Functionalization of brown seaweed aqueous dispersions by physical treatments

LOPEZ-SANCHEZ P. (1,2), SOUTO PRIETO A. (1,2), FERREIRO PORTAS T. (2), PARADA PENA P. (2), ABUIN ARIAS L. (2), COBOS GARCIA A. (1)

1 Food Technology, Dept analytical chemistry, nutrition and food science, University of Santiago de Compostela, Facultad de Ciencias, Campus Terra, 27002 Lugo, Spain, Lugo, Spain

2 Centre for dairy products and food technologies APLTA, University of Santiago de Compostela, Campus Terra, Rua Montiron 27002 Lugo, Spain, Lugo, Spain

The food demand is increasing worldwide due to demographics and challenges associate with climate change. As a result, there will be the need for a more sustainable exploitation of land and aquatic raw materials as a source of nutrients and of specific techno-functional properties of relevance for agrifood and other industries such as pharmaceuticals, biomaterials and biofuels. The interest to use seaweed in food products has increased, partially due to their nutritional value based on their content of dietary fibre, unsaturated fatty acids and protein. Furthermore, seaweed cell wall polysaccharides have structuring properties and have been used in food industry as viscosifiers and gelling agents during decades. However, these ingredients are industrially produced by energy costly methods, and may leave large amounts of unused side streams. Furthermore, they can be perceived as artificial by the consumers. An alternative could be to exploit the natural texturiser potential of cellular materials *i.e* cell clusters, cells and cell wall fragments containing polysaccharides with texturising abilities. However, in order to utilise seaweed as a whole ingredient a fundamental understanding of the relationship between processing conditions, cell wall structure and techno-functional properties is required. In particular, knowledge regarding rheological properties relevant for manufacturing conditions, food texture and nutrient bioaccessibility is needed. Brown algae are known to be a rich source of fiber i.e cell wall polysaccharides with the presence of several non-digestible polysaccharides including laminarin, fucoidan and alginate, the latter is particularly abundant in Laminaria species. Here we investigated the impact of physical treatments (thermal and mechanical) on the stability and the rheological properties of dispersions of two brown algae *Laminaria digitata* and *Saccharina Latissima* (5 % wt). Results showed that the mechanical treatment was the main parameter affecting rheology of the dispersions, whilst the thermal treatment and botanical origin had less impact. Flow behaviour and viscoelastic properties were explained based on the monosaccharide composition, nano- and microstructure as well as particle size distribution of the dispersions. The outcomes of this research give insights into the exploitation of brown seaweed in complex fluids and soft materials for food, pharma and other technological applications.