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RHEOLOGICAL PROPERTIES OF LACTOFERRIN/ β -LACTOGLOBULIN COMPLEX COACERVATES

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Complex coacervation is a liquid-liquid phase separation that leads to the formation of a highly concentrated phase or coacervates. The formed coacervates are proposed as carriers for bioactives thanks to their high encapsulation efficiency under mild processing conditions.

Despite its multiple use, especially in the fields of food science, little has been reported on heteroprotein 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]. In the present work, we aimed to characterize the rheological properties of the formed LF/ β -LG coacervates. We show that unlike some polysaccharide/protein systems, LF/ β -LG coacervates has a liquid-like behavior; the loss modulus G'' being 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 proteins network at high shear rates. The structural rearrangement was proved to be reversible and time-dependent.

These results bring a new light on the interactions involved in concentrated protein solutions and open new avenues for the use of coacervates as texturizing agents in food matrices.

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

[1]. Tavares, G. M., Croguennec, T., Hamon, P., Carvalho, A. F. & Bouhallab, S. Selective coacervation between lactoferrin and the two isoforms of β -lactoglobulin. (2015) Food Hydrocolloids 48, 238–247.