The quality of life in modern society, as well as further advancement of our civilization, largely depends on the progress achieved in synthetic organic chemistry. Our ability to synthesise complex substances of desired biological or physicochemical properties has increased dramatically over the past few decades. This advancement is inherently associated with development of new efficient and environmentally friendly methods of preparing particular classes of organic compounds. One such class is allenes, which are compounds of peculiar structure, for many years regarded only as chemical curiosities. Over the years, several natural products containing allene structural motif in their molecules have been identified. Moreover, owing to their high and diverse chemical reactivity, allenes have become versatile chemical intermediates utilized on the way to various complex organic compounds that are not allenes by themselves.

The above considerations inspired development of a completely new concept of allene synthesis. Its successful realization will enable construction of allenes from simple fragments in a straightforward manner, with creation of both double bonds of allene system in one synthetic operation. Within the project, sulfone substrates of diverse substitution pattern will be subjected to the newly developed reaction to form allenes with up to four different substituents. The new reaction will be based on organic sulphur chemistry, which means no toxic intermediates or by-products. It will not use transition metal catalysts, which are often toxic and difficult to remove from the target product of synthesis.

A peculiar feature of the allene structure is chirality of sufficiently complex allenes, that is existence of their molecules in two forms that are mirror images of each other (enantiomers). As all living organisms and their chemical processes are chiral, therefore a crucial aim of organic synthesis is to enable preparation of each of the enantiomeric forms of a biologically active compound selectively, as they differ in their activity. The possibility of preparing one, desired enantiomer of allene is inherently embedded in the method developed in the project. The chiral allenes thus obtained may be used as synthetic intermediates during preparation of drugs and natural products, as they will transfer their chirality to the target compounds.