PO72 - 25015 - NANOSPRAYDRYER FOR THE PRODUCTION OF SUB-MICRO PARTICLES BASED ON BOVINE LACTOFERRIN

***Arlete M. Marques*[1]; *Ana Isabel Bourbon*[2]; *Lorenzo M. Pastrana*[2]; *José A. Teixeira*[1]; *Miguel A. Cerqueira*[2]**

1 - Universidade do Minho; 2 - International Iberian Nanotechnology Laboratory

E-mail: arlete.marques@inl.int

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Abstract

Lactoferrin is a single chain glycoprotein isolated from the bovine milk, and it has been considered a multifunctional protein with a lot of benefits for human's health. Lactoferrin structure is composed by two globular lobes, the N-lobe and C-lobe, and has a molecular weight of 80 kDa. Lactoferrin can also be used as a carrier of bioactive compounds, such as iron (due to its iron-binding properties). However new methods are needed to guarantee their processability without losing their unique characteristics. One of the possibilities is to use the nanospraydrying (NSD). NSD consists in a quick one-step process that transforms different types of solutions into dry sub-micro particles, by spraying the solutions in a hot medium that causes efficient evaporation of the solvent and produces the particles with controlled morphology.
In this work lactoferrin (Lf) nanoparticles were produced by nanospraydryer with an atomized head with the small nozzle size. Lf solutions were sprayed after centrifugation (4,000 rpm, 20 min) and filtration (syringe filter of 0.45 mm) to avoid NSD clogging. Different processing conditions were tested such as Lf concentration (1%, 5% and 10% (w/v)) and temperatures (80 °C and 100 °C). The dried particles were evaluated by Fourier-transform infrared spectroscopy and Scanning Electron Microscopy. Afterwards the particles were hydrated and the particle size determined by Dynamic Light Scattering, Nanoparticle Tracking Analyses and Transmission Electron Microscopy, being also evaluated the polydispersity and zeta potential. The chemical structure of the particles was evaluated by electrophoresis and circular dichroism in order to evaluate the effect of the drying process on the Lf chemical structure.
Results shows that it is possible to use high concentrations of Lf to produce sub-micro particles without changing the main structure of Lf. The particles size of dried particles ranged 100-2,000 nm (determined by SEM), being the hydrated particles 100-200 nm.

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