Liquid-liquid phase separation in heteroprotein systems: a mini review

Boire A.[1], Renard D.[1], Bouchoux A.[2], Bouhallab S.[3]

[1]: INRAE, UR1268 Biopolymères Interactions Assemblages, F-44300 Nantes, France
[2]: TBI, UMR 5504/792 INRAE-CNRS-INSA, F-31077 Toulouse, France
[3]: INRAE, Institut Agro, UMR1253 STLO, F-35042 Rennes, France

adeline.boire@inrae.fr
said.bouhallab@inrae.fr

Liquid–liquid phase separation (LLPS), has emerged as a new paradigm in the fields of soft matter, colloid chemistry, food science and cell biology. Research in this area constitutes a fine example where physics and biology intertwine harmoniously and not only in the grand Ouest. LLPS is a dynamic assembly process that leads, in solution or *in vivo*, to the formation of micrometer-sized droplets, which are referred as biomolecular condensates, membrane less organelles, liquid droplets or complex coacervates, depending on the scientific community concerned.[1,2] Herein, we focus on LLPS that occurs in binary protein mixtures (heteroprotein systems). We briefly review aspects that are of particular interest: formation dynamics; main driving forces; physical and chemical properties; functions and applications. The challenges and future research directions are discussed.

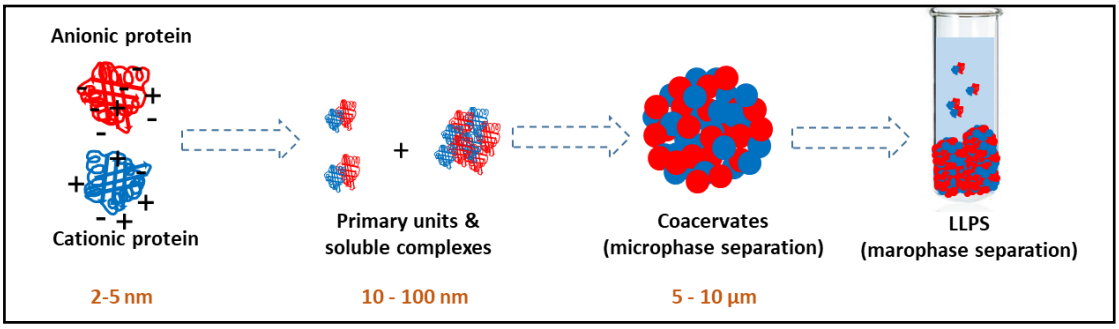

Figure: Associative liquid-liquid phase separation process in heteroprotein systems

1: R.A. Kapelner, V. Yeong, A.C. Obermeyer. Current Opinion in Colloid & Interface Science 2021, 52:101407
2: T. Croguennec, G.M. Tavares, S. Bouhallab. Advances in Colloid & Interface Science, 2017, 239: 15–126