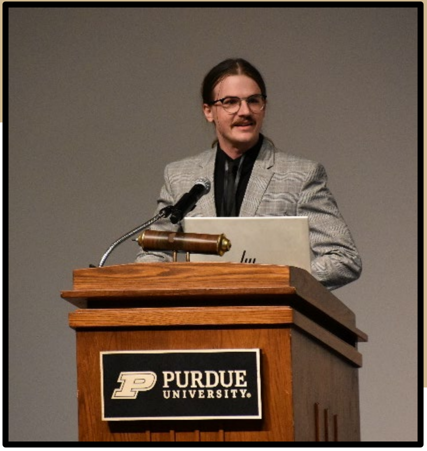
ORGANIC SEMINAR



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"TiCl4-Mediated Diastereoselective Cascade Reactions: A Comprehensive Study on Reactivity, Selectivity, and Mechanism"

The development of novel chemical reactions to access increasingly complex chemical spaces is of constant interest in modern organic chemistry. Over the years, the Ghosh group has had a particular interest in harnessing the bidentate chelating Lewis acid TiCl4 to impart diastereoselectivity and complexity to otherwise flat, simple, molecules. This chemistry has been used to synthesize a wide range of relevant molecules ranging from functionalized α-amino acids to key intermediates for the synthesis of natural products. Due to the vast capabilities of TiCl4 for efficient synthesis of complex molecules, the Ghosh lab has sought to expand on this work.

Herein, we report a comprehensive study on a wide range of novel TiCl4-promoted reactions. First, we report a tandem reaction between dihydrofuran and functionalized α-keto esters to synthesize underexplored substituted tricyclic hexahydro-2H-

benzocycloheptafurans through oxocarbenium ion intermediates. The reaction provides compounds with 3 contiguous stereocenters derived from the bidentate chelation of TiCl4 in excellent yields and diastereoselectivity. Model studies were then used to better understand the mechanism and selectivity using tethered oxocarbenium precursors. Expanding on this research further, we then studied using the same precursors to facilitate intramolecular Friedel-Crafts cyclization to synthesize substituted indane and indene derivatives with only slight modifications in reaction conditions. Lastly, we provide an improved method for Hantzsch ester transfer hydrogenation of α,β-unsaturated keto esters via Lewis acid activation.

PURDUE UNIVERSITY | James Tarpo Jr. and Margaret Tarpo Department of Chemistry

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