

M
NEW MEXICO TECH
SCIENCE • ENGINEERING • RESEARCH UNIVERSITY

Chemical Engineering

Annual Newsletter—Fall 2021

Message from the Outgoing Chair

Over the summer of 2020, I pushed to restart our department newsletter. We held a virtual alumni meeting in May of 2020 and there were a lot of items to update. Hopefully, we can keep people updated better by an annual newsletter moving forward.

In 2019, the department received a significant amount of funding from the legislature for research student assistantships and unit ops lab thanks to an alumnus, Jason Harper ('02). The funding for assistantships has become a recurring budget item to support multiple graduate and undergraduate students. More details follow in this newsletter.

Renovations in Jones Hall began at the end of 2019 with the plan for Chemical Engineering to take over the second floor space that has been vacated by chemistry in their move to the new Lopez building. The renovations include revamping most labs, a new ceiling, HVAC, and water system. The renovation is scheduled to be completed in

March of 2021 with move in shortly thereafter. This move will greatly increase our footprint on campus and provide much needed undergraduate and research lab space.

In 2019, the department submitted a proposal for M.S., M. Eng., and a Ph. D. degree in Chemical Engineering with Specialization/Dissertation in Surface Engineering. Over the course of the year with several delays due to COVID, the proposal is waiting the final approval from the state.

Since our last newsletter, two new faculty have been hired. Dr. Youngmin Lee was hired in 2018 to replace Paul Calvert who re-retired then. Professor Lee's expertise is in polymers. He has been teaching courses in polymers as well as process control, numerical methods, and kinetics. In 2020, Dr. Donglee Shin was hired. His expertise lies in biomimetics. In the fall of 2020, he is teaching Surfaces, Interfaces, and Colloids a course that will be a core requirement in our graduate program.

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Finally, for department changes, in August of 2020 I became the Dean of Engineering at New Mexico Tech. In doing so, I stepped down from the chair position. Dr. Michaelann Tartis then agreed to take over as department chair. She will lead the department through our move to Jones Hall as well as an ABET visit in 2 years.

— Dr. Corey Leclerc



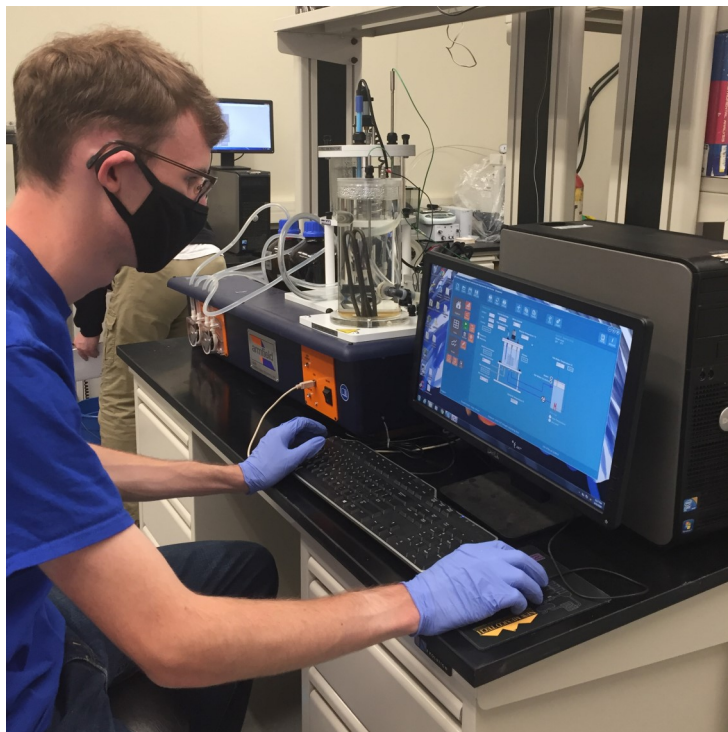
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UNIT OPS LAB

The Chemical Engineering department received an appropriation of \$200,000 from the state legislature in 2019 to upgrade equipment in our unit operations lab thanks to Jason Harper ('02).

The department upgraded in two phases starting in the fall of 2019 continuing in the summer of 2020. In the first phase, a continuous distillation column and a CSTR were purchased. The distillation column consists of a roughly 6 foot glass column with 13 trays capable of continuous operation or batch operation. The CSTR consists of a roughly 1 liter reactor capable of continuous operation with a heater for temperature control and an electrical conductivity probe. The CSTR began operation in the lab in the fall of 2019. It replaces the 10 L batch reactor that we have had for many years. The distillation column went into operation in the fall of 2020 to replace our 500 mL charge batch distillation column.

In the second phase, we have purchased a liquid-liquid extractor and a fluid mechanics apparatus. Both will be delivered during the fall semester of 2020. The liquid-liquid extractor consists of a packed column for separation. The fluid mechanics apparatus consists of flow loops that demonstrate many different concepts such as pressure drop due to roughness, pipe length, and fittings as well as laminar versus turbulent flow concepts as well as different flow meters and valves. We hope to implement these in unit ops lab during the fall of 2021.



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ChE STUDENT AWARDS



Outstanding Student Award

Aubrey Hands (2020)

Student Service Award

Alan Tirado (2020)

Aubrey Hands (2020)

Christopher Walkling (2020)

Dominick Filonowich (2020)

True Grit Award

Idalis Hernandez (2021)

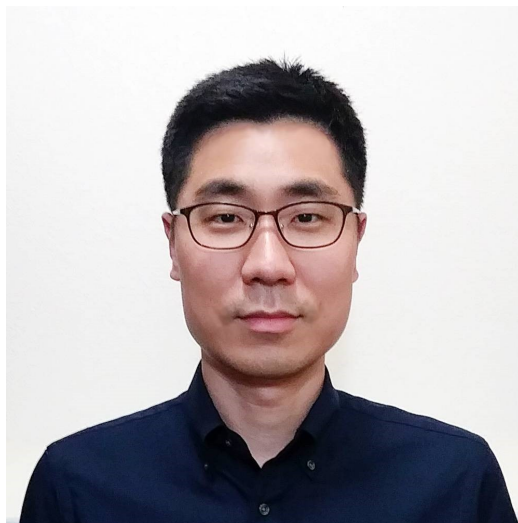
Seth Gordon (2020)

William Hale (2020)

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FACULTY SPOTLIGHT

Professor Youngmin Lee



My name is Youngmin Lee and I joined the Chemical Engineering department in August 2018. I was born in Seoul, Korea and spent my school days there. I moved to Pohang, located on the southeast coast of Korea, as I entered a college there, Pohang University of Science and Technology (POSTECH). I was one of 25 freshmen in Chemical Engineering. All of my classmates knew each other well and studied together. Due to the size, cultural climate, etc., I received a B.S. and Ph.D. from POSTECH.

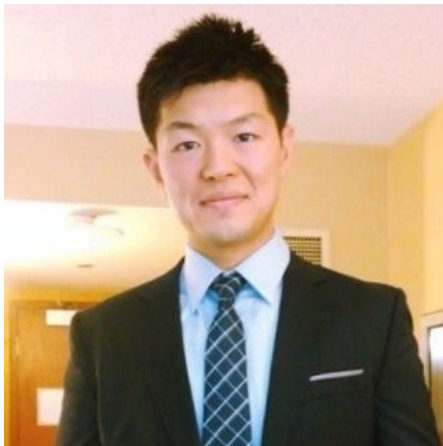
After graduation, I moved to Minnesota and worked as a postdoctoral researcher at University of Minnesota. After another postdoctoral experience at Penn State University, I joined New Mexico Tech.

In my first year, I was really impressed by engaged students and faculty members working together as one team. I am glad to be a part of this. My research has been focused on synthesis and characterization of functional polymeric materials. My on-going research topics are reversible epoxies for self-healing protective layers and deformation of conjugated polymer thin films for sensing application.

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FACULTY SPOTLIGHT

Professor Donglee Shin



Dr. Donglee Shin is an assistant professor in the Department of Chemical engineering at New Mexico Tech. Shin earned a bachelor's degree in Chemical Engineering from the University of Tennessee in 2011. He graduated from Georgia Tech with a Ph.D. in Chemical Engineering in 2017, followed by working as a postdoctoral researcher at Johns Hopkins University until 2019. He joined New Mexico Tech in 2020.

“The Chemical engineering department in NMT has been showing dynamic growth, especially the improvement of teaching and research capabilities. Also, I like the NMT research culture, which encourages open-collaboration opportunities with other institutes, departments, and programs. I believe that the collaboration opportunities over the research infrastructures from Los Alamos and Sandia National Labs and Energetic Materials Research and Technical Center (EMRTC) and Petroleum Recovery Research Center (PRRC) are exciting advantages for my independent research career.”

The ultimate goal of Shin's lab in NMT is to accomplish an enhanced understanding of the delicate interplay between the component of the colloid science and interfacial phenomena. Shin aims to comprehend and mimic the engineering principles that many plants and animals use to create critical functionality for their survival. His group develops novel fabrication processes utilizing colloid science and interfacial phenomena to create bioinspired functional materials for application in the areas of adhesion, separation, sensors, wetting, and optics.

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GRADUATING STUDENTS

Magdelyn Rich

Degree - B.S. Chemical Engineering

High School - Capitan High School, Capitan NM

Advisor - Sanchari Chowdhury

Current Research - By using a partial oxidation reaction for pyrolysis, Magdelyn hopes to produce a low oxygen content biofuel. To minimize the amount of oxygen content, she analyzes different polymers and assesses which one yields the lowest amount of oxygen. Additionally, she is looking at the possibility of extracting the biofuel from water.

Biography - Magdelyn graduated in May 2021, and is currently working at **3D Glass Solutions** in Albuquerque, NM.



Nicole Penners

Degree - B.S. Chemical Engineering

High School - La Cueva High School, Albuquerque NM

Advisor - Michaelann Tartis

Current Research - Removing or re-using conventional epoxy resin is no simple task, it forms a permanent network of structures. Nicole is currently working to create thermally reversible epoxies. To do so, she is synthesizing the polymer using rheology and observing it using infrared spectroscopy, determining the mechanical and chemical properties of the reverse reactions. Wherefore, Nicole will make a removable adhesive epoxy. She wishes to continue her research of polymers in the future.

Biography - Nicole is currently attending Grad School at the University of Alabama.



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GRADUATING STUDENTS



Aaron Plant

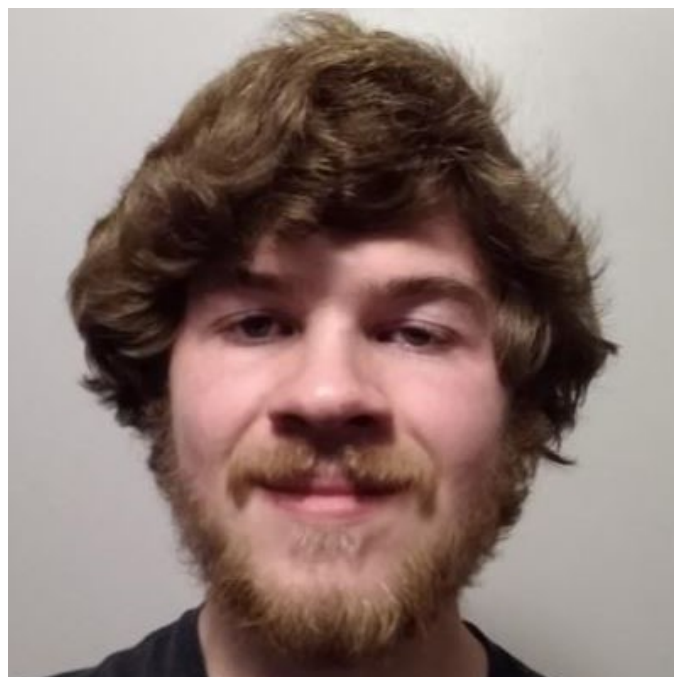
Degree - B.S Chemical Engineering

High School - Saint Pius X High School, Houston TX

Advisor - - Sanchari Chowdhury

Current Research - Aaron is analyzing the mechano-optoelectronic behavior of conjugated polymers. When polymers are mechanically deformed, its microstructures make significant changes to the material's mechano-optoelectronic properties. Additionally, he is working on fabricating PDMS substrates. After he graduates, he desires to continue his research in graduate school.

Biography - Aaron is currently pursuing a Master's in Chemical Engineering at New Mexico Tech.



Philip Mantos

Degree - B.S. Chemical Engineering

High School - Albuquerque Institute of Mathematics and Science, Albuquerque NM

Advisor - - Sanchari Chowdhury

Current Research - The conversion of greenhouse gas methane into methanol is important, as methanol can be used as liquid feedstock and fuel, easily transported and handled. That's why Philip is researching a suitable catalyst based on a transition metal phthalocyanide catalyst that can convert methane to methanol by the use of solar energy. This will make the conversion much more energetically efficient.

Biography - Philip will be pursuing a PhD program and is currently working with **Sandia National Labs**.

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GRADUATING STUDENTS

Kavon Mojtabai

Degree - B.S Chemical Engineering

High School - Belen High School, Belen NM

Advisor - Sanchari Chowdhury

Current Research - Kavon has been investigating the use of titanium nitride nanoparticles for cancer treatment. This method, photothermal therapy, utilizes the nanoparticles' ability to convert light into heat that can be used to damage tumors. However more recently, his research has broadened to the use of the nanoparticles as heat control that can be applied to reactors.

Biography - Kavon is pursuing a master's degree at NMT. After which, he plans on working in a lab specializing in nanoparticle science or characterization.



Nicholas Goodwin

Degree - B.S. Chemical Engineering

High School - Early College Academy and Rio Rancho High School

Advisor - Michaelann Tartis

Current Research - Nicholas is researching the synthesis of anti-cancer compounds for targeted drug delivery. Particularly, he is researching the properties of drug infused liposomes that can expand the life time of the medicine in the body. Thus, providing a means to treat cancers like that of the pancreas.

Biography - Ideally, Nicholas hopes to work for a pharmaceutical company, continuing to learn about up and coming medicinal compounds and is presently working at **Curia** in Albuquerque, NM.



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GRADUATING STUDENTS



Kilkee Flynn

Degree - B.S. Chemical Engineering

High School - Los Alamos High School, Los Alamos NM

Advisor - Corey Leclerc

Current Research - Similar to Nicholas, Kilkee is researching the usage of liposomes in drug delivery. However, Kilkee focuses on the characterization of their size, absorbance, and fluorescence, to determine their effectiveness.

Biography - Kilkee is currently pursuing a master's degree in biomedical school at NMT. From there, continuing onto medical school and training to be a Dermatologist or Anesthesiologist.



Sorcha Sterritt

Degree - B.S. Chemical Engineering

High School - Cibola High School, Albuquerque New Mexico

Advisor - Sanchari Chowdhury

Current Research - On the battlefield, soldiers who encounter I.E.D's commonly return home with brain injuries. Sorcha is investigating blast-induced traumatic brain injuries using bovine skin gel and polyacrylamide brain tissue models. Thus, using these models, there will be a greater understanding of how blasts affect the human brain, and how soldiers can be protected.

Biography - Whilst transitioning directly into the new Chemical Engineering M.S. program, Sorcha will begin creating her thesis under Dr. Tartis.

GRADUATING STUDENTS

Idalis Hernandez

Degree - B.S Chemical Engineering

High School - Lovington High School, Lovington NM

Advisor - Sanchari Chowdhury

Current Research - Similar to Kavon, Idalis is researching the properties of titanium nitride nanoparticles. However, his research focuses on the nanoparticles' properties and applications to microfluidic devices as opposed to the applications to cancer treatment. So far, his research has found that incorporating the nanoparticles into a silica gel preserve their optical properties and stability.

Biography - Once Idalis's master's degree has been achieved, she wishes to continue pursuing researching materials. Particularly, in a leadership role.



Chase McFarland

Degree - B.S. Biomedical Sciences

High School - Eldorado High School, Albuquerque NM

Advisor - Michaelann Tartis

Current Research - At the moment, Chase is designing and running organic reactions that modify traditional anticancer compounds. Using these reactions, he is able to create medicines which can be released directly at the tumor site via targeted ultrasound. This new method of medicating will circumvent unnecessary risks related to conventional treatment methods such as chemotherapy.

Biography - Chase plans to pursue his master's in biomedical sciences.



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GRADUATING STUDENTS



Eric Bartlett Jr.

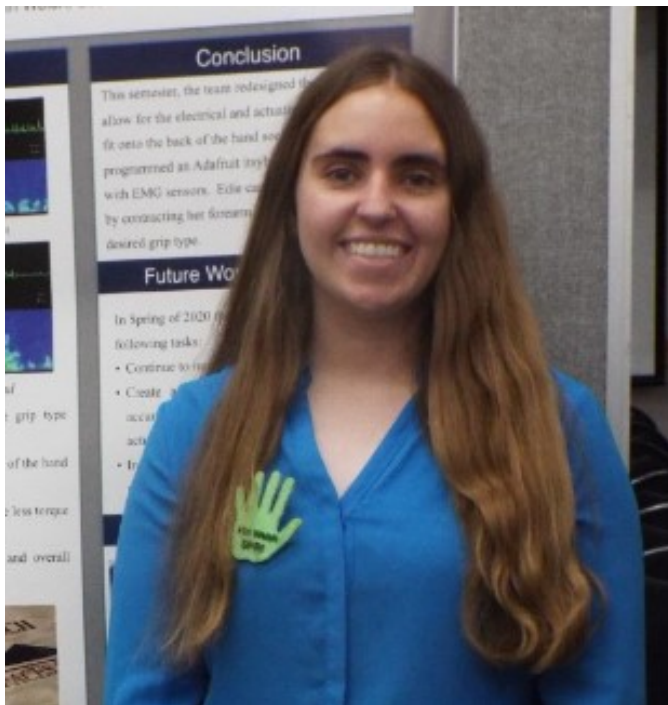
Degree - B.S. Biomedical Sciences

High School - Sandia High School, Albuquerque NM

Advisor - Michaelann Tartis

Current Research - Eric is studying the dispersion of titanium nitride nanoparticles in aqueous solutions, and characterizing their plasmonic properties. This knowledge can be used in a variety of applications and is both relatively cheap and biocompatible.

Biography - He remains undecided, but is looking into the PhD program provided by New Mexico Tech, as well as pursuing research of prosthesis and bio-mechanics as a career,



Kiri Welsh

Degree - M.S. Materials Engineering

High School - Sandia High School, Albuquerque NM

Advisor - Pabrita Choudhury

Current Research - Like Sorcha, Kiri is researching blast traumatic injuries on advanced artificial human brains. In particular, Kiri is investigating the cavitation and shear damage that may occur on impact since those effects are harder to observe on traditional brain models.

Biography - After graduation, Kiri plans to work at a biomedical company. Ideally, one that works to bridge communications between engineers and those in the medical field.

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OUR NEW DIGS

In July 2021, Chemical Engineering separated from Petroleum & Natural Gas Engineering and moved to the 2nd floor of the newly renovated Jones Building. Come and see us!



Dr. Donglee Shin teaching in Jones 227
- our new smart



The new AIChE-BrAIChE Lounge



Our new conference room with state-of-the-art OneScreen and HoverCam technology



Fall 2021



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Phone: 575.835.5442



ANNOUNCEMENTS

The New Mexico Tech Chemical Engineering department is pleased to announce the addition of their new Ph.D. and Masters program coming Spring of 2021.

The Ph.D. program with dissertation in Surface Engineering is a three to four year plan defined by the coursework and research thesis guided by faculty members.

The Masters program will focus on coursework and research thesis and can be completed in as little as 18 months.

Applicants must hold a bachelor's degree in chemical engineering or related field, have a minimum GPA of 3.00 on a 4.00 scale.

Diverse Research Areas

- Catalysis & Reaction Engineering
- Nanotechnology
- Molecular and Multi-scale modeling
- Polymer Science
- Colloidal Science and Interfacial Phenomena
- Biomedical Engineering
- Environmental Engineering
- Renewable Energy

For more information on requirements, please visit:

<https://www.nmt.edu/gradstudies/gradapp.php>

Jones Hall
main entrance



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