The progressing globalisation process and the development of mass culture have left their mark on the consumer behaviour of modern society. The current consumption model is not only geared to satisfying basic human needs but significantly exceeds the actual requirements of the social unit. Striving to improve the quality of life usually does not blend with caring for nature, on which life on Earth depends. Therefore, initiating actions aimed at reducing the negative impact of consumerism on the environment is one way of solving the problem. It is not without reason that the scientific term 'catalyst' is more and more widely known in society, given the broad range of materials named this way, as well as their everyday use. Among them, a group of aluminosilicate minerals is on the leading edge. They are primarily used in the most important industrial sector, i.e. in petrochemistry; in other words, they are implemented in hydrocarbon transformation reactions. The deployment of aluminosilicates in the process mentioned above is undoubtedly due to their properties, e.g. the pore arrangement, molecular selectivity, thermal stability, strength of acid sites, and most importantly low production costs being crucial for industrial applications. Despite the unique advantages of zeolites, in catalytic reactions involving both hydrocarbons and alcohols, the functionality of this group of materials is limited due to the carbon deposit (coke) formation. Its presence leads to clogging of zeolite micropores, inhibiting the diffusion of reagents and products both to and from active sites, to finally contribute to their poisoning. Only a comprehensive approach to the ongoing deactivation process will allow us to recognise the correlation between the coke formation process and the parameters of the catalyst and the unwrap the deactivation mechanism. Specialised knowledge obtained in the course of research will be crucial to the design of zeolite catalysts with the intended performance and lifetime.

The extraction of highly specific information from performed analyses will be possible thanks to the use of sophisticated research equipment, based primarily on the FT-IR, UV-Vis and Raman spectroscopies. Determining the structural, textural and acidic properties of the catalyst provides a prelude to studies devoted to its deactivation in the hydrocarbon and alcohols transformation process. The next stage of work based on *in situ* and *operando* studies of FT-IR, UV-Vis and Raman spectroscopies will allow to track the process of coke formation directly during the reaction, as well as assess the nature of the interaction between the catalyst surface and carbon deposit. It will be possible thanks to 2D COS (two-dimensional correlation spectroscopy) analysis, which reveals the smallest changes occurring in the set of spectra during the process of coke formation. Therefore, it is highly probable to determine the sequence of events occurring during the deposition of coke precursors. Besides, spectroscopic studies allow the characterisation of spent catalyst, which will be an invaluable source of information used at the next step of project realisation.

A broad spectrum of research, consequently a comprehensive approach to the subject, is a rational concept leading to the achievement of the objectives of the project. In this case, the outcomes resulting from the work on the project will open a new way for the methodology of designing catalysts with the targeted performance and maintenance, used in catalytic reactions involving hydrocarbons, i.e. the most important in the industrial sector. Given that zeolites have long been nominated as environmentally friendly catalysts, the design of these minerals with targeted properties will take this honourable title to a higher level.