Chemistry
Friday Seminar Series

September 2, 3:40 pm
Dabney 124
Refreshments at 3:30 pm

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Alkaloid biosynthesis: examples of iron-enzyme catalyzed C-S bond and endoperoxide formation

Activation of C-H bond for C-C bond and C-X bond formation has inspired generations of synthetic organic and biosynthetic chemists. In the last decades, many precious metal-based (e.g., Ru, Rh, Ir, Pd) catalytic systems have been developed. Interestingly, in biological systems, other more readily available metals (e.g., Fe, Co, Cu) are normally used, and the reactions are accomplished under very mild conditions (room temperature and regular pressure) and in aqueous medium. In this presentation, we will discuss our recent efforts on iron-enzyme catalyzed novel transformations: oxidative C-S bond formation and the activation of molecular oxygen to form endoperoxide.

Production of high value product through synthetic biology: Natural products are still one of the major sources of human medicine. However, for many natural products, due to their complicated structures, fermentation-based production is still the most competitive approach. I will present our mechanistic studies of two unprecedented C-S bond construction reactions, and then how these mechanistic study efforts guide our efforts to achieve high yield production of two high value products (billion dollar market size) through fermentation.

Iron-enzyme catalyzed endoperoxide formation. Over the years, many peroxy-containing secondary metabolites have been isolated from plants, marine invertebrates, particularly in sponge species. Among them, artemisinin was clinically applied in antimalarial therapies, and many other organic peroxides show anti-cancer and antibacterial activities. Thus far, the only characterized enzyme for endoperoxide formation is a heme-containing prostaglandin H synthase. In this talk, I will present the first non-heme iron enzyme catalyzed endoperoxide formation reaction.

Host: Wei-Chen Chang