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INFLUENCE OF UNADSORBED EMULSIFIERS ON THE RHEOLOGICAL PROPERTIES AND STRUCTURE OF HETEROAGGREGATE OF WHEY PROTEIN ISOLATE (WPI) COATED DROPLETS AND FLAXSEED GUM (FG) COATED DROPLETS

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Recent studies have shown that controlled heteroaggregation of oppositely charged lipid droplets can be used to improve the rheological properties of emulsion and create desirable functional properties in foods. The effect of unadsorbed emulsifier on the microstructure and rheological properties of heteroaggregate of emulsion is not clear. Therefore, the influence of unadsorbed emulsifiers (whey protein isolate-WPI & Flaxseed gum-FG) on the microstructure and rheological properties of heteroaggregate of 40% WPI-coated droplets and 60% FG-coated droplets was studied. WPI-stabilized emulsions and FG-stabilized emulsions were centrifuged to separate the aqueous phase from the oil droplets to prepare the washed emulsions, separately. Emulsions containing mixtures of droplets with washed and unwashed WPI-emulsion and FG-emulsion were prepared, respectively. Droplet size, zeta-potential, Transmission-physical stability, rheological behavior, and Cryo-SEM microstructure of the heteroaggregates were measured as a function of unwashed and washed WPI & FG emulsion. It was found that the presence of unadsorbed WPI in the aqueous phase of mixed emulsion adsorbed onto the FG-coated droplets, meanwhile, the unadsorbed FG could bind WPI-droplet and FG-droplet-WPI together forming a special three-dimensional network. Rheological properties indicated that free WPI and FG played dominated roles in the heteroaggregation of mixed emulsions. The shearing viscosity of the heteroaggregates formed by washed WPI-droplets and FG-droplets was significantly decreased compared with the unwashed mixed emulsion. It indicated that unadsorbed WPI and FG dominated the physical property through a specific network structure. This study proved the effect of the continuous phase on the rheological properties of heteroaggregates and provided theoretical basis for the development of reduced-fat food.

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