Physical properties of oleogels fabricated by the combination of diacylglycerols and monoacylglycerols

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Abstract

Oleogelation is an efficient way to structure oil and reduce saturated fatty acids of lipid products. Multi-component gels are of particularly interest attributed to the ability to tune gel properties by alteration of the component proportions. In this study, monoacylglycerol (MAG) and diacylglycerol (DAG) are used as gelator mixture and the influence of the ratio of these two crystalline particles on the characteristics of oleogels was investigated. The crystallization and melting behavior, solid fat content (SFC), crystal morphology, polymorphism and mechanical properties of the oleogels were characterized. The oleogels with higher gelator level displayed higher oil binding ability and shorter crystal formation time. The oleogels with higher MAG ratio exhibited more blade-like crystals, and the mixed oleogels with MAG: DAG of 3:7 and 5:5 showed altered crystal morphology with finer crystal size and reduced crystallization enthalpies possibly due to the increased nucleation seeds promoted by MAG. The oleogels with high MAG level showed lower equilibrium SFC during isothermal crystallization but faster crystallization rate, higher hardness and elasticity. Therefore, by changing the ratio of DAG with MAG, the crystallization profile and rheological properties of oleogels can be tailored and used as traditional solid fat substitutes in lipid-based products.

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