Preparation of biopolymeric nano / microgel particles by carbon dioxide assisted nebulization

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Microgels / nanogels can be defined as a colloidal dispersion of submicron or microscopic gel particles which are swollen after dispergation in a solvent. The rheology of colloidal microgel suspensions uniquely shares characteristics of both polymer solutions and hard-sphere suspensions. Colloidal dispersions of gel particles have great potential for the utilization in tissue engineering, biomedical implants, bionanotechnology, drug delivery, cosmetics, personal care and food industry. The utilisation of engineered microgels in foods has so far been limited, despite their great potential to address several needs in the food industry, including: satiety control, encapsulation of nutrients and prebiotics, texture control, healthier food formulations (e.g. reduced fat products), and targeting delivery to specific areas in the digestive tract.

For the preparation of microgels/nanogels various strategies have been developed. They include heterogeneous polymerization, continuous extrusion, precipitation in water, micromolding and microfluidic preparation, spray drying, supramolecular self-assembly, and self-complexation.

The objective of this study was testing new technology and a pilot-scale equipment or microgels/nanogels production by carbon dioxide assisted nebulization from gelatin, chitosan, and alginate. The performance of the pilot-scale nebulization dryer was determined as a function of feed concentration, inlet and outlet temperatures and feed flow rate. Particles of different sizes in the range from 500 to 3000 nm, as determined by lase diffraction particle sizing technique and electron microscopy, were obtained.

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