

CASEIN AND CASEIN MICELLES: STRUCTURES, FUNCTIONS, FUNCTIONALIZATION

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Abstract submitted for keynote lecture Caseins, main proteins in the milk of nearly all mammals, undergo a process of self-association during lactation to form micelles ranging between 50 and 300 nm. The detailed structure of casein micelles as well as the mechanisms underlying the structure formation are only partly understood. Within our research, we attempt to clarify the interactions that are responsible for the organization of the micellar structure and to investigate strategies for the directed modification of natural and artificial micelles which can serve as carriers (“nanocapsules”) of biologically relevant compounds. Process-induced chemical reactions during heating or storage have a significant impact on the protein and micelle structure. Glycation reactions (also referred to as Maillard reactions) can be applied to prepare glycoconjugates in the early stage of the complex reaction and to achieve non-enzymatic protein crosslinking in advanced stages. Corresponding reactions significantly affect the functional properties such as gelling and flavour binding. The presentation will focus on our recent studies concerning interactions between casein micelles from the milk of various mammals and bioactive guest molecules. Furthermore, studies dealing with the impact of glycation on the functional properties of milk proteins will be reported, which may demonstrate the potential of a controlled functionalization for practical applications.

Keywords: casein, casein micelles, milk, glycation reactions, functional properties of milk proteins