הפקולטה לכימיה ע"ש שוליך
טכניון – מכון טכנולוגי לישראל
Faculty of Chemistry SCHULICH
Technion, Israel Institute of Technology

The Laboratory for Organic and Inorganic Chemistry

Final PhD Seminar

Monday, June 5th at 11:30 in Lecture Hall 1

Mr. Anthony Cohen

Marek Group

On the Topic of:

Remote Functionalization of Stereodefined Substituted Cyclopropanes towards Synthetically Useful Acyclic Fragments

Technion City, Haifa 3200003, Israel
קריית הטכניון, חיפה 3200003

Remote Functionalization of Stereodefined Substituted Cyclopropanes towards Synthetically Useful Acyclic Fragments

Despite the ever-expanding plethora of methods allowing chemists to meet synthetic challenges, the rapid, efficient, and complete stereochemical control of remote stereocenters in acyclic systems is still an ongoing challenge. The flexibility of linear hydrocarbon chains associated with the multiple conformers that the molecular backbone can adopt represent one of the major difficulties for the control of stereochemistry of distant stereocenters. As the ability to use an existing stereocenter as directing or discriminating handles to generate the remote new stereocenter in acyclic system is becoming less prominent, alternative strategies must be developed.

Recent developments in the stereoselective synthesis of polysubstituted cyclopropanes allowed chemists to easily access these strained rings with high stereoselectivity. Further development of efficient and reliable protocols for the selective carbon–carbon bond cleavage of these strained rings has enabled a new strategy for the synthesis of challenging stereodefined acyclic molecules.

In my Ph.D. work, we have opted to merge this approach with the concept of remote functionalization in order to achieve complex stereodefined acyclic scaffolds. Remote functionalization consists of indirect activation of a site distant from the initial functional group. We envisaged that a transition metal “chain walking” initiated at a remote site would lead to sequence of chemical transformations, resulting in the cleavage of the cyclopropane ring and a concomitant termination reaction at a remote event.

The implantation of the Heck reaction for this purpose revealed particularly beneficial, leading to the establishment of new routes for the synthesis of terpenoids such as α-tocopherol and densely substituted lactones. Subsequent mechanistic investigations shed light onto the remarkable observed selectivity of the transformation.