Lactoferrin/β-lactoglobulin complex coacervates: rheological properties

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Abstract: Complex coacervation is a liquid-liquid phase separation that leads to the formation of highly concentrated phase (coacervates). Despite its multiple use, especially in the field of food science, little has been reported on hetero-protein complex coacervation. In our previous work, we reported on the ability of two globular proteins Lactoferrin (LF) and β-lactoglobulin (β-LG) to form coacervates under specific physicochemical conditions [1]. Here, different experiments were conducted in order to characterize the rheological properties of the formed LF/β-LG coacervates. We showed that unlike some polysaccharide/protein systems, LF/β-LG coacervates has a liquid like behavior; the loss modulus G" was 100 times higher than the storage modulus G'. This behavior was confirmed under creep-recovery tests. In addition, the coacervates exhibited a Newtonian viscous flow under low shear rate and a shear thinning behavior above 10 s^{-1}. These results suggest a structural change probably due to the weaknesses of electrostatic interactions inside the protein network at high shear rates. This structural change was proved to be reversible and the rearrangement of the structure was time-dependent. These results allow better understanding of the involved interactions in concentrated protein solutions and open new avenues for the use of coacervates as texturizing agents in food products.

Key words: Complex coacervation, Co-assembly, Rheology, β-Lactoglobulin, Lactoferrin.

References:

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