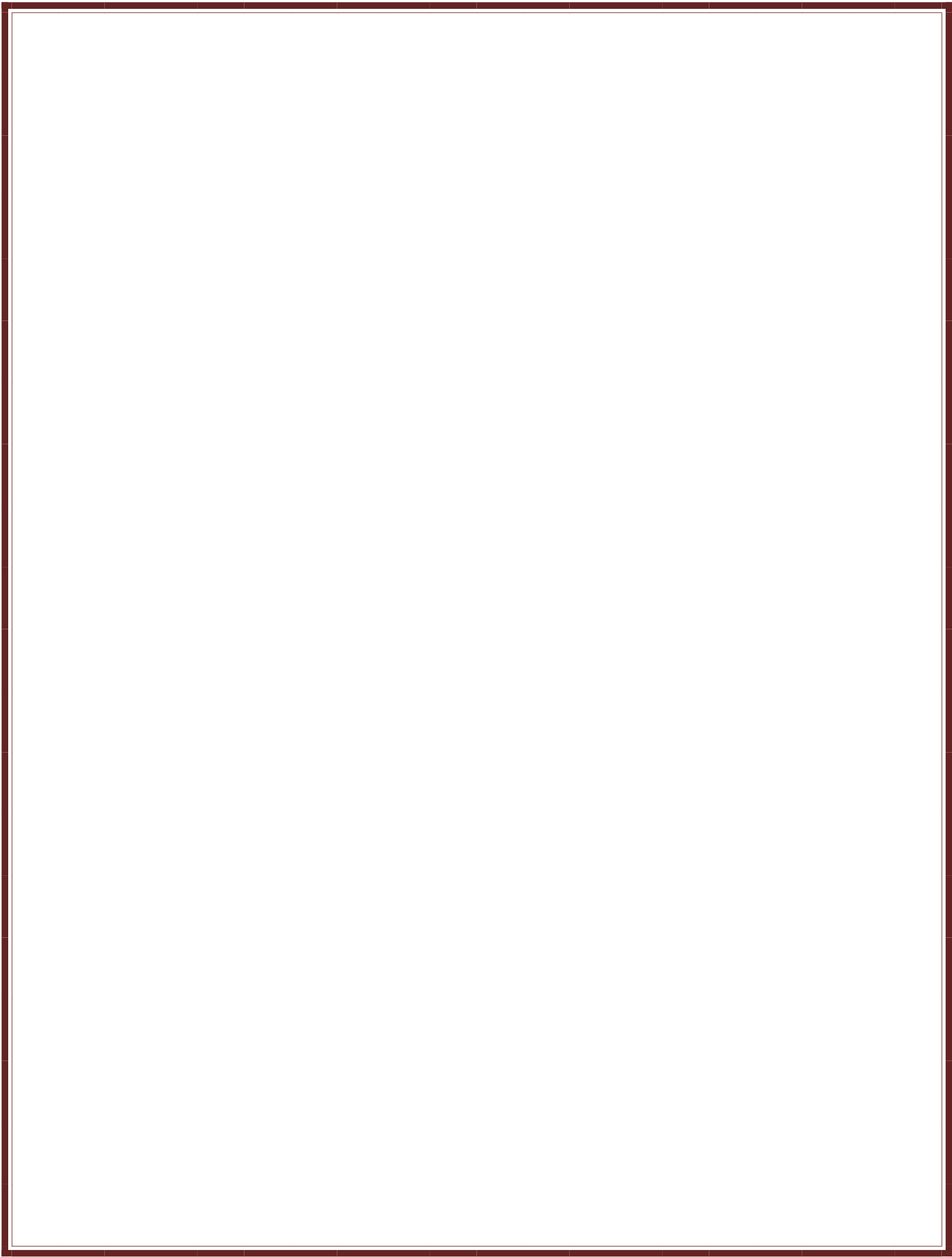


7<sup>th</sup> Chemical Engineering Graduate Student Association  
**ANNUAL RESEARCH SYMPOSIUM**

FRIDAY, MARCH 6<sup>th</sup>, 2020 | 8:00 AM-04:00 PM | MSC, TEXAS A&M UNIVERSITY





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## SPONSORS

### PLATINUM



**ARTIE MCFERRIN DEPARTMENT OF  
CHEMICAL ENGINEERING**  
TEXAS A&M UNIVERSITY

### GOLD



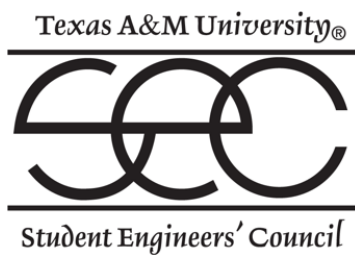
### BRONZE



**MARY KAY O'CONNOR  
PROCESS SAFETY CENTER**  
TEXAS A&M ENGINEERING EXPERIMENT STATION



TEXAS A&M UNIVERSITY  
Division of Research



## WELCOME NOTE

The organizing committee would like to welcome you to the 7<sup>th</sup> Annual Research Symposium in College Station. Through the symposium, we strive to showcase the research conducted in the department and provide students with an opportunity to present their research to industrial representatives. We gratefully acknowledge the sponsorship provided by The Artie McFerrin Department of Chemical Engineering, Shell, Ascend Performance Materials, The Association of Former Students, The Dow Chemical Company, Mary Kay O'Connor Process Safety Center, Division of Research, and Student Engineers' Council. We aspire to provide a platform for the exchange of ideas to aid in the advancement of science and technology. We wish all the participants a productive and enjoyable event.

### ADVISORY COMMITTEE

**Dr. Arul Jayaraman**

**Dr. Micah Green**

**Dr. Jodie Lutkenhaus**

### ORGANIZING COMMITTEE

**Nutan Patil**

**Naveen K. Mishra**

**Jianping Li**

**Ugochukwu (David) Okeibunor**

**Michael Bae**

**Rushant Sabnis**

**Hyojeong (Annie) Lee**

**Timothy Goyal**

**Opeyemi (Thomas) Olokede**

**Ju Hyun (Julie) Oh**

**George Koehm**

**Akshaya Kulkarni**

**Suyash Oka**

**Rahul Kakodkar**

**Rachit Gupta**

**Kasturi Sarang**

**Pallavi Kumari**

**Bhargavi Bhat**

**Parth Shah**

**Edwin Lavi**

### CONTACT US

**EMAIL:** chen-chegsa@tamu.edu

**WEBSITE:** <https://www.chegsatamu.com/>

**LINKEDIN:** Texas A&M Chemical Engineering Graduate Student Association (ChEGSA)

# SCHEDULE

TIME	EVENT				
8:00 A.M. - 8:45 A.M.	Breakfast and Registration - 2401				
8:45 - 9:00	Opening Remarks - 2400 (Dr. Yossef Elabd)				
9:00 - 9:30	Keynote Address - 2400 (Dr. Joseph Powell, Shell)				
9:30 - 9:40	Transition				
	Advanced Materials	Energy & Microelectronics	Process Engineering and Optimization	Safety and Sustainability	Bioengineering
	Track A (2404)	Track B (2405)	Track C (2500)	Track D (2502)	Track E (2504)
9:40 - 09:55	Anish Patel (A1)	Hyun-Kyu Choi (B1)	Burcu Beykal (C1)	Tsolas Spyridon (D1)	Akshi Singla (E1)
09:55 - 10:10	Kasturi Sarang (A2)	Parth Bhandakkar (B2)	Niranjan Sitapure (C2)	Gilzar Bhat (D2)	Dongheon Lee (E2)
10:10 - 10:20	Coffee break				
10:20 - 10:35	Naveen K. Mishra (A3)	Shaik Afzal (B3)	Stefanos Barastas (C3)	Harold Escobar (D3)	Rachit Gupta (E3)
10:35 - 10:50	Tzu Ling Chen (A4)	Stefany Angarita Gomez (B4)	M. Ziyen Sheriff (C4)	Xi Zhao (D4)	Opeyami Olojede (E4)
10:50 - 11:00	Transition				
11:00 - 12:00	Networking Session - 2400				
12:00 - 1:00	Lunch - 2400				
1:00 - 2:30	Poster Session - 2406				
2:30 - 2:45	Transition				
2:45 - 3:00	Rui Sun (A5)	Debopama Debnath (B5)	Jianping Li (C5)	Christopher Gordon (D5)	Keija Liu (E5)
3:00 - 3:15	Dali Huang (A6)	Jia Quan Su (B6)	Yuhe Tian (C6)	Denis Su F. (D6)	Zhi-Hua Liu (E6)
3:15 - 3:30	Break				
3:30 P.M. - 4:00 P.M.	Closing Remarks and Awards - 2400				
Energy	Advanced Materials	Bioengineering	Process Engineering and Optimization	Safety and sustainability	Microelectronics

**EXHIBITORS**  
**MSC 2400**  
**11:00 A.M. – 12:00 P.M.**

**All the booths will be located in ballroom, come see our exhibitors during the networking hour and breaks in MSC 2400!**

<b>Booth Number</b>	<b>Exhibitors</b>
<b>1</b>	<b>ASCEND</b>
<b>2</b>	<b>Shell</b>
<b>3</b>	<b>DOW</b>



## KEYNOTE ADDRESS

### Driving the Transition to a Cleaner Energy Future



*Dr. Joseph B. Powell*

**Shell Chief Scientist  
Ph.D. Chemical Engineering**

Dr. Joseph B. Powell is a Former Director and fellow of the American Institute of Chemical Engineers, and Shell's Chief Scientist - Chemical Engineering since 2006.

Over 30 years in the industry, he has led R&D programs in domains such as: new chemical processes, biofuels and enhanced oil recovery. He currently advises R&D for energy transition to a net-zero carbon economy. Dr. Powell is a co-inventor on more than 125 patent applications and has received awards from various magazines such as AIChE/ACS/R&D for Innovation, Service, and Practice. He is also the co-author of *Sustainable Development in the Process Industries: Cases and Impact* (2010).

He obtained a Ph.D. in Chemical Engineering from the University of Wisconsin-Madison (1984), following a B.S. in Chemical Engineering from the University of Virginia (1978).



## ORAL PRESENTATIONS – Morning Session

Time	Advanced Materials & Bioengineering	Energy	Process Engineering & Optimization	Process Safety	Bioengineering
	Track A MSC 2404	Track B MSC 2405	Track C MSC 2500	Track D MSC 2502	Track E MSC 2504
9:40-9:55	<b>Thermally Stable Aramid Nanofiber Separators for Energy Storage</b>  <i>Anish Patel</i>	<b>Multiscale Modeling and Multiobjective Control of Fiber Length in a Batch-type Pulp Digester</b>  <i>Hyun-Kyu Choi</i>	<b>Bi-level Mixed-Integer Optimization for Planning and Scheduling Integration using the DOMINO Framework</b>  <i>Burcu Beykal</i>	<b>Optimal Design and Operation of Resilient Water-Energy Nexus</b>  <i>Tsolas Spyridon</i>	<b>Novel Targeted Drug Delivery Technique against Multi-drug Resistant Bacteria</b>  <i>Akshi Singla</i>
9:55-10:10	<b>Two-dimensional MXene Nanosheets as Conductive Additives for Silicon Anodes in Lithium-ion Batteries</b>  <i>Kasturi Sarang</i>	<b>Enhancing Total Fracture Surface Area in Naturally Fractured Unconventional Reservoirs via Model Predictive Control</b>  <i>Parth Bhandakkar</i>	<b>Kinetic Monte Carlo Modelling of the Equilibrium-based Size Control of CsPbBr 3 Perovskite Quantum Dots</b>  <i>Niranjan Sitapure</i>	<b>Placing single metal complexes into the backbone of CO<sub>2</sub>-based Polycarbonate Chains, Construction of Nanostructures for prospective Micellar Catalysis</b>  <i>Gulzar Bhat</i>	<b>Integrative Analysis of Free Fatty Acid-Induced NFκB Activation in Macrophages</b>  <i>Dongheon Lee</i>

## ORAL PRESENTATIONS – Morning Session (Continued)

Time	Advanced Materials & Bioengineering	Energy	Process Engineering & Optimization	Process Safety	Bioengineering
	Track A MSC 2404	Track B MSC 2405	Track C MSC 2500	Track D MSC 2502	Track E MSC 2504
10:20-10:35	<b>Highly Selective Hollow Fiber Membranes for Carbon Capture via in-situ Layer-by-Layer Surface Functionalization</b>  <i>Naveen Mishra</i>	<b>Dry Reforming of Methane - Use of ALD Catalysts and Process Development</b>  <i>Shaik Afzal</i>	<b>A Novel Energy Price Predictive Framework and its Applications</b>  <i>Stefanos Barastas</i>	<b>Thermal Stability Studies using Machine Learning</b>  <i>Harold Escobar</i>	<b>Indole: Speed Limit Sign of Gut Microbiota</b>  <i>Rachit Gupta</i>
10:35-10:50	<b>Lithium Ion Transport in Poly (ionic liquid) Diblock Copolymer Electrolytes: Impact of Salt Concentration and Cation and Anion Chemistry</b>  <i>Tzu Ling Chen</i>	<b>Metadynamics Study of Lithium Electro-deposition on Lithium Metal Anodes</b>  <i>Stefany Angarita Gomez</i>	<b>A Model-based Approach to Track Process Drifts and Fouling in Heat Exchangers</b>  <i>M. Ziyen Sheriff</i>	<b>A Study of Atrium Design, Energy and Performance from Both Architectural and Engineering Perspectives</b>  <i>Xi Zhao</i>	<b>Effects of Shock Waves and Alkali Pretreatment on the Enzymatic Digestibility of Corn Stover</b>  <i>Opeyami Olokede</i>

## ORAL PRESENTATIONS - Afternoon Session

Time	Advanced Materials & Bioengineering  Track A MSC 2404	Micro-Electronics  Track B MSC 2405	Process Engineering & Optimization  Track C MSC 2500	Process Safety  Track D MSC 2502	Bioengineering  Track E MSC 2504
2:45-3:00	<b>Proton Conducting Sulfonated Poly (ionic liquid) Block Copolymers</b>  <i>Rui Sun</i>	<b>Radio Frequency Heating and Reduction of Graphene Oxide and Graphene Oxide - Polyvinyl Alcohol Composites</b>  <i>Debopama Debnath</i>	<b>Process Innovation and Intensification using Block Superstructure</b>  <i>Jianping Li</i>	<b>Data-Driven Prescriptive Maintenance Scheduling and Process Optimization</b>  <i>Christopher Gordon</i>	<b>Effects of Nutrients on Mixed-Culture Fermentation</b>  <i>Kejia Liu</i>
3:00-3:15	<b>Controlled Growth of Liquid Crystal Nanoplate under Temperature Gradients</b>  <i>Dali Huang</i>	<b>Titanium-Tungsten and Molybdenum Capping Layer Effect on Electro-migration of Plasma Etched Copper Lines</b>  <i>Jia Quan Su</i>	<b>Process Intensification Framework for Extractive Separation Systems</b>  <i>Yuhe Tian</i>	<b>Simultaneous Design and Control of a Distillation Column under Disturbance for Cost, Inherent Safety, and Controllability</b>  <i>Denis Su F.</i>	<b>Creating Lignin Valorization Pathway for the Synthesis of Polyhydroxyalkanoate (PHA)</b>  <i>Zhi-Hua Liu</i>

# POSTER SESSION

MSC 2406

01:00 P.M. – 02:30 P.M.

Poster Number	Name of Presenter	Title of Presentation
P1	Ahmed S. Badreldin	Surface Treatment Controlled Solvothermal Synthesis of Highly Active Reduced 1D Titania with Heterojunctioned Carbon Allotrope
P2	Beril Ulugun	Nanodiamond Based Ultradurable Antifouling Coatings for Industrial Applications
P3	Chikaodinaka Eneh	Fourier Transform Infrared Spectroscopy Investigation of Water Microenvironments in Polyelectrolyte Multilayers at Varying Temperatures
P4	Dustin Kenefake	Integrating Deep Learning and Explicit Model Predictive Control for Advanced Process Control
P5	Fanglue Wu	Mechanical and Electronic Properties of Diacetylene and Poly-Diacetylene Self-Assembled Monolayers on Au (111)
P6	Hyojeong (Annie) Lee	Bacterial Persistence and the Proton Motive Force
P7	Hyoungmook (Joseph) Pak	Tracking the Movement of Antibiotic Resistant Genes in Dairy Farms using Computational Fluid Dynamics
P8	Ian Echols	pH-Response of Polycation/Ti3C2Tx MXene Layer-by-Layer Assemblies for Use as Resistive Sensors
P9	Jeremy Zheng	Layer-by-Layer Polyphosphazene Coatings for Biomedical Applications
P10	Ju Hyun "Julie" Oh	Radio Frequency (RF) Heating Actuators
P11	Kevin Fuentes	Alternative Approach to Fabricating Cylindrical Microchannels for <i>in vitro</i> cell flow modeling
P12	Lacey Douglas	Mobilization of Bitumen Through Design of Superslick Surfaces and Rheological Modifications
P13	Malsha Udayakantha	Phonon Boundary Scattering as a Means of Thermal Conductivity Modulation of Oil-Well Cement
P14	Mauricio Carvajal Diaz	Towards a Better Understanding of the Nanotube Nucleation
P15	Niraj Ashutosh Vidwans	Photocatalytic Disinfection of Water using TiO <sub>2</sub> Nanowires: Case Study of <i>E. coli</i> Photocatalytic Disinfection
P16	Nutan Patil	Radio Frequency Reactors for Portable Green Chemistry
P17	Rui Sun	Alkaline Poly (ionic liquids) with Methylpyrrolidinium, Methylpiperidinium, Methylazepanium, Methylazocanium, and Methylazonanium Cations
P18	Rushant Sabnis	Modular Bifunctional Antibodies Purification
P19	Stefanos Baratsas	Towards a Novel Energy Price Predictive Framework: The Texas A&M Energy Price Index
P20	Sung Hwan Park	Understanding of in-situ Growth of MOF in a Polymer Thin Film: Polyimide/ZIF-7 Mixed-Matrix Membrane with Three Different Crystal Phases for Gas Separations
P21	Sunjeev Venkateswaran	Optimal Heating Rates in Micro-reactors for Near Isothermal Operation
P22	Tzu-Ling Chen	Poly (ionic liquid) Pentablock Terpolymer Electrolytes in Solid-State Lithium Ion Batteries





TEXAS A&M UNIVERSITY

# Artie McFerrin Department of Chemical Engineering

## RANKINGS (2020)

**#10**

Undergraduate Program  
Ranked No. 10 (Public)  
(U.S. News & World Report)

**#14**

Graduate Program  
Ranked No. 14 (Public)  
(U.S. News & World Report)

## DEGREES CONFERRED (2019)

B.S. Chemical Engineering	224
M.S. Chemical Engineering	10
M.S. Safety Engineering	6
Masters in Biotechnology	11
M.Eng. Chemical Engineering	7
Ph.D. Chemical Engineering	26

## RESEARCH EXPENDITURES

**\$15.6 MILLION** (2019)

## BY THE NUMBERS

**40** Faculty Members

**1,058** Students (Fall 19)

- **838** in Undergraduate Program
- **220** in Graduate Programs

## RESEARCH AREAS

- Biomolecular Engineering
- Process Control and Systems Engineering
- Catalysis and Reaction Engineering
- Complex Fluids, Microfluidics, Soft Matter
- Computational Chemical Engineering
- Environmental Sustainability
- Microelectronics
- Nanotechnology
- Biotechnology
- Process Safety



# It's more than a job.

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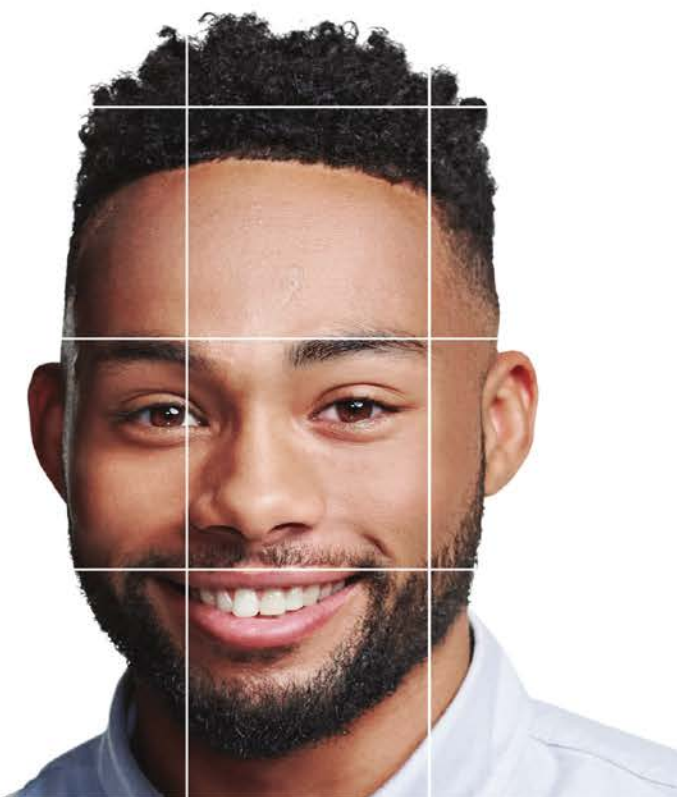
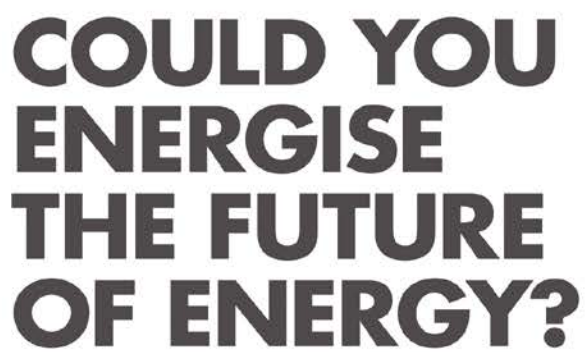
Our people don't just work, they lead. They solve problems and make things better, from interns to executives.

Through our employee-led foundation our people contribute time and money to local causes. We focus on education, hunger, housing, military support and children's health.

If you're ready to grow, learn, develop, contribute and give back, we'll be on campus for recruiting. We're looking for engineering co-ops, interns and employees ready for an opportunity.

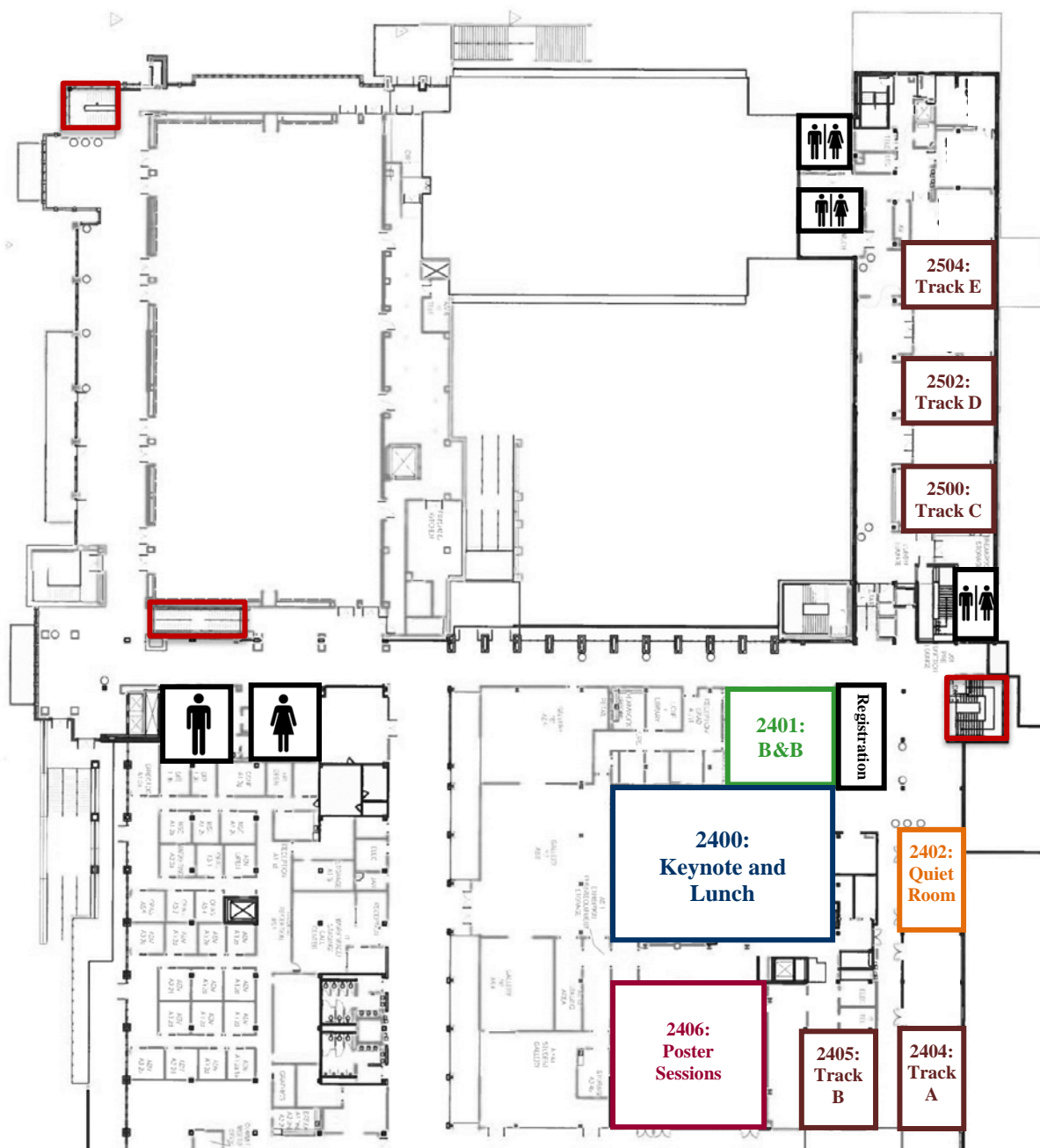
Learn more about Ascend by visiting [ascendmaterials.com/oncampus](http://ascendmaterials.com/oncampus) or our LinkedIn page.







# BUILDING LAYOUT



Memorial Student Center (MSC) 2<sup>nd</sup> Floor

**2400: Keynote Address; Networking and Lunch Reception**

**2401: Breakfast & Breaks (B&B)**

**2402: Quiet Room**

**2406: Poster Sessions**

**2404: Track A: Advanced Materials**

**2405: Track B: Energy & Microelectronics**

**2500: Track C: Process Engineering and Optimization**

**2502: Track D: Safety and Sustainability**

**2504: Track E: Bioengineering**

**Emergency Exits Marked**