



Center for Research in Soft matter & Polymers (CRiSP)

Graduate Research Information Session

November 19, 2020
12:00 – 1:00 PM ET





WELCOME!

UD CRiSP | Graduate Research Information Session

SCHEDULE

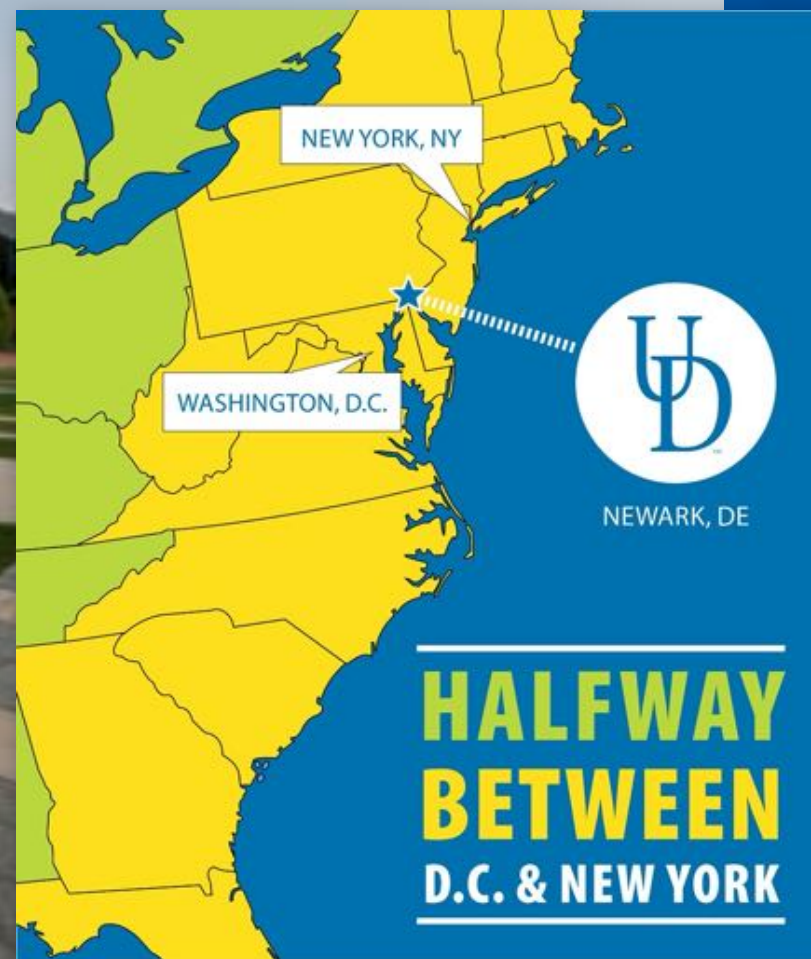
LaShanda Korley

*Professor, Materials Science & Engineering and Chemical & Biomolecular Engineering, College of Engineering
Director, CPI; Co-Director, CHARM; Assoc. Director, CRiSP*

Department Presentations

Center Overviews

Q&A with EmPOWER & MSE Grad Students





By the Numbers

- 880 graduate engineering students
- 151 tenure track faculty
- 4:1 Ph.D. student-faculty ratio
- Driver of 40% of UD's research expenditures
- 90% of UD's Core Research Facilities



TOP
50

Institutions Awarding Engineering Doctoral Degrees

Percentage of Doctoral Degrees awarded to Minorities

Doctoral Degrees to Foreign Nationals

Research Expenditure By Institutions

Source: American Society for Engineering Education. (2020).
Engineering and Engineering Technology by the Numbers 2019. Washington, DC.

*U.S. News &
World Report*



Best Grad Schools

**On-campus
& Online
Programs
Available**



RESEARCH CENTERS, INSTITUTES AND INITIATIVES

15

College of Engineering Research Centers, including:

Center for Research in Soft matter & Polymers (CRiSP)

Center for Hybrid, Active, and Responsive Materials (CHARM)

14

University of Delaware Centers, Institutes and Initiatives, including:

National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL)

Catalysis Center for Energy Innovation (CCEI)

Center for Plastics Innovation (CPI)

University of Delaware Data Science Institute (DSI)

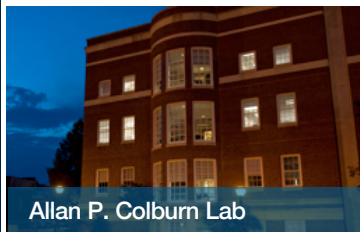


OUR ALUMNI ARE INDUSTRY LEADERS

Mechanical Engineering alumna,
Florence Li, meeting President
Obama at the Falcon 9 launch site.

*From left: Neil G. Hicks, Florence Li, Brian
Mosdell, President Obama, Leslie Woods Jr.,
and Elon Musk. Credit: Getty Images.*





Allan P. Colburn Lab



Interdisciplinary Science & Engineering (ISE) Lab



AP BioPharma



DuPont Hall



Brown Laboratory

A community of materials research resources across campus



Advanced Materials Characterization Lab (AMCL)



UD Nanofabrication Facility (UDNF)



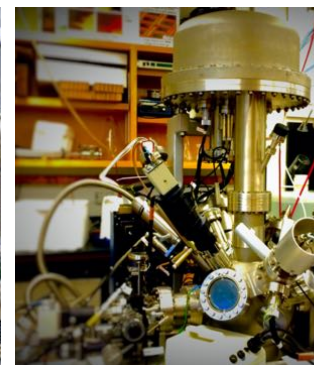
NMR Laboratory



DBI Bioimaging



Materials Growth Facility



Surface Analysis Laboratory



W.M. Keck Center for Advanced Microscopy (CAMM)



K-12 Outreach & Community Engagement



High Throughput Experimentation Facility



DEPARTMENTS

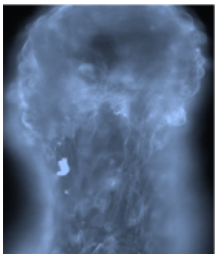
Biomedical Engineering in Soft Materials:

A growing faculty with research in high-impact biomedical applications



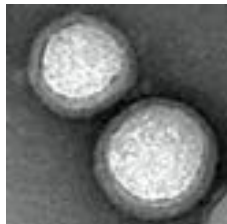
Elise Corbin

Microdevices,
dynamic in-vitro
systems,
cell engineering



Emily Day

Nanoparticles,
gene regulation,
drug delivery,
phototherapy,
biomimicry



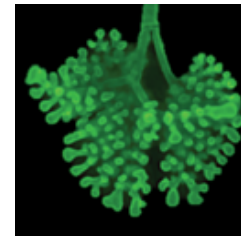
Charles Dhong

Haptics/touch devices,
mechanobiology &
microfluidics, fluid &
solid mechanics



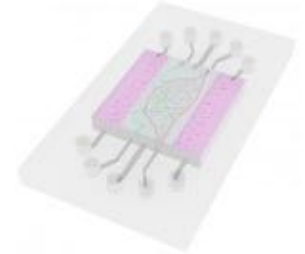
Jason Gleghorn

Microfluidics,
developmental biology,
microphysiological
systems



John Slater

Microphysiological
systems,
Cell & tissue
engineering



Important Application Information

PhD program & application information:

- <http://bme.udel.edu/graduate>
- Application Info:
 - December 15th deadline
 - Components: transcript, CV, 3 letters of recommendation, personal statement, TOEFL/IELTS
 - GRE requirement waived this year



Become our newest
“Hengineer”!

Why BME @ UD?

- Growing department (19 primary) with 4 NSF CAREER awardees and several faculty with R01-level funding
- Past and current students have won numerous awards, including the NSF GRFP, NIH F31, and DOD NDSEG graduate fellowships (+ 4 of last 7 prestigious annual George W. Laird Merit Fellowships)

Chemical & Biomolecular Engineering in Soft Materials:

Large faculty spanning innovative soft materials, (bio)polymers, and colloids research



ALEXANDRA V. BAYLES

- Ionic liquids and ionogels
- Microfluidic interferometry
- Microscopy and microrheology



WILFRED CHEN

- Synthetic biology
- Protein engineering
- Gene and drug delivery
- Cancer therapy



THOMAS H. EPPS, III

- Nanostructured and sustainable soft materials
- Polymeric materials
- Drug delivery and gene therapy



CATHERINE A. FROMEN

- Respiratory disease analytical tools and therapeutics
- Mucosal immunology



ERIC M. FURST

- Directed self-assembly
- Microrheology
- Colloidal dispersions



ARTHI JAYARAMAN

- Theory and simulations of polymers and biomaterials



APRIL M. KLOXIN

- Biomaterials
- 3D cell culture
- Drug delivery
- Tissue engineering



CHRISTOPHER J. KLOXIN

- Polymer synthesis
- Adaptable networks
- Polymer photochemistry



LASHANDA T. KORLEY

- Nature-inspired materials
- Hierarchical peptide polymer hybrids
- New fiber manufacturing
- Responsive composites



ADITYA M. KUNJAPUR

- Synthetic biology using biochemistry
- Protein engineering
- Metabolic engineering
- Genome engineering



MICHAEL E. MACKAY

- Rheology of materials
- Self assembly in thin polymer films
- Organic based solar cells



MILLCENT O. SULLIVAN

- Design of new materials for gene and drug delivery



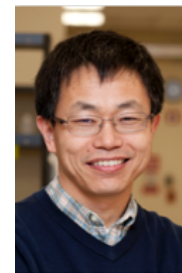
DIONISIOS G. VLACHOS

- Multiscale reaction engineering in process intensification, biomass conversion, & sustainability-driven chemistry



NORMAN J. WAGNER

- Bioinspired polymers
- Rheology/thixotropy
- Self assembly & colloidal dispersion



YUSHAN YAN

- Electrochemical energy engineering
- Design of novel catalysts & polymer electrolytes

Important Application Information

PhD program & application information:

- <https://cbe.udel.edu/graduate-programs/>
- Application info:
 - January 3rd deadline
 - Components: transcript, CV, 3 letters of recommendation, personal statement, TOEFL/IELTS
 - GRE will not be used



Why CBE @ UD?

- 28 (+3 more in 2021) full-time faculty with 5 Members of NAE, 18 Named professors, and 13 early career winners
- Graduate Program ranked 8th in the US

Materials Science & Engineering in Soft Materials:

Multidisciplinary faculty encompassing biology, chemistry, engineering, and physics



Elise Corbin

- Cell and Tissue Engineering
- Disease Modeling



Charles Dhong

- Haptics/Touch Devices
- Mechanobiology and Microfluidics
- Fluid and Solid Mechanics



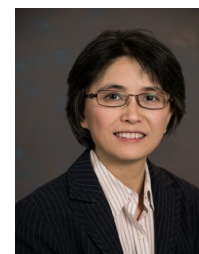
Thomas Epps

- Nanostructured and sustainable soft materials
- Polymeric materials
- Drug delivery and gene therapy



Arthi Jayaraman

- Theory and simulations of polymers and biomaterials



Xinqiao Jia

- Biomimetic materials
- Drug delivery
- Tissue engineering
- Functional biointerfaces



Laure Kayser

- Polymer synthesis
- Bioelectronics
- Conductive polymers
- Organometallic chemistry



Kristi Kllick

- Biosynthetic methods
- Biomaterials
- Drug delivery



April Kloxin

- Biomaterials
- 3D cell culture
- Drug delivery
- Tissue engineering



Christopher Kloxin

- Polymer synthesis
- Adaptable networks
- Polymer photochemistry



LaShanda Korley

- Nature-inspired materials
- Hierarchical peptide polymer hybrids
- New fiber manufacturing
- Responsive composites



Michael Mackay

- Rheology of materials
- Self assembly in thin polymer films
- Organic based solar cells



David Martin

- Low dose & voltage electron microscopy
- Conjugated polymers for interfacing
- Thin films



Darrin Pochan

- Biomaterials
- Nanocomposites
- Self-assembly



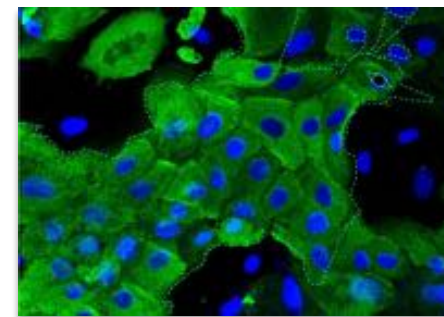
John Rabolt

- Structure/ processing
- Thin films/ self assembly
- Tissue scaffolds

Important Application Information

PhD program & application information:

- <https://mseg.udel.edu/students/graduate>
- Application Info:
 - January 7th deadline
 - Components: transcript, CV, 3 letters of recommendation, personal statement, TOEFL/IELTS
 - GRE requirement waived this year



Anitha Ravikrishnan

Why MSE @ UD?

- 27 (and growing) faculty spanning biomaterials, materials for energy, composite materials, polymer processing, electronic & photonic materials, photovoltaics, and computational materials science
- At the heart of interdisciplinary centers (CRiSP, CHARM, CPI) that unite academic, government, and industry collaborations

Chemistry & Biochemistry in Soft Materials:

Home to prestigious multidisciplinary research programs (COBRE, CBI, HTE)

- 30 Research Active Faculty
- 190+ Doctoral Students
- \$28,500/year Graduate Stipend
- Over \$10 million/year in external grants
- 3 buildings and total ~215,000 square feet of research/teaching space



Joseph Fox
Bioorthogonal
reactions, hydrogels
as biomaterials



Mary Watson
Organic synthesis,
asymmetric
catalysis, plastic
upcycling



Tatyana Polenova
Dynamics of
biopolymers in the solid
state, NMR
spectroscopy



Eric Bloch
Metal-organic
frameworks, biomass
conversion



Laure Kayser
Polymer electronics,
plastic-to-electronics
upcycling,
bioelectronics

Important Application Information

PhD program & application information:

- <https://www.chem.udel.edu/graduate/graduate-program-overview>
- Application info:
 - January 15th deadline
 - Components: transcripts, CV, 3 letters of recommendation, personal statement, TOEFL/IELTS
 - No GRE!

Why CHEM @ UD?

- 98-100% employment of our graduate students right after graduation
- Multidisciplinary research using state-of-the-art core facilities and departmental shops
- An emphasis on excellent faculty mentorship that is focused on the development and maturation of each individual student
- Opportunities to gain 'real-world' training and research experience with an eye toward long-term career development



CENTERS



CENTER FOR RESEARCH IN SOFT MATTER & POLYMERS

Collaboration & Community:

- 30+ faculty representing BME, CBE, ME, MSE, CHEM, & PHYS
- Seminars, hub for IP development

Research Thrusts:

- Sustainability | Energy
 - Renewable materials
 - Self-healing membranes
 - Coatings/mechanics
- Human Health
 - Tissue engineering
 - Drug delivery
- Protection | Personal Care
 - Composites
 - Colloids

CENTER FOR HYBRID, ACTIVE, AND RESPONSIVE MATERIALS



Collaboration & Community:

- 21+ faculty representing CBE, MSE, CHEM, & PHYS from UD, UPenn, & NIST
- Tech development, seed activities, and junior faculty growth
- Strong education & outreach framework

Research Thrusts:

- Peptide Active Materials
 - Developing nature-inspired materials
- Hybrid Quantum Materials with Emergent Terahertz Functionalities



CENTER FOR PLASTICS INNOVATION at the UNIVERSITY OF DELAWARE

Collaboration & Community:

- 16+ faculty representing CBE, ECE, CHEM, & MSE from UD, UChicago, UMass, UPenn, & ORNL
- DoE-driven effort to innovate in basic energy sciences with strong industry engagement

Research Thrusts:

- Plastics depolymerization to value-added products
- Upcycling of PPW to functional polymers
- Developing cross-cutting tools of PPW valorization



Q & A with Grad Students

Alana Szkodny and Jessica Thomas

