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Title:

How much protein kinds influence the morphology of the resulting powder?

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Spray drying is a well-established technique to convert a liquid solution into individual and solid particles which is widely used in food industry especially in the dairy sector. This process allows formation of a large range of particle morphology all distinct from each other by their physical characteristics (distribution of the particle size, particle shape and particle density) providing to particles a typical aerodynamic behaviour and determining their final functionality (flowability, dispersibility, wettability, etc.). In dairy industries, controlling physical properties of powder represent a key issue to facilitate the industrial hand-use and optimize the rehydration. Therefore, understanding how the final shape of the particle is formed has recently become a huge scientific concern. So far, much attention has been paid to the so called process – product relationships, most often considering theoretical models based on drying kinetics to predict the shell formation and the morphology of dairy powders. However, the way the protein kind influence the particle morphology remains a hot topic. In this study we focused on the drying behaviour of two major milk protein concentrates: whey protein isolate and native micellar caseins. To acquire a better understanding on the role of each protein in the particle forming mechanisms, seven mixtures containing different ratios of caseins and whey proteins were investigated. A micro-fluidic-jet-spray-dryer (MFJSD) was used to produce uniform particles by drying monodisperse droplets in a hot and dry air flow. Powders were characterized with regard to their physical characteristics and their rehydration properties. Besides, characterisation of particle size and shape was ensured by means of a dynamic image analysis system. It is shown that particle morphology is mainly governed by the protein material type, almost regardless of the drying kinetics; controlling the product formulation thus represents a potential means to tune particle morphology, and therefore powder functional properties.