DESIGNING MESOSTRUCTURES FOR FOOD FUNCTIONALITY

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We will discuss a few examples of the mutual couplings that exist between specific mesostructures (also typically present in foods) and their dispersing surrounding, and how these couplings across multiple scales dictate the mesostructural functionalities. Such a multi-scale dynamic approach is required in addressing processing, consumption and digestion of foods.

We first consider the elasticity of a system consisting of fibrillar structures and discuss the contribution of a fibril to the elasticity as a function of the interaction with the surrounding fibrils (van der Linden and Parker 2005). Next we review how the surrounding of the fibril by means of its pH can affect the system robustness against phase separation, and how this can be altered by adding a surfactant like SDS (Jung, Savin et al. 2008; Kroes-Nijboer, Sawalha et al. 2012).

We secondly consider a system of spherical assemblies of globular proteins and how the system's structural evolution contributes to the elasticity. We discuss how this structural evolution can be influenced by altering the protein surrounding, yielding novel protein functionality (Sağlam, Venema et al. 2011).
Finally we address the structural evolution of a more complex (mixed) system consisting of fibrillar and spherical mesostructures, and how multi-scale interdependences between these mesostructures and their surrounding are responsible for the functionality of each of the ingredients and of the overall complex system. We discuss our recent results on the stability emulsions that contain long semi-flexible structures that have a length equal to the diameter of the emulsions droplets. These recent results form an important extension of earlier work (Blijdenstein, Veerman et al. 2004). We also discuss our extensions to other sphere/fibril systems and point to an intricate issue on interpreting the stability of such systems.

References:

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