Currently, there is an increased interest in developing new sources of pectin with new functional properties that can replace commercial products. An important direction of research is the valorization of post-production waste, however, effective use of pectin as an emulsifier requires an in-depth understanding of influence of pectin structural features on the emulsifying and emulsion-stabilizing properties. **The goal of this research is to identify influence of structure of the diluted alkali soluble pectin (DASP) on physical stability on pectin-containing emulsions.**

Diluted alkali soluble pectin fraction, extracted by sodium carbonate is obtained by means of sequential extraction from cell walls. DASP has been the subject of research due to its characteristic self-assembled network on mica, which disintegrated during postharvest ripening of fruits and vegetables. It is suspected, that rhamnose interspersions may affect the cross-linking properties of DASP, and thus the gelling properties, as the greater mobility of linear segments allows for an increase in the degree of interaction with other molecules. Based on my doctoral thesis studies, it is suspected that arabinose is involved in the formation of the pectin network, but does not affect the mechanical strength and rhamnose is one of the factors influencing the properties of pectin matrix in solution (Project no. 2019/35/O/NZ9/01387 Preludium BIS1 headed by prof. Artur Zdunek in which I am PhD student).

The ability of pectin to form gels in water solutions makes it an important component for gastronomy and food industry, as well as ingredient of cosmetics, pharmaceuticals and pesticides formulations. Moreover, researchers are making great effort trying to develop structured emulsions, that are economically produced and have desirable quality and functional attributes. However, there is still a need to better understanding factors that determine the rheological properties and the stability of products. Stability of emulsion systems is closely related to the preparation method, emulsifier type and concentration, temperature, and other factors. Identification of physical and/or chemical mechanisms responsible for the emulsion instability is crucial for design the most effective technique to improve its stability. Pectin gelling capacity and viscous properties have been associated with effective preparation and improving of emulsions rheological properties. It is closely related to their specific features and structural groups. The hydrocolloids based on plant cell wall polysaccharides open new possibilities for design emulsifiers and stabilizers, including various food ingredients, matching the specific needs of vulnerable consumers with diet-related diseases.

In this project it is hypothesized that in DASP fraction, the rhamnose units with attached arabinose and galactose side chains, forming interspersions in the linear homogalacturonan may influence emulsion formation and/or emulsion-stabilizing properties.

An approach of this study is to use specific enzymes that modify the backbone and side chains of DASP fraction polysaccharides. This will allow for precise control of the occurrence of selected structural elements within a fraction and determination of influence of particular saccharides on emulsifying and emulsion-stabilizing properties. Apples, widely used in the juice industry and being a waste product, will be used as the source of pectin. The properties of the DASP-stabilized emulsions in relation to their structural characteristics will be assessed through an experimental approach involving the determination of a range of physicochemical and emulsifying properties as well as the physical stability of the emulsions.

We believe that the evaluation of the relationship between structure and function will allow for a wider management of waste, both of pectins from plant waste but also by-products from technological processes and use pectins extracted from well-defined sources for very specific aims.