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Oleogels as alternative deep-frying media to optimize the surface properties of fried products

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During deep-frying the frying medium is responsible for the heat transfer into the food, the formation of the typical aroma, texture, rheology and organoleptic properties of the final product. Since the water present in the food is replaced by the frying medium during deep-frying, the fat becomes a 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 modified 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 hardened peanut fat are used, which quickly recrystallize and solidify after the frying process. However, especially palm oil is strongly criticized by consumers because of environmental reasons, and conventional solid fats consist of a nutritionally unfavourable fatty acid profile with a high amount of saturated fatty acids. An alternative that does not only reduce the proportion of saturated fatty acids and palm oil, but also represents a substitute for fats rich in *trans*-fatty acids, are oleogels based on rapeseed oil and a structurant like sunflower wax (SFW) or monoglycerides (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.

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. French fries produced in oleogels displayed a similar colour, texture and total fat content compared to the standard product. In contrast to French fries deep-fried in rapeseed oil, oleogel based french-fries displayed optimized organoleptic properties, since the surface of the fries was less greasy and almost no oil leakage was observed within a short-term storage test after the frying process. Moreover, within a stress test several quality parameters of the frying media were analyzed. Whereas the amount of polymerized triglycerides and the fatty acid composition of both oleogels were comparable with rapeseed oil during the course of the experiment, oleogels with 5 % MG displayed per se 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 the same colour, texture and total fat uptake compared to the standard, but the organoleptic 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.