



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

Department of Chemistry

Gassman Lectureship in Chemistry

April 25 through April 28

**Lecture #1 3:45 p.m. Monday, April 25, 100 Smith Hall
(reception following 117/119 Smith Hall)**

Rapid Synthesis of Polyketides

Polyketide natural products represent an important class of secondary metabolites employed in human medicine, corresponding to 20% of the top-selling pharmaceuticals. Indeed, it has been estimated that polyketides are five times more likely to be employed as therapeutic agents than other classes of natural products. They are clinically used as antibiotics, anticancer agents, cholesterol lowering drugs, antiparasitics, antifungals, insecticides and immunosuppressants. While significant progress has been made in both synthesis and biosynthesis of this class of compounds, rapid production of new polyketides remains a significant challenge. The long-term goal of the project is to assemble a route to polyketides in one-pot using multi-component condensations enabled by unique reactivity of super sily enol ethers and super Brønsted acid catalyst, which will provide basic information for a polyketide synthesizer in the future. The objective of this particular application is to identify how the complex polyketide can be synthesized efficiently and selectively using the second generation of Mukaiyama aldol reactions.

Lecture #2: 9:45 a.m. Tuesday, April 26, 331 Smith Hall

Designer Lewis and Brønsted Acid Catalysts

Catalytic enantioselective methodology provides a powerful strategy for synthetic planning and execution. This method complements the use of chiral starting materials, chiral controller groups, or enzymatic catalysis in asymmetric synthesis. A new chiral tethered bis(8-quinolinolato) (TBOx) ligand, developed by our group is a remarkable new chiral ligand for asymmetric synthesis. The metal center of TBOxM adopts a cis-β-configuration with various metal ions. Its chromium complex catalyzed pinacol coupling and NH reactions while its aluminum complex catalyzed Michael addition, Pudovik, and Strecker reactions with selectivities that exceeded reports for all other catalysts. The versatility, ease of reaction and handling, as well as diastereo- and enantioselectivities of the process set our catalysts sharply apart from other known catalysts and processes. These outstanding successes originated from the unique stereochemical configuration of the new TBOxM which has two active coordination sites of the metal center.

Lecture #3: 9:45 a.m. Thursday, April 28, 331 Smith Hall

Asymmetric Oxidation

Modern drugs are highly functionalized molecules, and often these molecules are chiral. The most promising solution for production of these molecules has relied on an asymmetric catalytic process, especially catalytic asymmetric oxidation, which can introduce multi functional groups into the molecule. Thus, we have three sub-projects: 1) asymmetric construction of quaternary carbon using nitroso chemistry. Nitroso aldol reactions (N-NA and O-NA) were originated by our group and now used extensively by various research groups. Our objective is to create quaternary carbon centers asymmetrically by NA reaction. 2) Catalytic asymmetric nitroso hetero-Diels-Alder and related asymmetric cycloadditions is powerful method to introduce nitrogen and oxygen to the molecule. Our copper catalyst is very effective for these transformations. 3) asymmetric epoxidation: New vanadium catalyst was highly effective for asymmetric oxidation of allylic and homoallylic alcohols. The recently developed catalyst of hafnium was found to be effective asymmetric catalyst of bishomoallylic alcohols.



Professor

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Regents Professor Paul G. Gassman, internationally known in the chemical community, died in April 1993, at the age of 57. He left behind a legacy of achievement. During his career, he served as mentor and adviser to 85 doctoral and master's candidates as well as dozens of postdoctoral associates and undergraduate students. Numerous awards, honors, and honorary degrees were bestowed in recognition of his contributions to research and his service to the scientific, professional, and university communities. Some of these awards include election to the National Academy of Sciences (1989) and the American Academy of Arts and Sciences (1992), the James Flack Norris Award in Physical Organic Chemistry (1985), Arthur C. Cope Scholar Award (1986), and the National Catalyst Award of the Chemical Manufacturers Association (1990). He served as president of the American Chemical Society in 1990. He was co-chair of the organizing committees of the National Organic Symposium (1991) and the National Conferences on Undergraduate Research meeting (1992), on the University of Minnesota campus. It was his wish that a lectureship be established to bring distinguished organic chemists to the Department of Chemistry. We are proud to present this lecture series in his honor.

