Food adulteration is becoming a global problem, as fraud practices are becoming more sophisticated and methods of detection are insufficient. For these reasons, the European Union announced in 2017 “The fight against food fraud” as a challenge for the future. In view of the ever-growing number of new products offered to consumers, the number of food adulteration is growing, which often involves health risks and even life, as in the case of aniline addition to rapeseed oil in 1981 or melamine to milk in 2008. According to recent research, one of the most common consumer’s concern, next to food safety, is authenticity of products related with trust that the purchased product has a composition and properties in accordance with the manufacturer's declaration on the label. This fact is of great importance especially for regional, ecological and luxury products due to their higher price. In the case of edible oils, these concerns include especially pressed oils, valued for their high content of n-3 fatty acids, such as indigenous oils: camelina (*pl. rydzowy*), linseed or hemp or oils pressed from fruits seeds like raspberry, blackcurrant, chokeberry. One of the urgent challenge for analytics is the unlimited use of refined palm oil and its fractions, practically in most food products, used often also as an adulterant, due to low price.

The aim of the project is to develop methods for assessing the authenticity and detection of oil adulterations based on recognized lipidomic biomarkers and determined thermal properties using advanced analytical tools such as liquid chromatography coupled with a quadrupole time-of-flight mass spectrometer (LC/QTOF) as well as differential scanning calorimetry DSC. The determined lipidomic profiles and DSC profiles, determined by the composition and physicochemical properties, will constitute a specific characteristics of each oil, consisting of its "fingerprint". Based on the created algorithms and the use of statistical tools of chemometrics and artificial neural networks (ANN), a comprehensive analysis of the possibility of adulteration detection of oils with various cheaper substitutes will be carried out. For this purpose, calibration models will be created along with a database containing reference DSC profiles and a database of recognized lipidomic markers specific for given oils. The aspect of the authenticity of oils will be considered comprehensively i.e. in the aspect of recognition of oil species as well as the detection of adulteration and finally in the aspect of changes caused by loss of freshness and oxidation processes. The research is pioneering due to the use of new raw materials used in the production of oils, such as the seeds of such fruits as: strawberry, chokeberry, raspberry, currant, which are relatively recent on the market. Currently, there are no reference methods to verify their authenticity.

The effect of the research will be to develop a model for the authenticity of oils in order to protect consumers in terms of both economic and health security. The added value of the conducted research will be the deepening and widening of knowledge in the field of lipidomic recognition of characteristic biomarkers of the authenticity of oils, which gives significant scientific and applicative potential.