

Chemical Biology

Department of Chemistry
University of Illinois Urbana-Champaign



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Martin D. Burke

"Blocc chemistry" as a simple and powerful platform for making small-molecule synthesis friendly to machines, AI, and anyone; leveraging this platform with AI tools to include stereospecific Csp3 couplings and functional small molecules, including molecular prosthetics, safe antifungals, NextGen kinase inhibitors, and precision materials



Jefferson Chan

Development of chemical biology tools to study human disease states; synthesis of biomarker-responsive platforms and drugs for on-demand treatment



Hee-Sun Han

High-throughput, high-resolution omics technologies; microfluidics-based single virus genomics; imaging-based spatial transcriptomics; synthetic cell assembly; systems biology in brains and microbial populations



Paul J. Hergenrother

Use of small molecules to identify and define novel targets for the treatment of cancer and drug-resistant bacteria



Joomyung (Vicky) Jun

Developing modular chemical tools (i) to reversibly modify proteins for in vivo protein-based drug delivery; (ii) to investigate the cellular uptake mechanism of biologics; and (iii) for *in vivo* molecular imaging and new target discovery



Xiaotang Lu

Brain circuit imaging for understanding development and pathology of the central nervous system: correlated multidimensional (from nanoscale to whole brains) and multiplexed (transcriptomic and proteomic) imaging of the brain; (bio)chemical probes; tissue chemistry; imaging methods



Zaida Luthey-Schulten

Integration of experiments, theory, and simulations into whole-cell models; stochastic simulations of biological processes in minimal cells; physics of metabolism and ribosome biogenesis; dynamical networks of protein-nucleic acid interactions; statistical mechanics of the genome and DNA replication

Chemical Biology

chemistry.illinois.edu

Other faculty with interests in Chemical Biology

Raven Huang (faculty affiliate)
Structural biology

Mary L. Kraft (faculty affiliate)
Biomembrane surface science

Susan A. Martinis (faculty affiliate)
RNA-protein structure/function

Samy Meroueh (faculty affiliate)
Bioorganic and medicinal chemistry

Catherine J. Murphy
Nanobioscience

Satish K. Nair (faculty affiliate)
Structural biology

Eric Oldfield
Drug discovery and NMR/X-ray

Elena V. Romanova (research faculty)
Mass spectrometry of peptides

Stanislav Rubakhin (research faculty)
Microbioanalytical chemistry & imaging

Huimin Zhao (faculty affiliate)
Biocatalysis and synthetic biology



Anastasia C. Manesis

Bioinorganic chemistry aimed at understanding metallocofactor versatility; bioinformatic approaches for identifying novel metallocofactors within unexplored protein families; diheme enzymes for small-molecule activation; novel protein-derived cofactors



Angad P. Mehta

Key areas of focus include: (i) directed evolution and synthetic immunology to combat emerging pathogens, (ii) directed endosymbiosis (an engineered, symbiotic cell within a cell) to study organelle evolution and for synthetic biology, and (iii) synthetic biology approaches for targeting cancer



Liviu M. Mirica

Development of bifunctional therapeutic and diagnostic agents for amyloid peptide disorders such as Alzheimer's disease; study of the role of transition metal ions in neurodegenerative diseases



Lisa Olshansky

Design, preparation, and study of structurally switchable molecules, proteins, and materials, using a wide range of spectroscopic and physical methods, and application in photocatalysis, biocatalysis, solar energy conversion, and bioimaging



Mei Shen

Inflammation; immune response; Alzheimer's disease; glioblastoma; gut-brain axis; environmental toxicology; plant biology; creating nano-resolved platforms to quantify signaling molecules and proteins in single cells, at single synaptic clefts, in tissues, and in mice brains; neurotransmission



Scott K. Silverman

DNA as an enzyme



Wilfred A. van der Donk

Antibiotic biosynthesis; combinatorial chemistry of cyclic peptides; enzymology; genome mining for new natural products



Liwei Zheng

Developing chemistry and technologies that encode molecular information into DNA sequencing readouts, enabling next-generation bioanalytical technologies; single-molecule protein sequencing; aptamer structure profiling and functional engineering; single-cell and spatial metabolomics



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