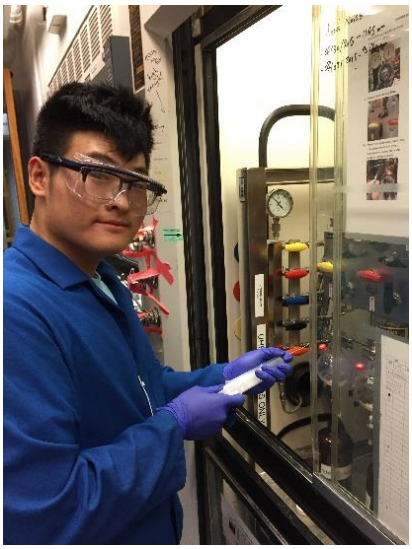

Engaging Alkenyl Triflates in Photoredox/Ni Dual Catalysis and the Haloselective Photoredox/Ni Cross-coupling of Bromo-Iodoarene
Kingson Lin (COL 2017)
Advisor: Gary Molander

Over the summer, I worked in an organic chemistry research laboratory run by Dr. Gary Molander. The group focused on the development of novel synthetic methods and their application to the synthesis of small molecules. Recently the group has pioneered Photoredox/Ni Dual catalysis as a novel mechanistic paradigm to forge Csp2-Csp3 bonds which were previously challenging to access using traditional transition metal mediated catalysis.

This advancement is significant because it allows chemists to access previously difficult or impossible to make natural and medicinal compounds in a facile manner. My specific project in the group was to determine the scope and limits of this new paradigm in terms of what substrates were viable. I synthesized a library of alkylsilicates which serve as radical precursors to engage various electrophiles. Specifically, I engaged alkenyl triflates, which are common intermediates in medicinal chemistry and total synthesis, to isolate a variety of different compounds from a different synthetic route. The project went very well initially with high yields and purity associated with isolated yields. However, when moving to more difficult systems using more reactive triflates, the reaction became harder to purify due to a variety of byproducts. I will revisit the project and finish it during the academic year.

I then investigated conditions for the selective cross coupling of bromo-iodoarenes in order to optimize conditions for regioselective alkylation at the bromine site. If successful, the possibility of doing rapid derivatization and sequential cross-coupling reactions will prove to be valuable assets to chemists. This project is currently in progress and will be continued during the academic year.

I gained valuable exposure in research and learned many new techniques over the course of the summer. The experience opened my eyes to what a career in science and research would be like. It was a great way to complete my first year of research with an intensive but gratifying summer. I look forward to continued work in Dr. Molander's laboratory in the coming year.