Smell is the most important factor that determines the perception of a food product. Volatile compounds with various physicochemical properties are responsible for its formation. It was found that the aroma of a food product determines its consumer desirability to a greater extent than other features. Hence there is a need for continuous monitoring of key odorants in all branches of the food industry. Nevertheless, this kind of analysis is very problematic. This is due to two main factors: i) very often they are compounds found in food at extremely low concentrations, ii) the chemical nature of these substances is extremely diverse, their logP values can range from -1 to 6. Both components make their extraction from food very complicated. Polar aromatic compounds are particularly difficult to extract, and this is caused by their significant affinity to the matrix (which in most cases consists mainly of water) as well as insufficient affinity to the sorbent or solvent used in the extraction.

Along with the progress of technology and the increasingly severe impact of man on the new environment extraction techniques are proposed by the analytical community. Solid Phase Microextraction (SPME) has been known and used for over 20 years. The most common form in food research is the fiber geometry, which is popular for its efficiency, green character, automation capabilities and speed of extraction. Nevertheless, SPME fibers are primarily used for the determination of non-polar aromatic compounds. This is due to their ease of extraction from the headspace and their affinity for sorbents used in the commercial fibers. In addition, the problem of using fibers in quantitative analysis has been raised many times over the years. They are related to the narrow range of linearity of the method, which is the result of their small sorption surface and the phenomenon of competition between polar and non-polar compounds for the active site in the sorbent. The solution to the above problems may be the new SPME format - TF-SPME (*Thin Film Solid Phase Microextraction*), which has been appropriately modified to be compatible directly with thermodesorption, using the TDU (*Thermo Desorption Unit*), which creates the possibility of desorption of a large amount of extracted compounds and future automation of technology. In this project, the TF-SPME technique will be used as a promising alternative to exhaustive extraction in the analysis of aromatic compounds, both polar and non-polar. In addition, the problem of using fibers in quantitative analysis has been raised many times over the years. They are related to the narrow range of linearity of the method, which is the result of their small sorption surface and the phenomenon of competition between polar and non-polar compounds for the active site in the sorbent. The solution to the above problems may be the new SPME format - TF-SPME (*Thin Film Solid Phase Microextraction*), which has been appropriately modified to be compatible directly with thermodesorption, using the TDU (*Thermo Desorption Unit*), which creates the possibility of desorption of a large amount of extracted compounds and future automation of technology. In this project, the TF-SPME technique will be used as a promising alternative to exhaustive extraction in the analysis of aromatic compounds, both polar and non-polar.

This esearch will focus on the analysis of aromatic compounds in alcoholic beverages using the TF-SPME technique. The specific objectives of the undertaken topic are as follows: I) evaluation of materials used as sorbents in a given technique, so that the technique can be used in both targeted and non-targeted analyses, II) new strategies aimed at using this method in the mode of extraction directly from the sample (instead of headspace), which is to significantly increase the amount of extracted polar compounds, III) fundamental research, aimed at presenting the possibilities of the technique as a solution to the problem of competition between polar and non-polar compounds for the active sites; IV) combination of the TF-SPME technique with the GCxGC-ToF-MS analysis method, which, thanks to the lack of the problem of coelution, will allow to fully demonstrate the potential of the method targeting (TFSPME-EI-MS/MS) of compounds responsible for defects in beer and wine. The project will be carried out in cooperation with the University of Waterloo (Waterloo, Canada), and specifically the laboratory of Professor Janusz Pawliszyn, a world authority in the field of analytical chemistry, the inventor of the SPME technique. The participation of a Canadian partner is extremely important in this case, because the support from one of the best analytical laboratory in the world and the participation of the Polish team specializing in the field of active aromatic compounds is a guarantee of the correct conduct of the planned research and the path to future fruitful cooperation.