Functional protein-based colloids for controlling structure and stability of food

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Native globular whey proteins are sensitive to heat treatment above their denaturation temperature. Heating induces molecular changes, leading to an activated non-native protein form that is able to self-aggregate. Depending on the processing conditions (pH, ionic strength, protein concentration, heating temperature and heating time), various types of protein aggregates are obtained.[1]

In this talk, we will describe whey protein microgels (WPM), a peculiar type of aggregate obtained upon heat treatment slightly above the IEP of whey proteins.[2] The WPM are characterized by fairly spherical shape, narrow polydispersity, high surface charge density and particle size ranging from 200 to 400 nm. These features confer milky appearance and colloidal stability upon storage to WPM dispersions. The internal structure of WPM was maintained by internal disulfide bridges, allowing high physical and chemical stability of these new ingredients in various subsequent food processes.[3]

We will show how WPM can be concentrated using microfiltration in order to reach high protein contents while keeping the system liquid. The thermal stability of WPM in presence of salts as well as their use as whitening agent in low fat coffee creamers will be presented.[4] Whey protein microgels can also be used to stabilized Pickering-type of emulsions close to their IEP.[5] Finally, we will discuss the use of these colloids as texture modulators in whey protein acid gels.[6]

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