ORGANIC SEMINAR

Harnessing Visible-Light Catalysis for Migratory Functionalization: A Strategy for Molecular Diversification

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Abstract: Migratory functionalization has emerged as a transformative approach for the selective reorganization and rearrangement of molecular architectures, allowing for precise structural modifications via controlled functional group migration. Among these transformations, acyloxy migration plays a pivotal role in synthetic chemistry, offering an efficient means for regio- and stereoselective diversification of complex molecular frameworks. Given that many bioactive and structurally intricate molecules inherently possess hydroxyl functionalities, their conversion into esters enables participation in this class of rearrangement reactions, significantly broadening their synthetic utility.

The underlying mechanisms of acyloxy migration are diverse, encompassing transition metal catalysis, radical-mediated pathways, and acid/base-promoted processes, each of which contributes to the dynamic transposition of functional groups. This reactivity expands the synthetic toolbox for late-stage functionalization, allowing for the modification of complex structures with high selectivity and efficiency. Notably, acyloxy migration has found extensive application in carbohydrate chemistry, polycyclic scaffold modifications, and natural product derivatization, where it dictates stereo electronic effects and influences molecular reactivity.

This presentation will highlight the usage of acyloxy migration, particularly in conjunction with photoredox catalysis to functionalize complex molecular systems such as carbohydrates and simple molecular systems such as styrenes, highlighting both synthetic utility and mechanistic insights.

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