The aim of the project is to develop starting furcellaran compositions in an extract-protein-polysaccharide-oil system, which will be the base matrix for three types of monolayer or multilayer coatings: film, coating solution and nano/microemulsion. Three production methods will be used: layer-by-layer, immersion and electrospinning. The polysaccharide structure will incorporate an extract and an emulsion resulting from the isolation of raw materials from milk thistle. The extract and peptides will be isolated from the dried parts of this plant, while the oil will be extruded from the seeds. The first stage of the project will involve the isolation of the raw materials needed from milk thistle. It will be based on the selection of extraction methods and conditions to optimise extraction, as well as the creation of a stable emulsion from the isolated components. Subsequently, the project will focus mainly on the creation of polysaccharide solutions that, when combined with the isolated components, will form homogeneous mixtures. Then, with the formulations of the mixtures already developed, we will work on the methods for creating the final materials. We are talking about adjusting the conditions using layer-by-layer, immersion and electron spray methods. Once the mixtures have been adjusted to the production conditions and methods, the final materials created will be applied to a perishable product (salmon fillets). As a function of time, we will monitor the quality of these products and, as a result, the interaction between the food product and the applied coating. It will be necessary to carry out a comprehensive comparison of each application method used in terms of its efficiency, precision, durability and impact on the quality and stability of the coatings.

The project using separation processes produces extracts, peptides and emulsions, which are then incorporated into the structures of furcellaran, a polysaccharide isolated from the red algae Furcellaria lumbricalis. This strategy presents the possibility of obtaining products (such as films or coatings) that are fully biodegradable and one hundred per cent natural, thus affecting the microbiological properties of products, including salmon fillets. The project presented here introduces three completely new and innovative materials and application methods. By using the isolation of ingredients from thistle and an innovative furcellaran matrix, we will be able to obtain materials with highly advanced functional properties, such as a better protective barrier, antimicrobial and antioxidant activity. Furthermore, different polysaccharide-based products are produced using different methods, allowing us to compare their desired properties and select the most optimal one. The project will make it possible to answer the age-old question of scientists which form of polysaccharide materials has better properties for storing perishable products - coatings or films.