# Foam Stability Properties of Food Ingredients

*Reference: LE Bennett, S. Sudharmarajan, K.J. De Silva, J.L. Barnett, M.A. Johnson, R. Stockmann and G.W Smithers*
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## Introduction

The foaming and emulsifying characteristics of proteins are important attributes during the production stage, storage, transport, and consumer perception of quality (appearance) of food dispersions (emulsions and foams). In this contribution, we are concerned with the analysis of foaming, and emulsifying characteristics of different protein

Methods for measuring properties such as foam and emulsion stability are usually empirical and not sensitive enough to differentiate different proteins.

In this application note, the foam stability of different food ingredients containing protein have been investigated in collaboration with the ***Food Science Australia*** using the Turbiscan™ technology.

## Reminder on the technique

Turbiscan® technology, based on Static Multiple Light Scattering, consists on sending a light source (880nm) on a sample and acquiring backscattered (BS) and transmitted (T) signal all over the sample height. By repeating this measurement over time at adapted frequency, the instrument enables to monitor physical stability.

The signal is directly linked to the particle concentration (φ) and size (d) according to the Mie theory knowing refractive index of continuous ($n_f$) and dispersed phase ($n_p$):

$$BS = f(\varphi, d, n_p, n_f)$$

## Method

Different food ingredients containing proteins have been investigated to evaluate their foaming properties. Three proteins have been selected from commercial source:

- Total milk protein (**TMP**, TP=83.4%)
- Whey protein concentrate (**WPC**, TP=70.5%)
- Egg white powder (**EWP**, TP=75.8%)

And three proteins have been prepared in pilot facilities at Food Science Australia:

- Skimmed milk powder (**SMP**, TP=75.8%)
- caseinate (**CAS** , TP=75.2%)
- β-lactoglobulin-enriched protein powder (**BF**, TP=78.8%)

The True protein percentage was determined by the difference between Kjeldahl total and non-protein nitrogen.

Foams were prepared using a blender (Braun) with whisk attachment, after dissolution of 100 mg/g of true protein. Foams are then characterized using the Turbiscan by scanning them every minute during a period of 10 minutes.

## Results

### 1. Raw data

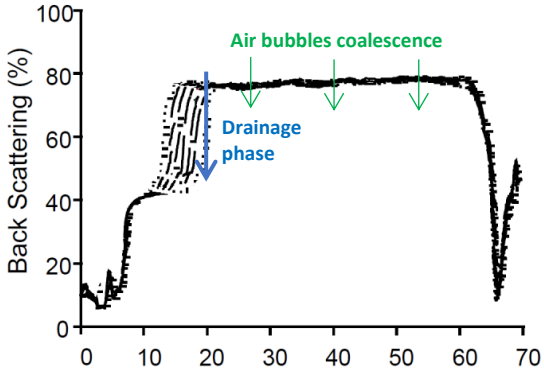


*Figure 1: Backscattering intensity versus sample height*

The stability of the foams is very easily visualized by looking at the raw data in backscattering (Figure 1). At the bottom of the sample an important decrease of the intensity of backscattering is observed due to the drainage of a liquid. Moreover all over the height of the sample a global decrease is measured meaning an increase of the air bubbles size.