Poject 2.13. Regio- and stereocontrolled synthesis of olefins substituted with fluoromethyl groups

Supervisor: dr hab. Wojciech Chaładaj

Institute: Institute of Organic Chemistry PAS

Unit: Group VI

WWW: www.icho.edu.pl/chaladaj

Description:
- implementation of the entrusted research tasks (including optimization, testing the scope and mechanistic investigations)
- spectroscopic analysis of the obtained compounds
- systematic literature studies
- preparing material for publication and / or presentation

Aim:
The introduction of fluorine atoms or fluorinated groups into the structure of organic compounds exerts significant impact on their chemical, physical and biological properties. Therefor such compounds found numerous applications in medical chemistry, agrochemistry, material sciences and other fields of science. One of the most direct methods of the synthesis of fluoroalkyl-substituted olefins is based on the addition of fluorinated groups to alkynes (readily available starting materials) with concomitant introduction of an additional functional group. Theoretically, such reaction could lead to four isomeric, differing in the arrangement of substituents around the C-C double bond. However, control of such process providing selective access to each of them is difficult, and some isomers are still unreachable in this way. The main goal of this project is to develop a set of synthetic methodologies that provide direct access (starting from an alkyne) to each and every isomer of the alkenes substituted with CF_3 or CF_2H groups. A conceptually new approach will be employed, involving the addition of organometallic compounds to alkynes (providing control of the regio- and stereoselectivity), followed by the introduction of CF_3 or CF_2H groups by means of carbon-metal bond functionalization. Another strategy envisioned within the project is based on the reaction of fluorinated organometallic compounds with alkynes.

Requirements:
- Master's degree in chemistry
- Good knowledge of organic chemistry, transition metal catalysis or organometallic chemistry
- Commitment, capacity for team work, and critical thinking
- Communicative in English (to the extent necessary for independent scientific work)