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Department of Chemistry
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Department of Chemistry - Research Seminar Series

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Syntheses of Chiral Fluorinated Molecules Featuring Multiple Stereocenters

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Syntheses of Chiral Fluorinated Molecules Featuring Multiple Stereocenters

by

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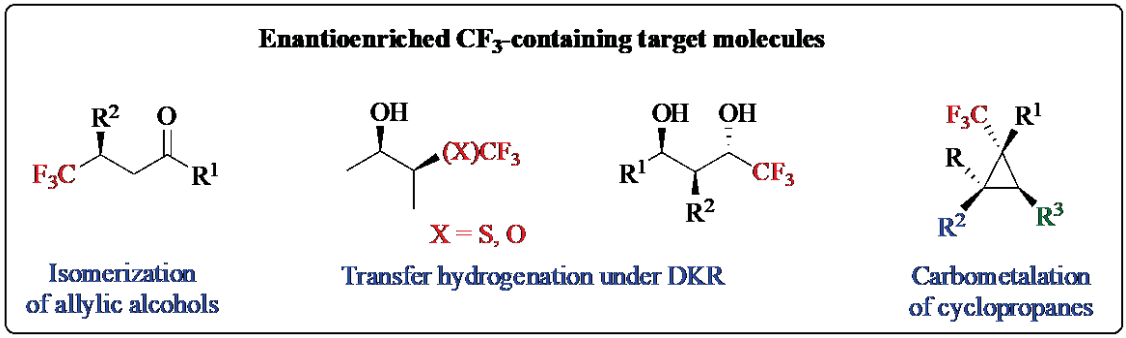
A decade ago, we embarked on the asymmetric construction of chiral carbon atoms featuring the trifluoromethylated motif through original approaches. Initial work on the isomerization of allylic alcohols furnished a protocole to prepare β-CF_3 carbonyl compounds with a complete stereospecificity (Fig. 1 left) [1]. In this work, we demonstrated for the first time a suprafacial enantiospecific 1,3-hydrogen atom transfer. Next, we studied various asymmetric transfer hydrogenations leading to simultaneous construction of up to three contiguous stereogenic centers under single or double dynamic kinetic resolution (DKR). Previously inaccessible chiral fluorinated alcohols were obtained by this method with very high enantioselectivities (Fig. 1 center) [2]. Very recently, we developed a regio- and diastereoselective carbometalation of CF_3-substituted cyclopropenes in which the CF_3 group acts as a directing group in the carbometallation step. This simple strategy allows the preparation of polysubstituted (up to penta-) cyclopropyl rings possessing two adjacent quaternary carbon stereocenters with excellent diastereoselectivities (Fig. 1 right) [3]. The enantioselective version was also investigated.

Figure 1. Approaches toward enantioenriched CF_3-containing molecules.



All these reactions will be presented in the seminar with emphasis to the most recent ones.

References

[1] (a) V. Bizet, X. Pannecoucke, J. L. Renaud, D. Cahard. *Angew. Chem. Int. Ed*., **2012**, *51*, 6467–6470; (b) V. Bizet, X. Pannecoucke, J. L. Renaud, D. Cahard. *Adv. Synth. Catal*., **2013**, *355*, 1394–1402.

[2] (a) A. E. Cotman, D. Cahard, B. Mohar. *Angew. Chem. Int. Ed.,* **2016**, *55*, 5294 –5298; (b) A. E. Cotman, P. A. Dub, M. Sterle, M. Lozinšek, J. Dernovšek, Ž. Zajec, T. Tomašič, D. Cahard. *ACS Org. Inorg. Au*, **2022**, *2*, 396-404.

[3] V. Myronova, D. Cahard, I. Marek. *Org. Lett*., **2022**, *24*, 9076–9080.