Qi technologies

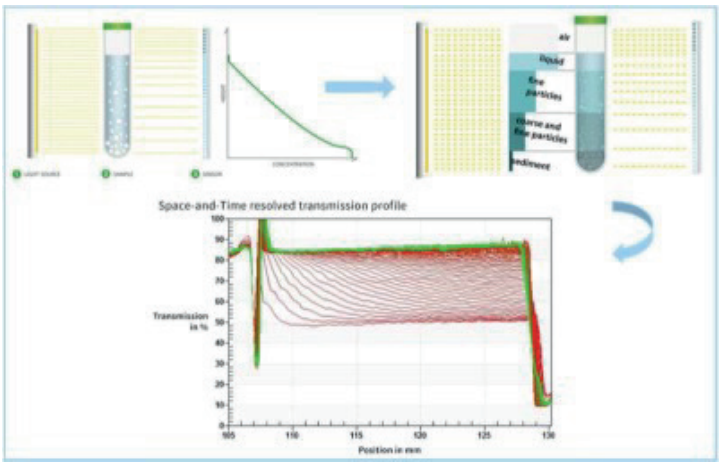
APPLICATION NOTE



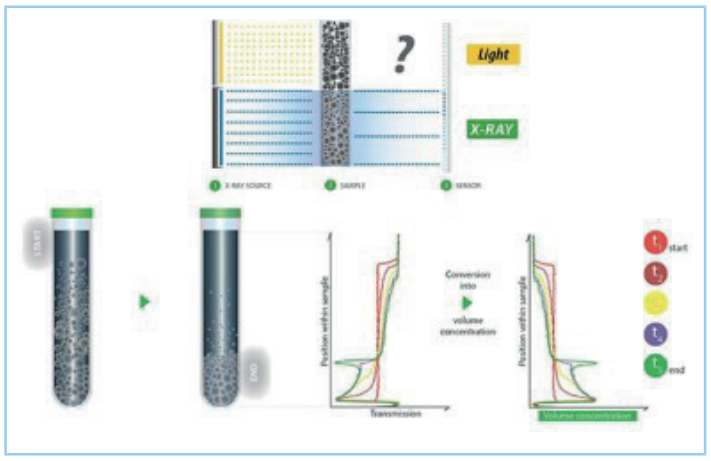




Accelerated Stability Tests of Pesto Genovese - Combined Measurements with LUMiSizer 651 and LUMiReader X-Ray



STEP® TECHNOLOGY - LUMISIZER



STEP® TECHNOLOGY - LUMIREADER X-RAY

INTRODUCTION

Herbs dressing sauces are usually prepared with herbs (basil in the *Pesto Genovese* original recipe), pine seeds, cheese, olive oil, garlic, salt and milk components (serum + powder), all chopped and partially emulsified. These sauces are commonly made fresh or sold with a very short shelf life (weeks).

Pasteurization can increase their stability (up to several months) and render them microbiologically safe. Unfortunately, thermal treatment can reduce the physical stability of these emulsions, leading to a phase separation which may not meet with customer acceptance and overall liking.
For this reason, the prediction of physical stability of these products is a crucial aspect in the definition of their shelf life.

MEASUREMENTS

Freshly prepared *Pesto sauce* aliquots underwent different thermal treatments, as described in the table below.

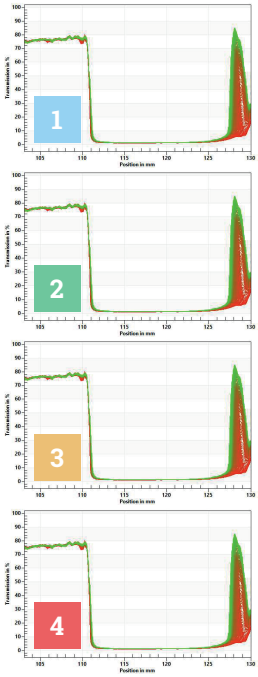
Then, the samples have been tested by a combination of detection techniques based on the LUM STEP-Technology® with NIR light and x-ray transmission

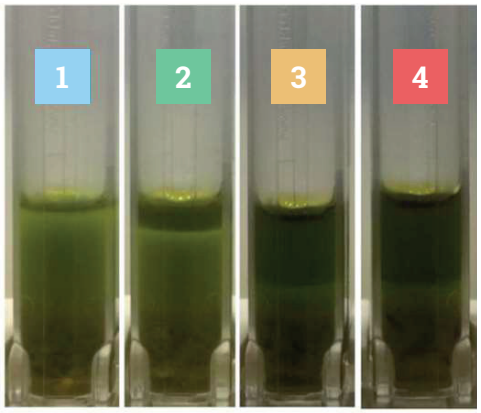
- A pre-scan of sample in the LUMiReader X-Ray to record initial x-ray transmission profile
- An accelerated separation analysis in the LUMiSizer
  - 10000s at 2300g (corresponding to about 9 months at 1g for Newtonian samples)
- A final scan of sample in the LUMiReader X-Ray to record final x-ray transmission profile (concentration profiling)

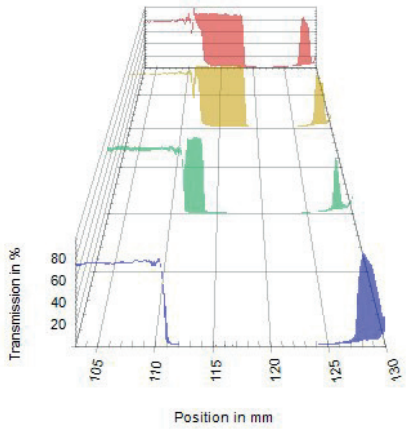


Sample	Temperature	Time
Sample 1	94 °C	0 min
Sample 2	94 °C	20 min
Sample 3	94 °C	45 min
Sample 4	94 °C	70 min

LUMISIZER FINGERPRINTS





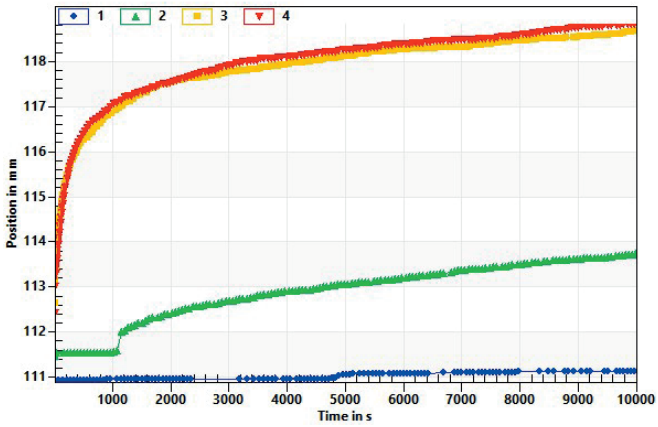


Untreated sample shows:

- an important aqueous phase separation (bottom of the cell)
- no sign of oil separation (top of the cell)

Increasing thermal treatments lead to increasing oil phase separations

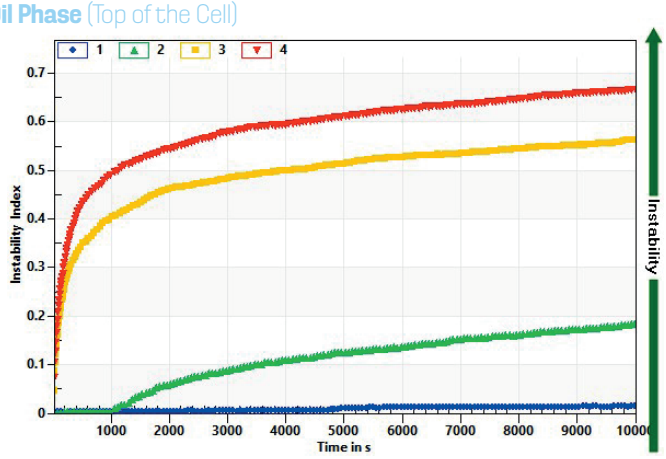
FRONT TRACKING ANALYSIS



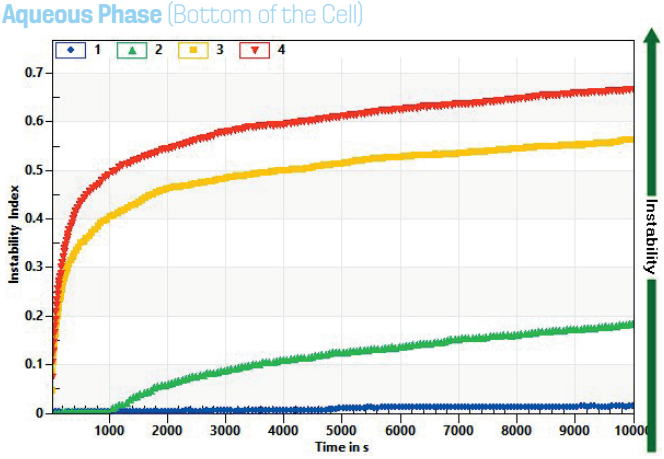
Sample	v (mm/s)		Oil Layer Thickness
	Time range 0÷300 s	Time range 4000÷7000 s	
Sample 1	0.1818	0.0597	0.3 mm
Sample 2	0.2321	0.1501	2.2 mm
Sample 3	14.37	0.1431	6.0 mm
Sample 4	15.26	0.1358	6.3 mm

STABILITY ANALYSIS

Oil Phase (Top of the Cell)



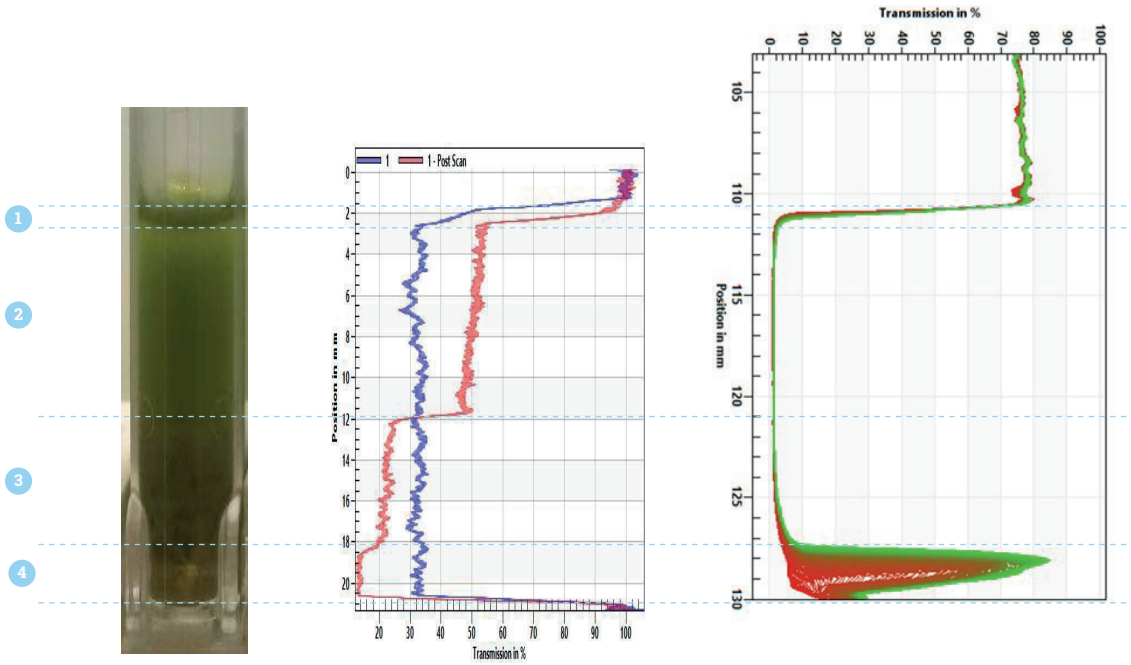
Aqueous Phase (Bottom of the Cell)



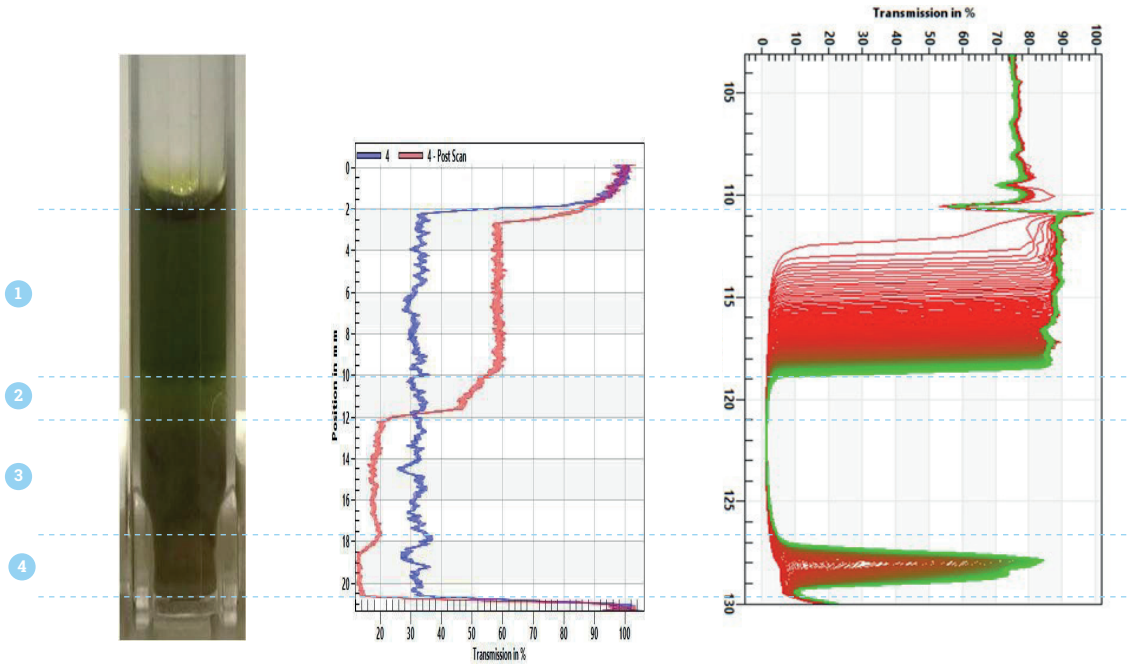
INTEGRATION LUMISIZER / LUMIREADER X-RAY

- LUMiSizer can detect both oil and aqueous separations, it is not able to discriminate the concentrated and opaque phases of emulsionant and sediment.
- To this purpose, LUMiReader X-Ray was used before (in blu, below) and after (in red, below) the LUMiSizer centrifugal analysis.

SAMPLE 1



SAMPLE 4



1. **Oil phase:** Visible in NIR and X-Ray
2. **Emulsion:** Visible in X-Ray (NIR cannot discriminate from sediment)
3. **Sediment (Basil leafs and pines):** Visible in X-Ray (NIR cannot discriminate from emulsion)
4. **Aqueous phase:** Visible in NIR and X-Ray

CONCLUSIONS

Pesto Genovese, such as other sauce dressings and food emulsions, is a quite complex material, composed of partially emulsified oil phase, aqueous phase and chopped solid ingredients.
A combined measure with LUMiSizer and LUMiReader X-Ray can provide a complete knowledge of the physical stability of these complex samples, and predict their shelf life.

LUMiSizer:

- Can detect oil bleeding and aqueous separation.
- Characterize different types of samples directly in original concentration at temperatures relevant for storage, transport and application.
- Analyze in 2-18 h and/or at elevated temperature, depending on the type, instead of waiting for months and years.
- Give fast and reliable results for up to 12 samples simultaneously

LUMiReader X-Ray:

- Characterizes samples with opaque components, when optical methods do not detect changes.
- Characterizes concentration gradients for sediments after accelerated separation for samples in opaque dispersions.

STEP-Technology

Dispersion Analyser	Stability Analyser	Separation & Sediment Analyser
LUMiSizer®	**LUMiFuge®**	**LUMiReader® X-Ray**



Direct and Accelerated Separation

Real-time Separation
Concentration profiling after accelerated separation

Qi technologies

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