SPME is a sorption-based microextraction technique in which an equilibrium between the target analyte in a sample and a sorptive phase occurs. Later, desorption of the target analyte from the sorptive phase to GC inlet and separation in a column is used for analysis and determination of the analyte in the sample. Nowadays SPME can be used practically in all branches of research due to effectiveness and versatility, simplicity of use, for e.g. in environmental analysis including water, air and soil analyses, metabolomics, toxicology, forensic science and for medical applications. Particular importance of SPME applications is analysis of volatile organic compounds (VOCs), thus making their application for analysis of potential cancer biomarkers promising, since many studies attempted to define the correlation between cancer diagnosis and VOCs emitted by human body matrices as well as with stage and type of cancer.

There are many commercial SPME fibers with different type of coating materials with advantages and disadvantages. The commercial SPME coatings are expensive and are not selective for specific applications. Thus, the question of development and introducing of new types of SPME fibers is relevant. A few types of lab-made coating materials were introduced such as ionic liquids, molecular imprinted polymers, layered double hydroxides, metal organic frameworks and conductive polymers (CP). These materials have some features such as the ease of the coating procedure, ability to extract the specific target analyte(s), cost and (chemical, thermal, and mechanical) stability. Conductive polymers are materials, which have mechanical properties of organic polymers and electrically conducting properties similar to metals. They have high specific surface area and the other advantages offered by the commercially available hydrophobic sorbents, however they have limited extraction efficiency for polar analytes. A wise alternative for this can be in preparation of hydrophilic sorbents by copolymerizing monomers containing suitable functional groups or by introducing a functional group to the existing hydrophobic polymers.

CP-based SPME coatings can be categorized into four groups: polyaniline, polypyrrole, polythiophene, and their composites with other materials. CP can be synthesized by a few methods, but electropolymerization is suitable method for synthesis of SPME fibers since this method allows to control film thickness, surface morphology, porosity. In addition, it allows to perform the synthesis *in situ* thus contributing to homogeneous coatings with minimal consumption of solvents and monomer solutions, therefore reducing the costs. Thus, the aim of the project will be to develop and synthesize CP-based coatings for SPME fibers and to study their properties for their potential applications for analysis of colorectal cancer biomarkers.