Organic molecules bearing fluorine atoms or fluorinated groups feature a range of unique chemical, physical, and biological properties, hardly accessible for their non-fluorinated analogues. It is reflected in multiple applications in material sciences, agrochemistry (>30% of crop protection chemicals), and medicinal chemistry (>20% of drugs, including top sellers), among others. It sharply contrasts with less than 30 naturally occurring compounds having a carbon-fluorine bond. Therefore, due to great demand, research focused on the synthesis of selectively fluorinated organic molecules has recently gained considerable momentum. One of the most straightforward, and thus attractive protocols, is based on the direct installation of a fluorinated moiety on the scaffold of the desired compound. Many methods applicable for the functionalization of simple alkenes, alkynes, aromatic and carbonyl compounds were reported. Of particular interest are so-called cascade processes composed of several reactions proceeding sequentially in one pot. Such an approach enables the introduction of multiple groups in one synthetic step.

This project aims at the development of the family of cascade reactions for the concomitant introduction of the fluorinated group along with other functionality into the structure of enone (ketone bearing adjacent C-C double bond). This class or reactions of enones is severely underexplored. The developed toolbox of synthetic methods would provide entry to a range of compounds of potentially vital importance for many branches of chemistry, including medicinal chemistry and material sciences.