

Imagine well-established organic reactions proceeding according to novel reaction pathways. Imagine a diversity of new building blocks easily accessible via such an approach. Imagine novel cascade reactivities offered by the initially formed products. The proposed project seeks to open a new research front within the field of asymmetric organocatalysis and redefine the synthetic potential of fundamental organic transformations such as Michael addition, Morita-Baylis-Hillman reaction, sigmatropic rearrangement, Rauhut–Currier reaction or electrocyclic reactions. In the studies challenging substrates such as functional-group-activated (FGA) polyenes will be used and their novel reactions studied with the aim to address issues related to their site- and stereoselectivities. The project goal is the development of an innovative toolbox that can help to face these important challenges of a contemporary organic chemistry. Two different approaches to solve these problems are proposed and will be studied. The first one relies on the introduction of a novel group of catalysts. In the second one the site-selectivity of the reaction will be controlled by the specific directing groups while its stereoselectivity by a chiral catalyst. Notably, the introduction of innovative catalytic and stereoselective solutions to efficiently promote organic reactions offering access to novel reaction pathways fulfills the requirements of “green chemistry” and is in accordance with the European strategy concerning Sustainable Chemistry. Therefore, this research project aims at challenging the current approach to stereoselective reactions of FGA-polyenes by providing a toolbox that can help to control site-selectivity and stereoselectivities of their transformations, thereby changing a general thinking about selected classical reactions of organic compounds.