

Scope

Soy beverages are gaining in popularity mainly due to assumed health benefits. Soy milk can be used to create a broad range of beverages. Raw soy milk has a high inherent dispersion stability, however, when it is processed with additives to obtain various variants with different textural properties and flavour or to enrich it with nutritional supplements dispersion stability is modified.

For screening of the dispersion stability during the formulation process a multisample approach is proposed using analytical centrifugation with high resolution photometric detection of transmission profiles (STEP Technology), which allows for an accelerated and rapid characterization of the demixing behaviour (creaming, sedimentation, coalescence, phase separation) of dispersions without dilution.

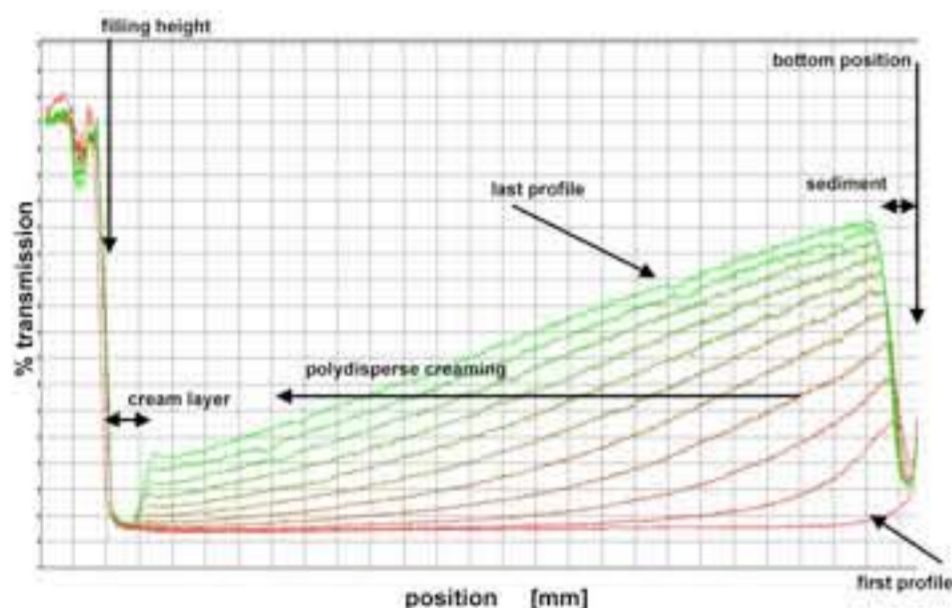
Experimental

6 different soy milk products were obtained from local supermarkets.

After purchase samples were measured with a multisample analytical centrifuge (LUMiSizer – LUM, Germany) at 2300 g for 2 hours to characterize the milk dispersions. The measurement was repeated at lower acceleration (328 g) but for equivalent time (15 hours).

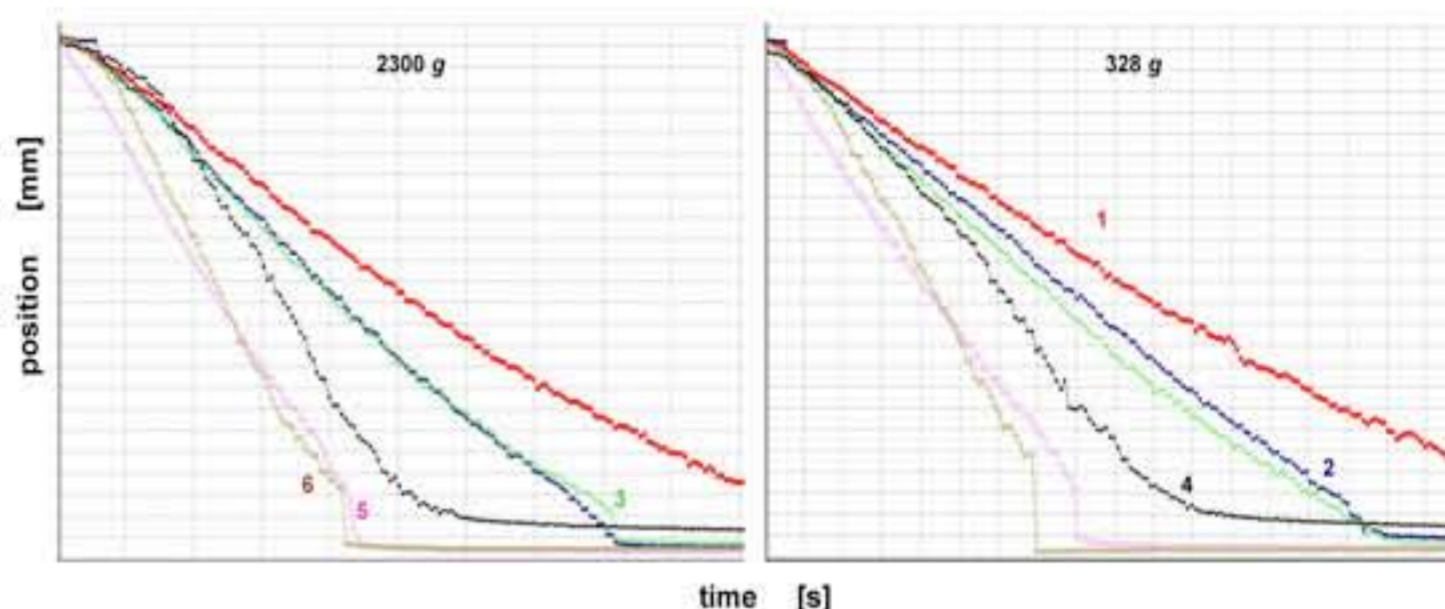
After opening and 10 days storage in a fridge at 4 °C the measurement at 2300 g was repeated to trace changes in dispersion quality due to aging.

principle demixing behaviour



The separation behaviour is characterized by a polydisperse creaming. Simultaneously a fast sedimentation is observed.

creaming kinetics

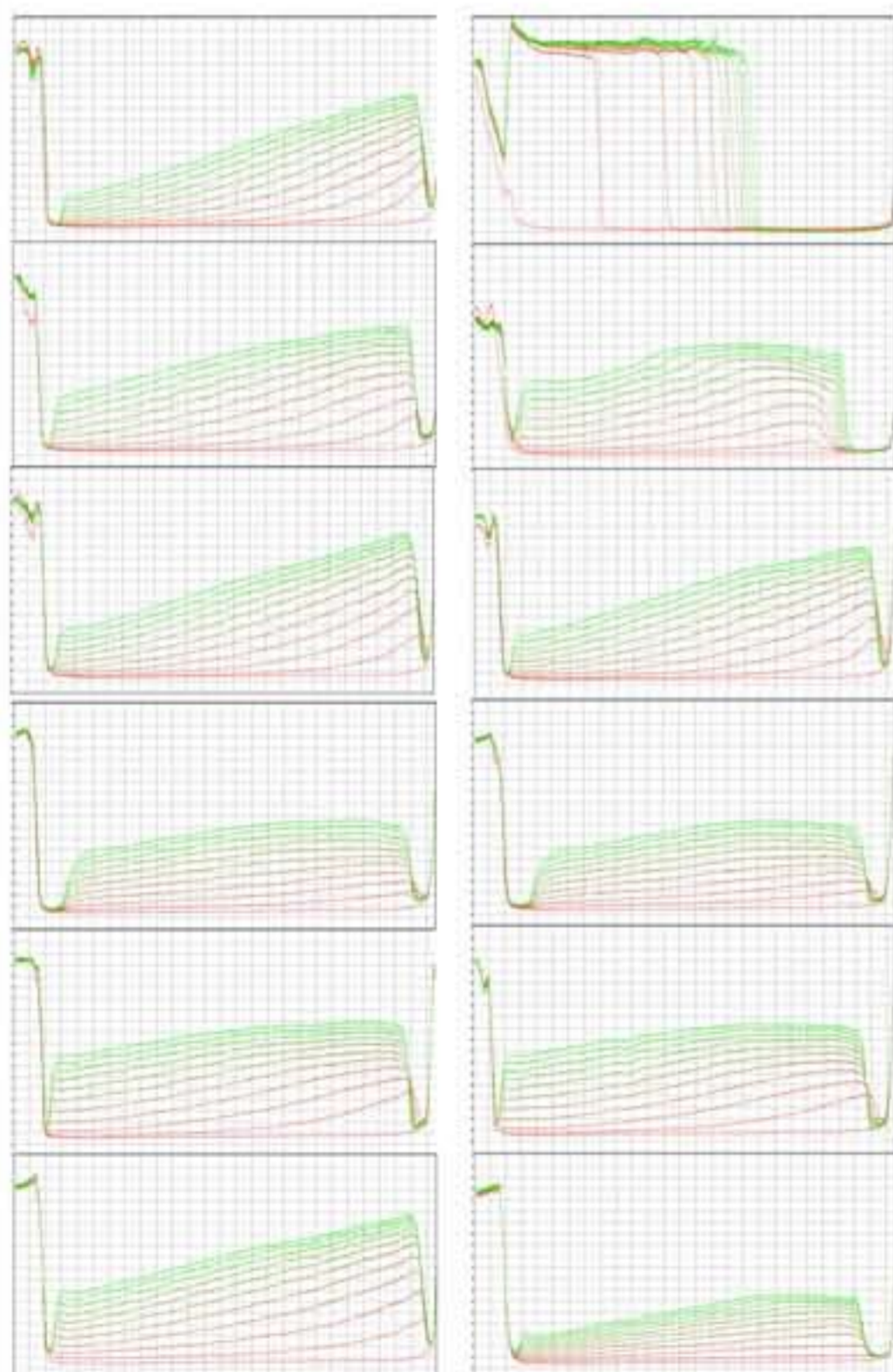


The soy milks exhibit marked differences in creaming kinetics, however the ranking and principle behaviour does not depend on centrifugal acceleration applied.

Comparison of samples – effect of 10 days storage after opening

fresh

after 10 days



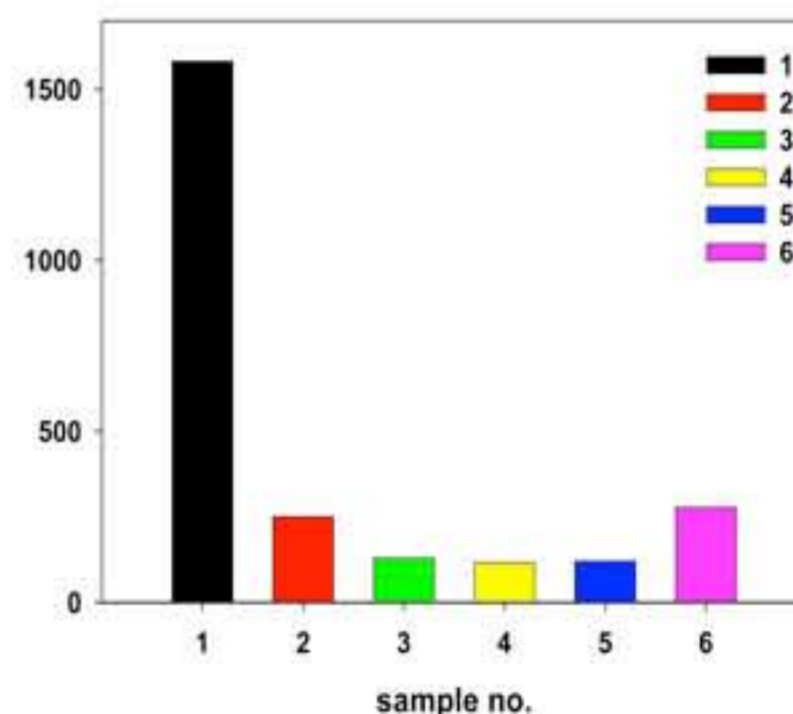
fresh samples (left):

For all samples creaming dominates. There are differences in cream layer (fat) and sediment thickness, but also in the degree of clarification and in the shape of the profiles.

samples after 10 days (right):

There are marked changes in sample 1 which does not show any creaming but zone sedimentation typical for a flocculated network. In general the sediment thickness increases markedly.

This is compared in the bar chart right side.



Conclusion

- Soy milk dispersions and their storage stability were evaluated using multisample analytical centrifugation.
- The demixing of the fresh products is dominated by a polydisperse creaming, but simultaneously fast sedimentation occurs. There are differences in cream layer (fat) and sediment thickness.
- The ranking of the products does not depend on the centrifugal acceleration applied.
- There are marked changes after 10 days after opening and storage in the fridge, especially in relation to an increase in sediment.