

Polyphenols are specialized secondary plant metabolites with significant health-promoting potential. A frequent limitation in their use is low bioavailability caused by poor solubility in water and in body fluids, and/or degradation in the gastrointestinal environment.

In order to overcome these limitations, a frequently used solution is nano-encapsulation of polyphenols by electrospinning or extrusion. The combination of selected polyphenol contained in plant extracts with the biopolymer may perform a protective function against external factors or provide an improvement in solubility.

In light of the above Applicant wants to find an answer to the question: ***How does nano-encapsulation improve chemical-physical properties of polyphenols-rich plant extracts which is important in regards to modify their pharmacological activity ?***

The Applicant assumes that the route of administration of flavonoids through the development of mucoadhesive delivery systems will overcome the limitations resulting from the transfer of flavonoids through the digestive system. The biopolymers used in innovative technologies such as extrusion and electrospinning will additionally improve the physicochemical properties of flavanoids, which are important for their pharmaceutical use.

In order to achieve the goal, the following stage of studies will be conducted (Figure 1):

1. extracts preparation from plant materials rich in polyphenols, and evaluation of their properties
2. electrospun nanofibers/extrudate preparation with plant extracts and mucoadhesive polymers,
3. biological properties screening of prepared systems.

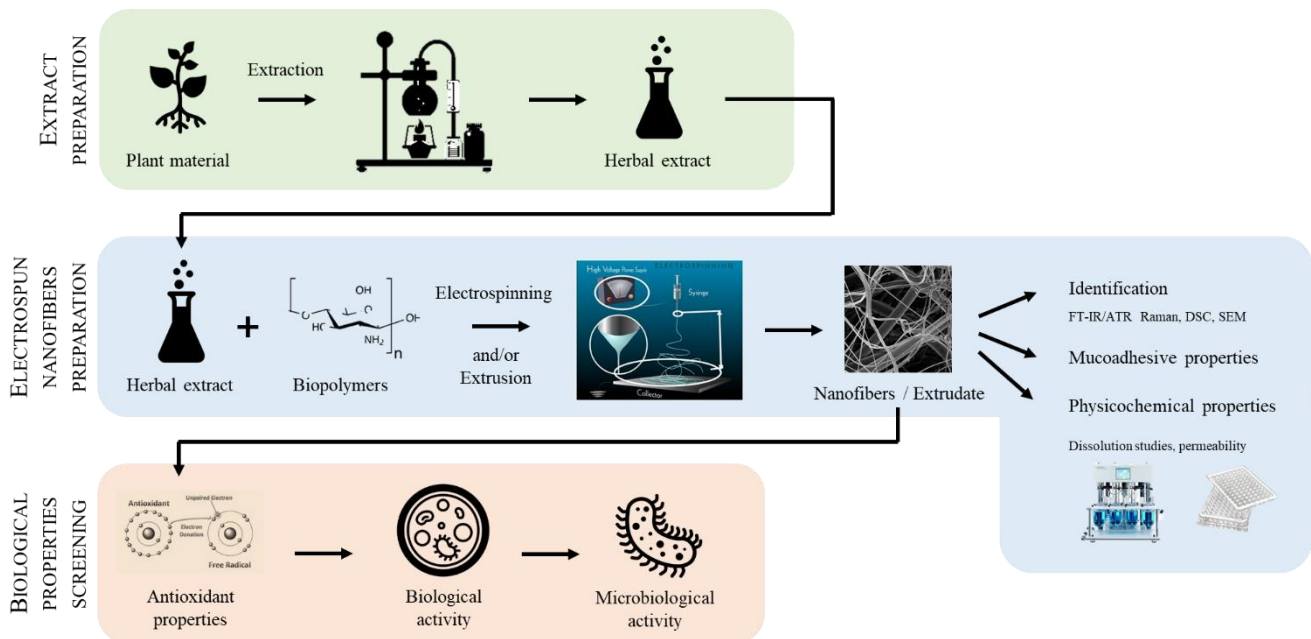


Figure 1. Schematic project plan.

The use of innovative mucoadhesive polyphenol delivery systems allows to minimize the low bioavailability resulting from both low water solubility and fast enterohepatic first-pass metabolism. Additionally, the use of innovative technologies (electrospinning and/or extrusion), which are low-cost and environmentally friendly techniques, allows for obtaining safe systems, e.g. without the presence of volatile solvents. Confirmation of the health-promoting properties of the created electrospun nanofibers/extrudate with plant extracts, will be applicable to the prevention of civilization diseases.