
- Mohan RR, Cabrera AP, Harrison RES, Gorham RD Jr, Johnson LV, Ghosh K, Morikis D (2016) Peptide redesign for inhibition of the complement system: targeting age-related macular degeneration, *Molecular Vision*, 22:1280-1290.

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Ph.D.: Materials Science and Engineering, Ohio State University

Postdoctoral Training: The Ohio State University

Highlight: Dean's Award of Excellence in Research

Research Focus

Multi-functional scaffolding, stem cell mechanobiology, and tissue engineering

Summary

The Nam Laboratory focuses on developing enabling technologies to repair damaged tissues via stem cell/tissue engineering approaches, specifically by controlling the physical microenvironments of cells.

Selected Publications

- Horner C, Hirota K, Liu J, Maldonado M, Park BH, Nam J (2016) Magnitude-Dependent and inversely-related osteogenic/chondrogenic differentiation of human mesenchymal stem cells under dynamic compressive strain, *Journal of Tissue Engineering and Regenerative Medicine*, 10.1002/term.2332.
- Low K, Wong L, Maldonado M, Manjunath C, Horner C, Perez M, Myung VN, Nam J (2017) Physico-electrochemical characterization of pluripotent stem cells during self-renewal or differentiation by a multi-modal monitoring system, *Stem Cell Reports*, 8: 1-11.

B. Hyle Park, Associate Professor

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Ph.D.: Physics, University of California, Irvine

Postdoctoral Training: Wellman Center for Photomedicine

Highlight: Outstanding Engineering Achievement Merit Award, Engineer's Council

Research Focus

Optical coherence tomography, and neuroimaging

Summary

The Neuroscience and Optical Imaging Research (NOIR) group advances optical imaging technology for label-free characterization of biological tissue, focusing particularly on detection of neural activity.

Selected Publications

- Tong MQ, Hasan MM, Lee SS, Haque MR, Kim DH, Islam MS, Adams ME, Park BH (2017) OCT intensity and phase fluctuations correlated with activity-dependent neuronal calcium dynamics in the Drosophila CNS, *Biomedical Optics Express*, 8:726-735.
- Eberle MM, Hsu MS, Rodriguez CLR, Szu JI, Oliveira MC, Binder DK, Park BH (2015) Localization of cortical tissue optical changes during seizure activity in vivo with optical coherence tomography, *Biomedical Optics Express*, 6: 1812-1827.

Megan Peters, Assistant Professor

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Ph.D.: Computational Cognitive Neuroscience, University of California, Los Angeles

Postdoctoral Training: University of California, Los Angeles

Highlight: Organization for Human Brain Mapping Merit Abstract Award

Research Focus

Neuroimaging, computational modeling, machine learning, perception and awareness, and neural representations of uncertainty

Summary

The Neural Computation lab uses computational models, neuroimaging, and machine learning to understand how the brain processes information.

Selected Publications

- Peters MAK, Lau H (2015) Human observers have optimal introspective access to perceptual processes even for visually masked stimuli, *eLife*, 4:e09651.
- Peters MAK, Thesen T, Ko YD, Maniscalco B, Carlson C, Davidson M, Doyle W, Kuzniecky R, Devinsky O, Halgren E, Lau H (2017) Perceptual confidence neglects decision-incongruent evidence in the brain, *Nature Human Behaviour*, 1:0139.

Victor G. J. Rodgers
Inaugural Jacques S. Yeager, Sr. Professor of Bioengineering
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D.Sc.: Chemical Engineering, Washington University, St. Louis
Fellow: AAAS, AIMBE

Research Focus

Crowded protein analysis, biotransport phenomena, and membrane separations

Summary

The B2K Group blends fundamental principles of transport phenomena with experimental techniques to research and solve advanced biomedical engineering problems.

Selected Publications

- Erudaitius D, Huang A, Kazmi S, Buettner GR, Rodgers VGJ (2017) Peroxiporin expression is an important factor for cancer cell susceptibility to therapeutic H2O2: implications for pharmacological ascorbate therapy, *PLoS ONE*, 12:e0170442.
- McBride DW, Szu JI, Hale C, Hsu MS, Rodgers VGJ, Binder DK (2014) Reduction of cerebral edema following TBI using an osmotic transport device, *Journal of Neurotrauma*, 31:1948–1954.

Valentine Vullev, Professor
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Ph.D.: Chemistry, Boston University
Postdoctoral Training: Harvard University
Highlight: Regents of University of California, Faculty Development Award

Research Focus

Charge transfer, bioinspired molecular engineering, biofunctional surfaces microbial biosensing, and microfluidics

Summary

Bioinspired molecular engineering: employing ideas from biology in unorthodox manners allows us to achieve functionalities beyond what nature offers for charge transfer, photonics and electronics.

Selected Publications

- Bao D, Upadhyayula S, Larsen JM, Xia B, Georgieva B, Nuñez V, Espinoza EM, Hartman JD, Wurch M, Chang A, Lin C-K, Larkin J, Vasquez K, Beran GJO, Vullev VI (2014) Dipole-mediated rectification of intramolecular photoinduced charge separation and charge recombination, *J. Am. Chem. Soc.*, 136: 12966-12973.
- Purc A, Espinoza EM, Nazir R, Romero JJ, Skonieczny K, Jeżewski A, Larsen JM, Gryko DT, Vullev VI (2016) Gating that suppresses charge recombination the role of mono-n-arylated diketopyrrolopyrrole, *J. Am. Chem. Soc.*, 138:12826-12832.

BIG 50 FACULTY

MARLAN AND ROSEMARY BOURNS COLLEGE OF ENGINEERING

Computer Science and Engineering

Bir Bhanu, Video bioinformatics, computational biology, computational neuroscience, big data to knowledge

Tao Jiang, Bioinformatics, design and analysis of algorithms, computational molecular biology

Stefano Lonardi, Computational molecular biology, data compression, data mining, information hiding

Chemical and Environmental Engineering

Xin Ge, Therapeutic antibody engineering

Nosang Myung, Nano-devices

Ian Wheeldon, Protein engineering, synthetic biology

Ashok Mulchandani, Biosensors and biodetoxification

Sharon Walker, Biofilms, bioremediation

Jianzhong Wu, Biothermodynamics and enzymatic process

Charles Wyman, Biological conversion of abundant, non-food sources

Electrical and Computer Engineering

Bir Bhanu, Bio-Imaging, multi-modal imaging, MRI, video bioinformatics, traumatic brain injury

Elaine Haberer, Bio-templated materials for electronics

Mihri Ozkan, Integrating quantum dots with cells

Mechanical Engineering

Guillermo Aguilar, Medical lasers

Cengiz S. Ozkan, Self-assembly of structures and nanofabrication

Thomas F. Stahovich, Computational design tools

Kambiz Vafai, Microcantilever arrays for bioanalysis

Elisa Franco, Biological feedback systems

Masaru P. Rao, Novel micro/nanofabrication methods for biomedical devices

Hideaki Tsutsui, Biomedical microdevices, stem cell engineering

COLLEGE OF NATURAL AND AGRICULTURAL SCIENCES

Botany and Plant Sciences

Sean Cutler, Chemical genomics, analysis and exploitation of natural variation using small molecules

Thomas Girke, Comparative genomics, data mining, cellular network analysis

Eugene Nothnagel, Control of biosynthesis in the golgi apparatus

Molecular, Cell and Systems Biology

Sarjeet Gill, Molecular mechanisms of toxic action and xenobiotic metabolism

Manuela Martins-Green, Wound healing and tumor development

Prue Talbot, Effects of cigarette smoke on cellular processes in stem cells

Nicole I. zur Nieden, Bone development to deduce novel therapeutic targets

Chemistry

Christopher J. Bardeen, Transport processes occur in complex systems

Quan Cheng, Biosensing and imaging arrays

Michael Marsella, Synthesis of both small molecules and macromolecules

Michael Pirrung, Chemical biology, synthesis, and nucleic acids

David Bocian, Energy-transducing systems, molecular photonic devices

Cynthia K. Larive, Ligand-protein interactions, tissue-targeted metabonomics

Thomas H. Morton, Mechanisms of receptor-ligand interactions

Entomology

Michael E. Adams, Signaling in the nervous system

Richard Cardullo, Biochemical and biophysical methodologies determining molecules involved in fertilization

Mathematics

Mark Alber, Mathematical and computational biology

Physics & Astronomy

Umar Mohideen, Signal transmission in the human brain

Harry W.K. Tom, Nonlinear optics, surface science

SCHOOL OF MEDICINE

Biomedical Sciences

Devin K. Binder, Neurosurgery

Nicholas DiPatrizio, Lipid messengers

Iryna Ethell, Molecular and cellular mechanisms of synapse development and plasticity

Byron Ford, Pathophysiology of stroke and acute brain injuries

Martin I. Garcia-Castro, Neural crest cells

David Lo, Mucosal vaccines

David Johnson, Enzyme mechanism analysis

Maurizio Pellecchia, Cancer research

Seema Tiwari-Woodruff, Mechanisms of neurodegeneration and neuroprotection

COLLEGE OF HUMANITIES, ARTS, AND SOCIAL SCIENCES

Psychology

G. John Andersen, Computational models of high level visual processing

Khaleel A. Razak, Development of sensory processing

Aaron Seitz, Brain adaptations to environmental changes

REPRESENT
4
Colleges

9 INSTITUTES & CENTERS

CENTER FOR ADVANCED NEUROIMAGING (CAN)

UCR's newest center, CAN facilitates cutting-edge neuroscience and neuroengineering research. The center houses a 13-ton "3 Tesla Siemens Prisma" Magnetic Resonance Imaging (MRI) machine – a high-end, research grade system that is the first of its kind in the Inland Empire. CAN's MRI is capable of acquiring and analyzing numerous images of the brain to understand precisely how the brain works, how the brain is wired, how we see, why we can smell, and how the brain functions differently when an individual is dealing with mental illness.

CENTER FOR GLIAL-NEURONAL INTERACTIONS

The center is dedicated to providing an interactive and welcoming forum facilitating innovative collaborations between neuro- and glial-centric researchers as well as with researchers from outside the field of neuroscience. The ultimate goal is to define the multifactorial processes contributing to the health and dysfunction of the nervous system. By doing so, CGNI members are contributing to identification of risk factors for brain disease as a consequence of genetic, pathogen or environmental insults as well as to the identification of therapeutic targets in neurodevelopmental, neurocognitive and neurodegenerative diseases. In addition, the center has a goal to mentor and support a new generation of researchers able to bridge the divide between scientific fields.

CENTER FOR MOLECULAR AND TRANSLATIONAL MEDICINE

The multi-disciplinary center brings together researchers and clinicians from across the campus to help improve the health of individuals by translating basic findings into diagnostics tools to therapeutics.

CENTER FOR NANOSCALE SCIENCE AND ENGINEERING (CNSE)

The center operates two Nanofabrication Cleanroom facilities on the UCR campus. The first is a state-of-the-art Nanofabrication Research facility available 24/7 to qualified users. The 2,000 square foot facility if certified at Class 100 in the Photolithography bay, Class 1000 in the Thin/Film/Etch bay and the environment is being controlled and monitored. Our second Cleanroom is a 100/1000 space of approximately 8,000 square feet along with two small bays that are functional with the initial few tools installed.

CENTER FOR RESEARCH IN INTELLIGENT SYSTEMS (CRIS)

Established in 1998, the center promotes interdisciplinary research for developing computer systems that are flexible, adaptive and intelligent. The ultimate goal of the Center is the research and development of autonomous/semiautonomous systems with sensing capabilities that are able to communicate and interact with other intelligent (biological and artificial) systems.

HIGH-PERFORMANCE COMPUTING CENTER (HPCC)

The center provides state-of-the-art research computing infrastructure and training accessible to all UCR researchers and affiliates at low cost. This includes access to the shared HPC resources and services summarized below. The main advantage of a shared research computing environment is access to a much larger HPC infrastructure (with thousands of CPUs/GPUs and many PBs of directly attached storage) than what smaller clusters of individual research groups could afford, while also providing a long-term sustainability plan and professional systems administrative support.

INSTITUTE FOR INTEGRATIVE GENOME BIOLOGY (IIGB)

Established in 2000, the center focuses on pioneering solutions for hunger, disease and environmental sustainability. It embraces advances in genomics technologies and the current trend for increasingly multi-disciplinary research in projects exploring the development of more nutritious foods, disease- and flood-resistance crops, alternative fuel sources and new medical and pharmaceutical treatments, to name a few.

INTERDISCIPLINARY CENTER FOR QUANTITATIVE MODELING IN BIOLOGY

The center addresses challenges to bridging scales from molecular to clinical by catalyzing collaborations with clinicians. Among the challenges are multi-scale modeling of cell behavior and tissue growth in patients under stress conditions, multi-scale modeling of therapeutic interventions, and multi-scale modeling of biochemical networks personalized with omics data.

UCR STEM CELL CENTER

The mission of the Center is to advance the stem cell field by fostering basic and translational resear4ch and engaging in education and outreach. Research focuses on understanding the basic mechanisms that control stem cell function and deciphering how the tremendous potential of stem cells can be used to improve human health. Researchers at the center have expertise in many different fields including developmental biology, cancer biology, endocrinology, aging, nanotechnology, neuroscience and bioengineering. The center trains the next generation of stem cell scientists and prepares them to be leaders in the health sciences.

5 FACILITIES

Analytical Chemistry Instrumentation Facility

Housed in the Department of Chemistry, this facility consists of the Nuclear Magnetic Resonance (NMR) Facility, the Southern California Mass Spectrometry (SCMS) Facility, the Small Molecule X-ray Crystallography (SMXC) Facility and the Optical Spectroscopy (OS) Facility. The Department of Chemistry also houses a "hot-lab" for isotopic labeling.

W.M. Keck Foundation Proteomics Facility

This suite, run by Dr. Songqin Pan, is equipped with state-of-the-art mass spectrometers including oMAKDI MS/MS, Q-TOF ESI MS/MS, and LC-MALDI pep systems, and a 2D-gel system for protein separation.

UCR Nanofabrication Cleanrooms

UCR has two Nanofabrication Cleanroom facilities. The first is a Class 100/1,000 facility that is approximately 2,000 square feet and includes more than $7 million worth of equipment. The second cleanroom is also a class 100/1,000 facility that is approximately 8,000 square feet with two bays and includes significant safety and monitoring capabilities.

Institute for Integrative Genome Biology

The facility at the IIGB offers the systems and training needed to generate sharp images from the widest range of samples and staining techniques. Six different confocal microscopes cover all of the requirements for speed, sensitivity, versatility, resolution and automation. Other assets include a luminescence dark box imager, gene gun, laser-capture system, and a complete set of tissue sectioning instruments.

UCR Stem Core Facility

The UCR Stem Cell Core is a 4,000-square-foot facility of laboratory space that facilitates the development of basic and translational stem cell research by providing services and state-of-the-art equipment to stem cell researchers. The facility includes three cell culture rooms, two microscope rooms, an analytical room for molecular biology, a room for flow cytometry, two equipment rooms, three offices, and a conference room.

FACULTY

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