

CHEMICAL & BIOLOGICAL  
ENGINEERING

GRADUATE  
PROGRAMS



Chemical and Biological Engineering  
UNIVERSITY OF COLORADO **BOULDER**

**DEGREES**

- » PhD
- » Master of Science



\$160M research facility built in 2012



“ The department has many working partnerships with private, academic and government entities, which I felt would enrich my graduate research experience. Their facilities are well-equipped to perform cutting-edge research in a broad array of fields. Located at the foot of the Rockies, Boulder also allows me to pursue all of my passions in the outdoors so that I can work hard and play often in the same place. ”

- Megan English, Weimer Lab



**16th**

OVERALL RANKED  
CHEMICAL ENGINEERING  
GRADUATE PROGRAM  
(U.S. News & World Report)



- #1 Recognized Faculty (Shanghai Ranking)**
- 3 National Academy Members**
- 4 MRS Outstanding Young Investigators**
- 10 NSF CAREER Awards**
- 2 AIChE Colburn Awards**
- 1 AIChE Lifetime Achievement Award**
- 50%+ Received Teaching Awards**

**\$15,122,128**

**Average research grant  
total in last four years**



“ CU Boulder is the closest to a dream school I could think of. I love to be immersed in an academic environment where people can have a perfect leisure-to-work balance and enjoy the outdoors without sacrificing the quality of the cutting-edge research that is carried out here. It is motivating to belong to the ChBE family, and inspiring to be surrounded by successful and smart people all year long. ”

- Hector Sanchez-Moran, Kaar & Schwartz Labs

# AWARD-WINNING FACULTY

## Kristi Anseth

*Biomaterials, stem cells, regenerative medicine, drug delivery*  
Elected into the National Academy of Engineering, Science and Medicine

## Chris Bowman

*Biomaterials, photopolymerization, reaction kinetics, polymer chemistry*  
Founding director of CU's Materials Science and Engineering Program  
Polymers licensed to 3M for Filtek™ Bulk Fill Posterior Restorative

## Stephanie Bryant

*Functional tissue engineering, photopolymerization, biomaterials*  
Inducted into the American Institute for Medical and Biological Engineering

## Jennifer Cha

*Nanoengineering, biomaterials, surface science, colloids, self-assembly*  
Research featured on front cover of *Advanced Materials*

## Anushree Chatterjee

*Gene mutations, resistance-free antibiotics, metabolic engineering, biofuels*  
ACS Infectious Diseases Young Investigator Award

## Robert Davis

*Fluid mechanics, separation processes*  
Dean Emeritus of the College of Engineering and Applied Science  
Tisone Endowed Chair

## Jerome Fox

*Biocatalysis, synthetic biology, protein engineering, biofuels, molecular recognition, biological complexity*  
NSF CAREER Award, ARO Young Investigator, Army-ECASE Award

## Andrew Goodwin

*Colloid and interface science, polymer engineering, drug delivery, cancer research*  
Recipient of \$2M NIH New Innovator Award to detect disease

## Ankur Gupta

*Transport phenomena, electrokinetics, energy storage, complex fluids, soft matter*  
Hugh Hampton Young Fellow

## Ryan Hayward

*Assembly of polymer and particle-based nanostructures, mechanics and instabilities of soft active materials, active polymer materials and interfaces, self assembly of polymers and particles*  
Fellow of the American Physical Society

## Hendrik Heinz

*Simulation of biological and nanostructured materials, force field development*  
NSF CAREER Award and Max Hey Medal recipient

## Laurel Hind

*Innate immunity, microfluidic models*  
Interaction With an Endothelial Lumen Increases Neutrophil Lifetime and Motility in Response to *P aeruginosa*, *Blood*, 2018

## Adam Holewinski

*Heterogeneous catalysis and electrochemistry for sustainability*  
Catalysis work published in *Nature Chemistry*

## Christine Hrenya

*Complex fluids: gas-particle fluidization and heat transfer, flow instabilities, particle cohesion, aerosol dynamics, granular matter*  
Associate Editor of *AIChE Journal* (2015 – present), Chair of the 2016 *AIChE Annual Meeting*, 2014 *AIChE PTF Lectureship Award* in Fluidization

## Joel Kaar

*Biocatalysts, enzyme stabilization, protein-polymer materials, protein-surface interactions*  
NSF CAREER Award recipient, ARO Young Investigator

## Michael McGehee

*Perovskite solar cells and dynamic windows with adjustable tinting*  
Materials Research Society Outstanding Young Investigator

## Will Medlin

*Surface chemistry, heterogeneous catalysis, renewable energy*  
2015 *AIChE Himmelblau Award* recipient

## Charles Musgrave

*Catalysis, electrocatalysis, photocatalysis, photovoltaics, H<sub>2</sub>O splitting and CO<sub>2</sub> reduction, machine-learning, quantum simulations*  
Water-splitting and organic photocatalysis both highlighted in *Science*

## Ted Randolph

*Thermodynamics of protein solutions, lyophilization, reactions*  
Awarded \$4.4M by NIH to study aggregation of therapeutic proteins

## Dan Schwartz

*Biointerfaces, separations for energy and pharma, surface modification, catalysis/biocatalysis, single-molecule/nanoparticle studies of transport at surfaces and in porous environments*  
Elected Fellow of the ACS and APS

## C. Wyatt Shields IV

*Soft Materials, active particles, microfluidics, self-assembly, in vitro diagnostics, colloid and interface science, biosensors, drug delivery*  
Dean's Award for Excellence in Mentoring from Duke University

## Michael Shirts

*Materials modeling, molecular simulation methods, pharmaceutical design*  
ACS Young Investigator Award and NSF CAREER Award recipient

## Wilson Smith

*Electrochemical engineering, materials science, operando spectroscopy and microscopy*  
RASEI Fellow, Senior Scientist at NREL

## Kayla Sprenger

*Immune-based therapies for neurological and infectious diseases*  
Optimizing Immunization Protocols to Elicit Broadly Neutralizing Antibodies, *PNAS*

## Jeff Stansbury

*Dental and biomedical polymeric materials, photopolymerization processes*  
Awarded NIH grants to develop high performance materials for 3D printing

## Michael Toney

*Electrochemical energy storage, foundational and applied materials science of hybrid metal halide perovskite semiconductors, organic photovoltaics, clean water technologies, hydrogen storage materials*  
American Physical Society Fellow

## Al Weimer

*Particle ALD, reaction engineering, solar-thermal processing, additive manufacturing*  
2018 National Academy of Inventors

## Timothy White

*Soft matter, responsive materials, functionality in robotics, optics and biology*  
Outstanding Young Investigator – Materials Research Society, SPIE, Air Force

## Timothy Whitehead

*Designing biological macromolecules for new and enhanced functions*  
2017 PEGS Young Investigator Award



## DEPARTMENT **FACTS**

- » Two PhD programs:
  - » Chemical Engineering
  - » Biological Engineering
- » 30 tenured or tenure-track faculty
- » 167 graduate students
  - » 36% female students
  - » 22% international students
  - » 6% Black, Latina/o/x and Indigenous domestic students
  - » **All students fully supported via research funding**
  - » 43 postdoctoral fellows
  - » 739 undergraduates

## DEPT-INSPIRED **START-UPS**

- ALD Nanosolutions** | Nanocoatings | Weimer
- BaroFold** | Therapeutic protein folding | Randolph
- CPS** | Colorado Photopolymer Solutions | Bowman
- Dynamic Matter** | Bowman
- Inscripta** | Digital genome engineering
- Mosaic Biosciences** | Materials for tissue regeneration | Bowman, Anseth
- Nanoly Bioscience** | Vaccine stabilization | Anseth
- PRAAN Biosciences** | Quantum Molecular Sequencing | Chatterjee, Nagpal
- RxKinetix** | Drug delivery | Randolph
- Sundrop Fuels** | Solar gasification | Weimer
- VitriVax** | Vaccine stabilization | Randolph





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NIH  
FELLOWS

12

NSF  
FELLOWS

41

GAANN  
FELLOWS

3

NEW GAANN PROGRAMS  
ACCEPTING STUDENTS

## CAREER PREPARATION

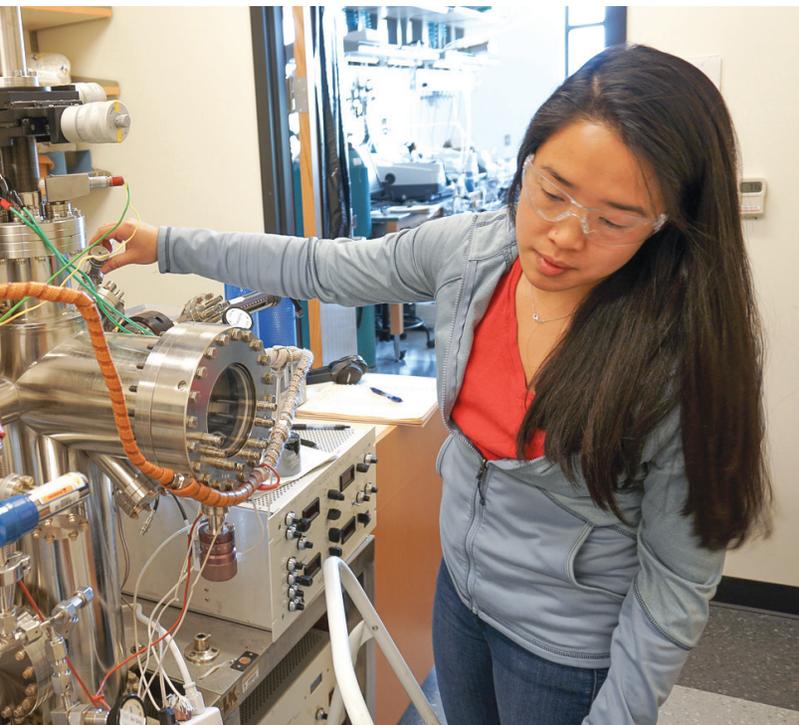
Since May 2013, there have been 83 graduates of the PhD program. Of the 81 recent survey responses, the majority (59%) is employed in industry, with 25% in academia (nine postdoc, 11 faculty) and 14% in government labs.

Many of our graduate students go on to become faculty at leading research and education institutions. Those interested in this route will be well-prepared for a career in academia.



## RESEARCH PARTNERS

- BioFrontiers Institute
- Center for Membrane Applied Science and Technology (MAST)
- Center for Pharmaceutical Biotechnology
- National Institute of Standards and Technology (NIST)
- National Renewable Energy Lab (NREL)
- Photopolymerizations Center
- Renewable & Sustainable Energy Institute (RASEI)
- Soft Materials Research Center (SMRC)





“ I did not imagine working as a grad student in the ChBE Department meant being a part of a family, but it's felt amongst the admin, faculty, students and even the cafe staff! Integrity and quality work are enforced as much as enjoying a healthy work-life balance. The department also works with you to make sure you're getting what you need every step of the way in order to not only graduate but also be prepared for what comes after. They invest in you and your success.”

-Amanda Garley, Heinz Lab



# Be Boulder

Located at the foot of the Rocky Mountains, the University of Colorado Boulder has a breathtaking view from campus. CU Boulder and its nationally and internationally recognized faculty and staff have built a global reputation for outstanding teaching, research, service and creative work across more than 150 academic fields. Together, we teach, inspire and encourage our students, faculty, staff and researchers to change the world.

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