

NON-TECHNICAL ABSTRACT: *(State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project.)*

The conjugate addition of nucleophiles to α,β -unsaturated carbonyl compounds is one of the most efficient methods for C-C bond formation and has a wide application in organic synthesis. Although the 1,4-addition of nucleophiles to α,β -unsaturated aldehydes has only recently been addressed, there are no effective methods for catalyzing the 1,4-allylation of α,β -unsaturated aldehydes. The methodology described herein is novel and efficient in that it would allow for the 1,4-addition of the allyl indium to α,β -unsaturated aldehydes via the formation of an iminium ion.

This project would provide an environmentally friendly method towards forming C-C bonds, which usually requires rigorous reaction conditions. For this organocatalytic reaction a small organic molecule will be employed as the catalysts over an organometallic system. Organic molecules are typically non-toxic, insensitive to oxygen and moisture, and inexpensive making this strategy appealing to medicinal chemists. The responsibility of a medicinal chemist is to synthesize and test new drug products and to develop the most cost effective and environmentally friendly means of production. Organocatalytic reactions are having a powerful impact in biotechnology and this reaction would provide medicinal chemists with a safe and rapid method towards the construction of molecules used for drug testing. A demonstration of the synthetic utility of this organocatalytic reaction can be presented in the functionalization of the desired products to construct useful building blocks for the synthesis of anti-cancer kavalactones such as kavain and methysticin.