

## RESEARCH CENTERS

Department of Chemistry faculty are leaders or collaborators in CMU's many research centers:

Biomolecular Design Institute

Center for Atmospheric Particle Studies

Center for Macromolecular Engineering

Center for the Mechanics and Engineering of Cellular Systems

Center for Molecular Analysis

Center for Complex Fluids Engineering



Center for Nucleic Acids Science and Technology

Center for Polymer-Based Protein Engineering

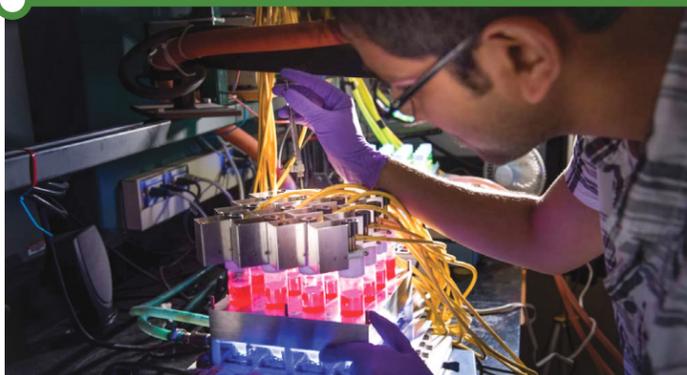
Institute for Green Science

Molecular Biosensors and Imaging Center

Pittsburgh Supercomputing Center

Scott Institute for Energy Innovation

Steinbrenner Environmental Institute for Education and Research



# Atmospheric, Green & Environmental Chemistry

# Biological Chemistry

# Catalysis & Energy

# Materials & Nanoscience

# Physical, Analytical & Theoretical Chemistry

[cmu.edu/chemistry](http://cmu.edu/chemistry)

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## CONTACT

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**Graduate Program Office**

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 @CMU\_Chem

# FACULTY RESEARCH INTERESTS



## BRUCE ARMITAGE

Professor & Co-Director,  
Center for Nucleic Acid  
Science and Technology

Bioorganic chemistry,  
fluorescent dyes, DNA  
nanotechnology, molecular  
evolution, peptide nucleic acids,  
molecular recognition  
of DNA/RNA,  
G quadruplexes



## STEFAN BERNHARD

Professor

Luminescent materials, solar  
fuels, organic photovoltaics,  
organic light emitting devices,  
circular polarized luminescence



## MARK BIER

Professor and Director,  
Center for Molecular Analysis

Mass spectrometry instrument  
development, heavy ion  
MS, superconducting tunnel  
junction MS, development of  
new ionization techniques,  
mechanospray ionization,  
biophysical chemistry,  
environmental chemistry,  
water analysis by MS



## EMILE BOMINAAR

Associate Research Professor

Electronic structure, transition-  
metal complexes, metal clusters,  
theory, computational, density  
functional theory, exchange  
interactions, hyperfine  
interactions, Mössbauer  
spectroscopy, magneto optical  
spectroscopy, magneto  
chemistry, bioinorganic  
chemistry



## MARCEL BRUCHEZ

Professor of Biological  
Sciences & Chemistry and  
Director, Molecular Biosensor  
and Imaging Center

Fluorescence, biological  
microscopy, imaging,  
light-harvesting structures,  
biosensors, single molecule  
biophysics, protein translation,  
protein folding, protein  
trafficking



## TERRENCE COLLINS

Teresa Heinz Professor in  
Green Chemistry and Director,  
Insitute for Green Science

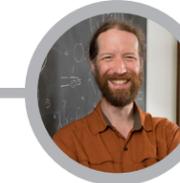
Green chemistry, green oxidation  
catalysis in water, inorganic  
chemistry, biomimetic chemistry  
of peroxidase enzymes,  
mechanisms of oxidation  
catalysis, novel approaches to  
water purification



## SUBHA DAS

Associate Professor

Organic synthesis, nucleic  
acids chemistry, RNA  
biochemistry, RNA-protein  
recognition, nanotechnology



## NEIL DONAHUE

Lord University Professor in  
Chemistry, Professor of Chem.  
Engineering and Engineering & Public  
Policy and Director, Steinbrenner  
Institute for Environmental  
Education & Research

Atmospheric chemistry, organic  
aerosol, kinetics, particle nucleation  
& microphysics, reaction dynamics,  
radical-molecule reactivity, ozonolysis,  
mass spectrometry



## ROBERTO GIL

Research Professor and  
Director, NMR Facility

Nuclear magnetic resonance  
spectroscopy, residual dipolar  
couplings, residual chemical  
shift anisotropy, anisotropic  
polymer gels, natural  
products, characterization  
of nucleic acids, peptides,  
synthetic polymers and small  
molecules in general



## YISONG (ALEX) GUO

Associate Professor

Spectroscopy, bioinorganic  
chemistry, Mössbauer and EPR  
spectroscopy, synchrotron  
radiation techniques,  
synchrotron Mössbauer,  
metalloproteins, enzyme  
mechanisms, transition  
metal complexes, electronic  
structures, density functional  
theory



## MICHAEL HENDRICH

Professor

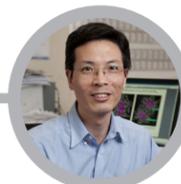
Spectroscopy, biophysical  
chemistry, enzymatic  
mechanisms, bioinorganic  
chemistry, metalloenzymes



## OLEXANDR ISAYEV

Assistant Professor

Computational chemistry,  
machine learning, deep  
learning, AI, cheminformatics,  
computational drug discovery,  
materials informatics,  
molecular design



## RONGCHAO JIN

Professor

Nanoscience, nanoparticles,  
synthesis, catalysis, optics



## ANNA KIETRYS

Assistant Professor

Chemical biology, RNA  
structure & function,  
RNA-driven cell signalling,  
epitranscriptomics, RNA ageing,  
neurodegeneration,  
RNA-protein interactions



## HYUNG KIM

Professor

Theoretical and computational  
chemistry, equilibrium and  
nonequilibrium statistical  
mechanics, computer  
simulations, chemical  
reactions and spectroscopy  
in solution, green solvents,  
supercapacitors, multi-domain  
proteins



## TOMASZ KOWALEWSKI

Professor

Physical chemistry, atomic  
force microscopy, proximal  
probe techniques, organic  
electronics, nano-structured  
materi- als, nanographene,  
self-assembly of organic  
materials, characterization  
of nanostructures, device  
fabrication and characterization



## MARIA KURNIKOVA

Associate Professor

Theory, computational  
chemistry, biophysical  
chemistry, molecular modeling,  
continuum electrostatics,  
drift-diffusion models, ion  
channels, membrane receptors,  
signal transduction, membrane  
protein structure-function  
relations, flexibility and rigidity  
in protein dynamics



## DANITH LY

Professor and Director,  
Biomolecular Design  
Institute

Bioorganic chemistry,  
chemical biology, gene  
regulation, cellular delivery,  
protein engineering,  
molecular self-assembly



## KRZYSZTOF MATYJASZEWSKI

J. C. Warner University Professor  
of Natural Sciences and Director,  
Center for Macromolecular  
Engineering and Co-Director,  
Center for Polymer-Based Protein  
Engineering

Polymer synthesis, controlled/living  
polymerization, macromolecular  
engineering, bio-related polymers,  
organic/inorganic hybrids, catalysis,  
green chemistry



## KEVIN NOONAN

Associate Professor

Alternative energy, organic  
semiconductors, fuel cells,  
gas separation, catalysis,  
synthetic chemistry, main-  
group chemistry, polymer  
synthesis, organometallic  
chemistry



## LINDA PETEANU

Professor and  
Department Head

Photophysics, laser  
spectroscopy, microscopy,  
Stark spectroscopy, conjugated  
materials, nucleic acids,  
fluorescent labels, plasmonics



## RYAN SULLIVAN

Associate Professor of  
Chemistry & Mech. Engineering  
and Associate Director,  
Institute for Green Science

Atmospheric chemistry, aerosol  
instrumentation, single-particle  
analysis, mass spectrometry, laser  
spectroscopy, heterogeneous  
chemistry, combustion, particle  
hygroscopicity, cloud nucleation,  
aerosol-cloud-climate interactions



## STEFANIE SYDLIK

Assistant Professor

Polymer science, materials  
chemistry, biomaterials,  
regenerative medicine,  
graphene oxide, functional  
graphenic materials



## NEWELL WASHBURN

Associate Professor of  
Chemistry and Biomedical  
Engineering

Biomaterials, materials  
chemistry, polymer science,  
tissue engineering



## DAVID YARON

Professor

Theory, computational  
chemistry, semi-empirical  
quantum chemistry, electronic  
structure theory, materials  
theory, photophysics,  
spectroscopy

## CARNEGIE MELLON UNIVERSITY

The only top 25 university founded in the 20th century, Carnegie Mellon University has rapidly evolved into an internationally recognized institution with a distinctive mix of world-class educational and research programs. More than 8,000 undergraduate and graduate students enjoy exceptional opportunities for innovation and interdisciplinary research toward finding meaningful solutions to significant problems of society.

## PITTSBURGH

Pittsburgh ranks in the top 10 on lists for liveability, jobs, and affordability, including ranking among the top 10 U.S. cities for millennials. The New York Times calls Pittsburgh "a tech hub." Excellence in education, healthcare, culture and environment lead to a #2 ranking in the U.S. by the Economist Intelligence Unit's report.