Abstract

High internal phase emulsion received tremendous interest in food, cosmetic and tissue engineering because of its extensive applications. HIPEs are generally characterized by their minimum internal phase volume. In this work, we focus on understanding the influence of protein concentration and the effect of native and heated OVA on SBO-water stability. firstly we optimized the OVA concentration by evaluating microstructure, droplet size distribution and rheology at a random packing fraction. Upon knowing the optimum value, we synthesize HIPEs over a range of dispersed phase volume fractions for native OVA. To understand the dimension and droplet network, the microstructure of the cream phase was analyzed and further used for evaluating the size and polydispersity. The flow behavior of HIPEs was demonstrated by frequency sweep measurements. Below $\phi = 0.64$, emulsions are liquid-like with a distinct phase of cream and serum. Catastrophic phase separation was observed beyond $\phi = 0.74$. G' and G'' show a crossover frequency below 100 rad/s for a lower fraction of the dispersed phase. The heating of OVA prior to emulsification provides a broader spectrum of dispersed phase volume fraction for the synthesis of HIPEs. Single-phase gel-like emulsion was synthesized even below random packing fraction. An increase in the magnitude of storage modulus and relaxation time confirms the better shelf life compared to native OVA. Moreover, Lower size droplets observed for heated OVA-stabilized the emulsion also confirms the stability against flocculation and coalescence. Conformational change in secondary structure witnessed using circular dichroism might be a responsible factor for the enhancement in the physicochemical properties of ovalbumin.