Application of non-thermal technologies for the recovery of β- glucans from yeast biomass

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The food packaging industry is becoming increasingly aware of the hidden problems of plastic packaging, including its inability to degrade or regenerate. For this reason, biodegradable alternatives to petroleum- based polymers are being developed for food packaging. Among alternative biopolymers, β-glucans from yeast cell walls are getting a lot of attention due to their specific properties, such as high apparent viscosity, water-holding capacity and stabilisation of emulsions. Although yeasts contain an appreciable amount of β- glucan (30–60 % of the dry weight), the recovery and isolation of this compound could be difficult due to the compact and rigid cell wall.

In this context, the aim of this study was to evaluate the potential of high-pressure homogenisation (HPH) and pulsed electric field (PEF) treatments

to favour the rupture of yeasts cell wall and the release and recovery of β-glucans from yeast biomass to obtain innovative biopolymers.

Specifically, different HPH (125 MPa for 3 passes) and PEF (5–25 kV/cm for 30–240 μs) treatments combined or not with heat treatments at 90 °C for 20 min were applied on biomasses of commercial bakery yeast. The dispersions obtained were characterized by observation at epifluorescence microscope and for carbohydrates, proteins and β-glucan content, in order to assess the effective cell wall rupture.

HPH treatment at 125 MPa for 3 passes showed high dispersibility indices of proteins (37.5 % ± 0.03) and carbohydrates (24.7 % ± 1.56) and a high release of β-glucans, indicating that this technique may be suitable the cell wall rupture without the need of additional thermal treatments. Also, the combination of PEF and heat treatments increased the release of β-glucans from yeast biomasses. Both HPH and PEF treatments allowed to obtained films with positive properties, excellent continuity, and homogeneity.