Online Particle size and Stability measurement by Static Multiple Light Scattering (SMLS)

- Complete dispersion characterization -

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Static Multiple Light Scattering (SMLS) has been shown to be a straightforward technique for the characterization for dispersions without dilution and on a large range of concentration (0,001 up to 95% v/v), as multiple scattered light in backscattered and transmitted mode is directly related to concentration and size of scatterers present in the sample [1].

The use of SMLS for stability measurement of various dispersion types has already been described in the literature [2]. The principle is based on repeated scans over the whole height of dispersion samples such as emulsions or particle suspensions. Starting from a homogeneous dispersion, the variation of backscattered or transmitted light can be attributed to destabilization phenomena, such as migration (sedimentation, creaming) or particle size change (coalescence, flocculation) [3].

We have developed two experimental set-ups for online SMLS experiment to understand the impact of the formulation and the process parameters on particle size and dispersibility of the dispersion. The SMLS experiment is perform at high speed (10 measurement per seconds), with no dilution, and under agitation (applied directly in the mixing vials) or by creating a bypass/loop from any reactor (using a peristatic pump) for a real time monitoring of the process.

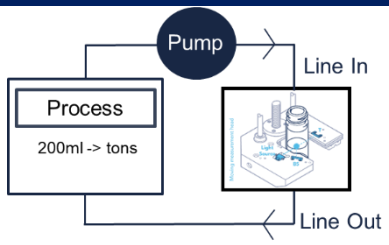
SMLS under agitation

Agitation applied inside the measurement vials

20ml cell

SMLS in your reactor

Turbiscan vials connected to the reactor



In this work we will present a complete study for the development of a new emulsion formula using SMLS under flow to study emulsification properties of surfactant and the influence of the process parameters (ultraturrax speed, mixing time…). Finally, the study will link the the dispersion state measured during the process and the long-term stability at rest.

[1] Bohren, C. F. et al. *Absorption and Scattering of Light by Small Particles*; John Wiley & Sons, Inc., **1983**.

[2] Lemarchand, C et al. *International Journal of Pharmaceutics* **2003**, *254* (1), 77–82.

[3] Araújo, J. et al. *Colloids and Surfaces B: Biointerfaces* **2009**, 72 (1), 48–56.