



COLLEGE OF ENGINEERING

Department of **CHEMICAL & MATERIALS ENGINEERING**



CME PIPELINE // FALL 2020





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CHAIR'S MESSAGE

Greetings from Huntsville! Trust and hope that all of you are staying well and healthy during these very unprecedented and challenging times. We faced very unique challenges this year and thanks to the resilience, resourcefulness and determination of our faculty, staff and students we were able to successfully meet the academic milestones. We continued with our commitment to education as classes moved to alternative modalities (online, hybrid, and face to face). We bid a virtual goodbye to our graduates of Spring 2020! We have adapted to the challenges and remain committed to providing the best possible chemical engineering education to our students. I am very proud to share some of the recent accomplishments of our faculty. Enjoy the newsletter for our exciting news.

Sincerely,

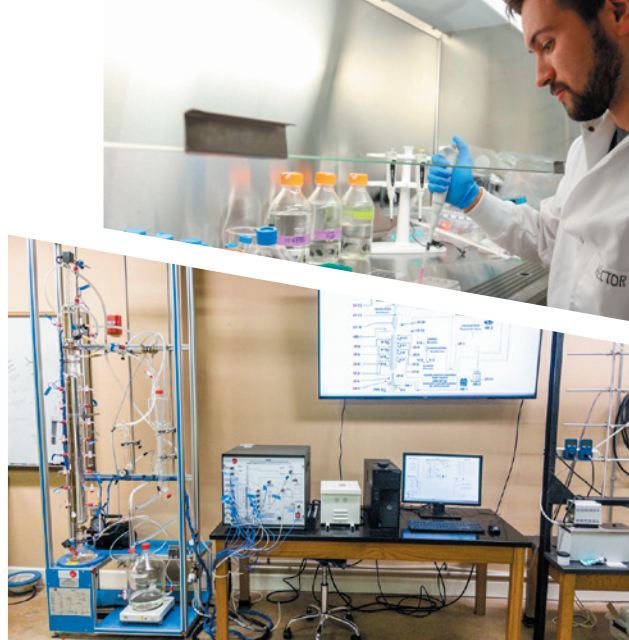
Dr. Anuradha (Anu) Subramanian
Department Chair
Chemical and Materials Engineering Department

UNIT OPERATIONS LABORATORY UPDATE

The unit operations laboratory is the fundamental laboratory course in the undergraduate curriculum and provides a vital link to reduce theory to practice. The Unit Operations Laboratory courses have been designed to include a cross-section of equipment and processes to allow the student to gain experience with some more typical operations. At UAH, we offer unit operations I and II, respectively, at the junior and senior levels. Unit Operations-I mainly focuses on understanding equipment operations common to chemical, industry, Unit Operations-II was recently restructured to focus on process development and measurements; where students learn how to design and conduct experiments in a laboratory, work effectively as a member of a team, and prepare high quality written reports and oral presentations that summarize a project in a professional and informative manner. The course places an emphasis on safety, and students understand how plant safety is integrated in data collection and laboratory experiments. The lab will continue to evolve to better match the evolving needs of chemical engineering education, incorporating new experiments and expanding and enhancing existing experiments to enrich the undergraduate learning experience.

During the last two years a concerted effort has been made to modernize some aspects of the labs. Some updates include:

- ▶ The addition of a variable frequency drive to a pump on the fluids experiment. This gives the students a better understanding for a process flow control alternative to automatic control valve. Since this alternative usually provides for finer flow control as well as substantial energy savings it is beneficial for the students to experience its use and understand how it is applied.
- ▶ The addition of a continuous distillation apparatus allowing the student to see the benefits of batch and continuous distillation; a cornerstone in chemical engineering separation processes. The old batch distillation system is



still very useful. However, the new distillation allows the student to see the benefits that a continuous system offers. This also allows the students to better correlate their classroom studies of continuous distillation systems.

- ▶ The addition of a rheometer allowing a deeper understanding of materials behavior such as bio-gels and polymer melts. Previously, the lab studied only fluid behaviors such as viscosities. Rheology helps understand the solids properties of materials such as how much can Jell-O giggle before it collapses.
- ▶ The upgrade of the process control experiment to include standard industrial controls and instrumentation. This upgrade will acquaint students with industrial grade equipment so that they can experience the relation of equipment with the control concepts taught in the CHE curriculum. This particular experiment is crucial to the success of a graduate since one of the main challenges faced by engineers is that of optimization. A fundamental understanding of controls is required to be able to use process equipment in an improved manner in order to better optimize processes.

Experiences that the students will have range from the seemingly minor to the obviously major impacts. These impacts will remain with the students throughout their careers. Lessons learned here will allow these soon to be graduate engineers to be able to make a much quicker impact on the chemical industry.

WHAT'S NEW

WITH OUR FACULTY

Dr. Anu Subramanian

DEPARTMENT CHAIR

Dr. Anu Subramanian continues to work with the grant funding received from NIH to develop translatable therapies based on low-intensity-ultrasound to develop strategies to improve outcomes upon cartilage repair.



Dr. Kyung-Ho Roh

ASSISTANT PROFESSOR

Dr. Kyung-Ho Roh, Assistant Professor has received the Faculty Early Career Development (CAREER) Award from the National Science Foundation (NSF). This is the NSF's most prestigious award "in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization." Dr. Roh received the 5-year, \$507,777 award to investigate the artificial ex-vivo model system that enables the mimicry of critical functions of the lymphoid organs such as lymph nodes. The research project is designed to develop the critical engineering platforms, to combine these individual components as an integrated system, and finally to examine the functions of the artificial lymph nodes. The resulting ex-vivo engineered system have promising potential in development of novel B-cell-based cellular immunotherapies, faster and more efficient discovery of antigen-specific antibodies, and studies for safer and cheaper vaccines and the physiology of immune-cell related cancers like lymphomas and leukemias. As educational and outreach components of this award, Dr. Roh will continue his efforts to enhance the trainings of undergraduate and graduate students for the interdisciplinary topic of "immunoengineering".

Dr. Michael Banish

ASSOCIATE PROFESSOR

Dr. Michael Banish continues his research on thermophysical property research.

Dr. Yu Lei and Dr. Moonhyung Jang

ASSOCIATE PROFESSOR

Dr. Yu Lei and Dr. Moonhyung Jang recently published a paper titled " Ultrasonic Atomization of Titanium Isopropoxide at Room Temperature for TiO₂ Atomic Layer Deposition" in Journal of Vacuum Science & Technology A, 38 (2020) 024710 and it was selected as Editor's pick <https://www.uah.edu/news/news/new-atomic-layer-deposition-process-invented-by-uah-researchers>

Dr. Isaac Torres-Díaz

ASSISTANT PROFESSOR

Dr. Isaac Torres-Díaz, Assistant Professor, is building his research lab to focus on anisotropic colloidal particles under the influence of magnetic fields. Dr. Torres-Díaz chaired two sessions at the virtual AIChE annual meeting in November 2020.

Dr. Jeffrey Weimer

ASSOCIATE PROFESSOR

Dr. Jeffrey Weimer is in charge of the UAH research and creative experience for undergraduates (RCEU) summer program.

CHEMICAL ENGINEERING

STUDENT STORIES

Mr. Meyer Gullede

a senior in our department is the recipient of an international scholarship.
<https://www.waff.com/2020/08/13/uah-student-wins-international-scholarship/>

Our student chapter of AIChE won third place at the AIChE jeopardy competition.

The undergraduate student,

KaiLian Davis

presented a poster titled "DLVO interactions of Janus Ellipsoids with Planar substrates" in the Alabama Materials Science Student Research Symposium on 01/17/2020 at the University of Alabama at Birmingham.

Bruna Mendonca

(class of 2019 and currently at BASF) published her undergraduate research project in Perpetua. "**Alginate microgels created by electrohydrodynamic jetting**" Perpetua, vol. 5 (1), 9-14 (2020).

CONGRATULATIONS!!!

GRADUATE STUDENTS

— MUNTASEER BUNIAN

Received 2020-2021 Alabama EPSCoR Graduate Research Scholars Program Fellowship.

GRADUATE DISSERTATIONS

— ZHUORAN GAN

Defended PhD dissertation – “Design and Synthesis of Pt-Zn Intermetallic Nanocatalysts for Ethane Dehydrogenation”

Committee: Drs. Yu Lei (CME), Anu Subramanian (CME), Mike Banish (CME), Judith Schneider (MAE), and George Nelson (MAE)



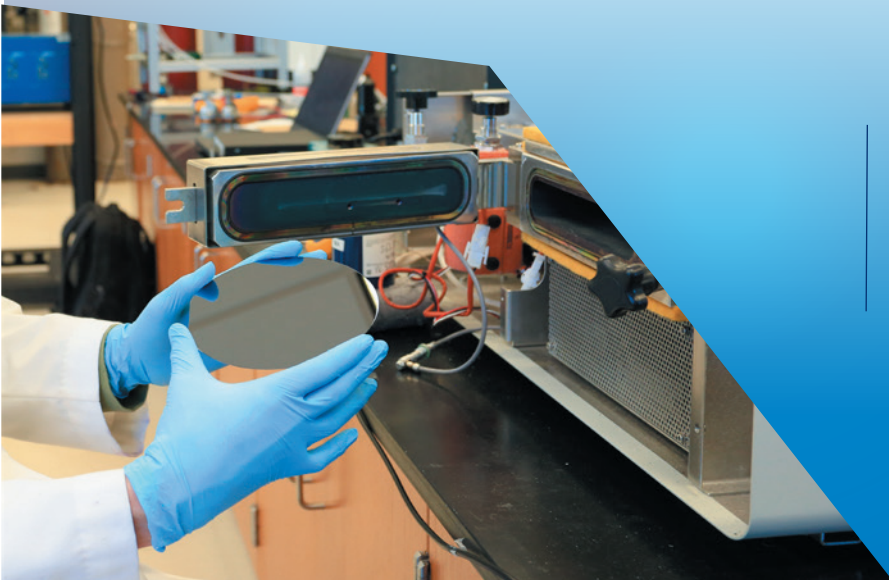
As always, do stay in touch with the department and reach out when you plan to be on campus.



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The Department of Chemical and Materials Engineering at UAH is dedicated to educate and inspire students to contribute to human society through the creation, application, and innovation of chemical and materials engineering knowledge. We do this through outstanding research, teaching, and service to our profession, our state of Alabama, the nation, and the world.