Physical properties of bacterial cellulose aqueous suspensions treated by ultrasounds

Paraskevi Paximada[1], Eleni- Alkmini Dimitrakopoulou[1], Nikolaos Kopsahelis[1], Apostolis A. Koutinas[1] and Ioanna Mandala[1]*

1. Dept. Food Science and Human Nutrition, Agricultural University of Athens, Greece

* Corresponding author: imandala@aua.gr

Cellulose is the most abundant natural polysaccharide, being the major structural component of plants. It has been well known that bacteria (*Komagataeibacter sucrofermentans* DSM 15973) produce cellulose as pellicle, which has distinctive advantages over traditional sources: high water-holding capacity, smooth texture and unique fluid property. BC is used in many areas such as medical, cosmetics, electronics and food industry. However, in the form of pellicle that is produced, it is not possible to be efficiently added in food models (i.e. emulsions). Hence, in the present study, purified wet bacterial cellulose was disrupted into cellulose aqueous suspensions (0.5%, w/w) and then homogenized by a 12 kHz ultrasound at 0, 1 and 3 min respectively. In order to evaluate the effects of ultrasonication (US) on bacterial cellulose aqueous suspensions, morphology, rheology, stability, water holding capacity (WHC) and charge change were investigated. Morphological analysis by TEM revealed changes in microstructure and dispersion of cellulose ribbons after US treatment. The diameter of micro-fibril ribbons decreased significantly with increasing the processing time. The rheology results suggested that all the suspensions displayed a shear thinning behaviour, moreover the suspensions treated by US showed 3 regions (shear thinning region, plateau region and shear thinning region again) and the flow curves followed the Herschel–Buckley model. Furthermore, stability of the suspensions was enhanced after US treatment.