

Rapeseed Oil Based Oleogels as a Promising New Alternative to Conventional Deep-frying Media

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The selected frying medium takes up an important role for deep-frying. It is responsible for the heat transfer into the food as well as the formation of the typical aroma, texture, rheological and sensory properties of the final product. Since the water present in the food is partially replaced by the frying medium during deep-frying, the fat becomes an important component of the final product. Therefore, the texture and rheology of the frying medium are directly correlated with the surface properties of the fried goods and can be adjusted via the variation of the applied frying medium. In order to generate a less greasy surface and to prevent oil leakage, especially during storage of fried products, fats like palm oil or modified fats are used, which quickly recrystallize and solidify after the frying process. However, especially palm oil is strongly criticized by consumers because of environmental reasons. In addition, conventional solid fats consist of a nutritionally unfavourable fatty acid profile with a high amount of saturated fatty acids. A new alternative for reducing the proportion of saturated fatty acids and the use of palm oil are structured oils, so-called oleogels, based on rapeseed oil paired with a structuring agent like sunflower wax (SFW) or monoacylglycerides (MG). Rapeseed oil represents one of the nutritionally most favourable oils, since it displays a high amount of unsaturated fatty acids and a ratio of linoleic to linolenic acid of 2:1. With melting the structuring agent within the oil it forms a 3-dimensional network in which the liquid oil is embedded. As a result, the oil solidifies and the favourable fatty acid composition of the used oil remains.

Commercial par-fried French fries were deep-fried in rapeseed oil, which was set as standard frying medium, and in oleogels based on rapeseed oil with 5% SFW or 5% MG. Regarding sensory evaluation it showed that the oleogel-fried products had less greasy haptic properties and a less oily mouthfeel. The lightness, aroma exposition and crispness were not significantly different to the rapeseed oil standard. Colour and texture measurements showed little to no differences between the samples. However, the total fat content showed decreased values with both par- and deep-frying with oleogels. Moreover, within a stress test several quality parameters of the frying media were analyzed. Whereas the amounts of polymerized triacylglycerides and the fatty acid composition of both oleogels were comparable with rapeseed oil during the course of the experiment, oleogels with 5% MG displayed from beginning a significantly higher amount of polar compounds, so that the limit value of 24% polar compounds was reached more quickly.

To sum up, French fries deep-fried in oleogels based on rapeseed oil and 5% SFW or 5% MG displayed a similar colour, texture and total fat uptake compared to the standard but the haptic properties were significantly improved by the application of oleogels. Since the amount of polar compounds in MG based oleogels was very high even before the first frying cycle, especially the application of 5% SFW based oleogels represents a promising new alternative for deep-frying.