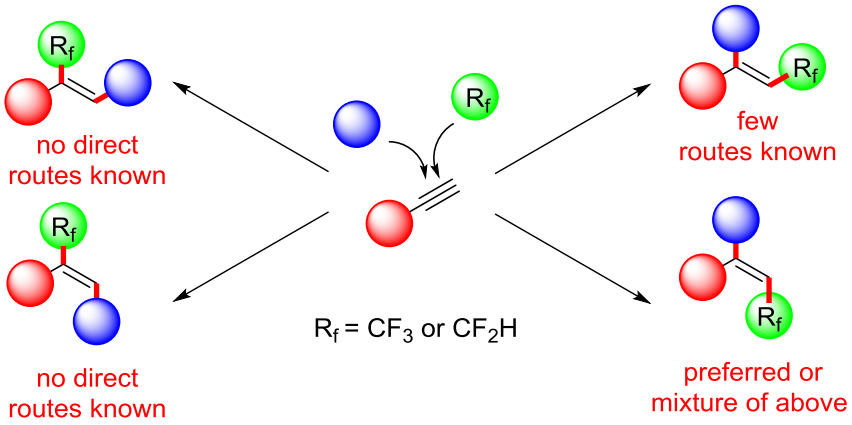
The incorporation of fluorine atoms or fluorinated groups into the structure of organic molecules severely alters their chemical, physical, and biological properties. Such compounds have found many applications in medicinal chemistry (>20% of drugs, including top sellers), agrochemistry (>30% of crop protection chemicals), materials science, and other fields. This is a striking contrast with only about 30 naturally occurring compounds containing carbon-fluorine bonds (e.g. fluoroacetic acid found in *Dichapetalum cymosum*). Therefore, there is a great need for the development of efficient and reliable methods for the synthesis of selectively fluorinated organic scaffolds. Over the last years, research focused on the synthesis of such compounds has gained considerable momentum. For instance, many methods for the synthesis of target molecules possessing a C-C double bond (called olefins or alkenes) with CF_3 or CF_2H groups attached have been put forth. One of the most straightforward, and thus attractive protocols, is based on the addition of a fluorinated moiety (green) to the C-C triple bond of an alkyne, a readily accessible feedstock material, with concomitant introduction of other functionalities (blue). However, four products of such a reaction, differing in the arrangement of substituents around the C-C double bond, could be formed in theory. Control of the outcome of the process to provide selective access to each one of them is difficult, and some of them are still unreachable in this manner. The main objective of this project is to address these challenges. A conceptually new approach, encompassing the addition of organometallics (compounds containing or a carbon-metal bond) or related compounds to the alkyne, followed by the installation of CF_3 or CF_2H groups, will be utilized. Another strategy to be studied within the project is based on the reaction of fluorinated organometallics with alkynes.



The developed toolbox of synthetic methods would provide direct entry from alkynes to every possible form of alkenes bearing CF_3 or CF_2H groups, compounds of potentially vital importance for many branches of chemistry, including medicinal chemistry and materials science.