Cells components are an important objects of scientific investigations all over the world. They might provide essential answers in the field of cell biology, microbiology or medicine. Because utilization of proper scientific tool is the basis of every research success, the proposed project is aimed on the development of the novel method for isolation and enrichment of selected cellular structures. Exosomes will be used as a model structure. These interesting nanoparticles (20-300 nm) takes part in transport of biologically active substances like enzymes or toxins, be responsible for antibiotic resistance spreading among bacteria, or, in the case of intestine flora, stimulate human immune system.

Project assumes employment of electromigration techniques for isolation and preconcentration of exosomes for bacteria culture medium. For this purpose isotachophoresis will be used. The idea is based on transfer of targeted compound under the high (tens of kV) electric voltage from sample solution to tiny capillary (tens of μm of inner diameter), in which a focusing process of exosomes will be conducted. The enriched zone of cellular components will be collected at the outlet of capillary and submitted to further analysis for characterization.

The currently established methodology of exosomes isolation is a multi-step process that requires a few techniques to be applied. The proposed solution should limit whole procedure to one ITP step with minimal sample preparation time and should not be longer than 10 minutes. Implementation of commercially available apparatus for this aim will also allow to automatize whole process and to monitor it on-line thanks to spectrophotometric detector. Success in realization of basic aims of the project will probably enable to extend the scope of the research to other cellular structures.

The proposed researches are the interdisciplinary project gathering analytical chemistry and microbiology. The close collaboration of the specialists in these two rather distinct fields may provide a useful tool for future scientific trials on exosomes or other cellular components in medicine, biology or biotechnology.