Application Note – Colloid Analysis

Inline Particle Measurement

In many manufacturing processes of dispersions like printing inks or Inkjet inks there is a growing demand to measure the dispersions already during the production in real-time. This allows for a very good process control as well as an energy efficient product manufacturing. Furthermore, by continuous measurement an excellent quality assurance of the manufacturing process or the end product can be achieved. [1]

A common measurement method with the production of Inkjet inks is the particle size measurement as the pigment size has a decisive influence on the colour properties. However, the instruments that are currently available on the market for particle characterization are not suitable for inline measurement during the production process. The reasons are the often necessary sample dilutions, the limited particle size and/or concentration measurement range and the relatively long duration of a measurement data set acquisition. [1]

Figure 1: IPAS module for DLS measurements and online sensor head

In the context of a public funded ZIM-project Particle Metrix GmbH, as project coordinator of a consortium, develops a new Inline Particle Analysis System – IPAS. With IPAS it shall be possible to characterise products with a particle size of 0.8 nm to 10 µm inline by means of Dynamic Light Scattering (DLS) during production. [1]

In future, the new type of sensor head, shown in **Figure 1**, can directly be integrated in the manufacturing process (Figure 2) and can include an additional sensor which, for example, allows the determination of colour characteristics or of concentrations and the crystallinity of particles. By a live data acquisition, the correlation of the colour characteristics with particle size distribution and the solid concentration in dependency of the manufacturing progress is realised. With a large data base it will be possible to obtain information about the actual manufacturing progress of established Inkjet inks, whereby conclusions on the efficiency of the pre-set processing parameters can be drawn. In conclusion, a faster process optimisation can be achieved [1]

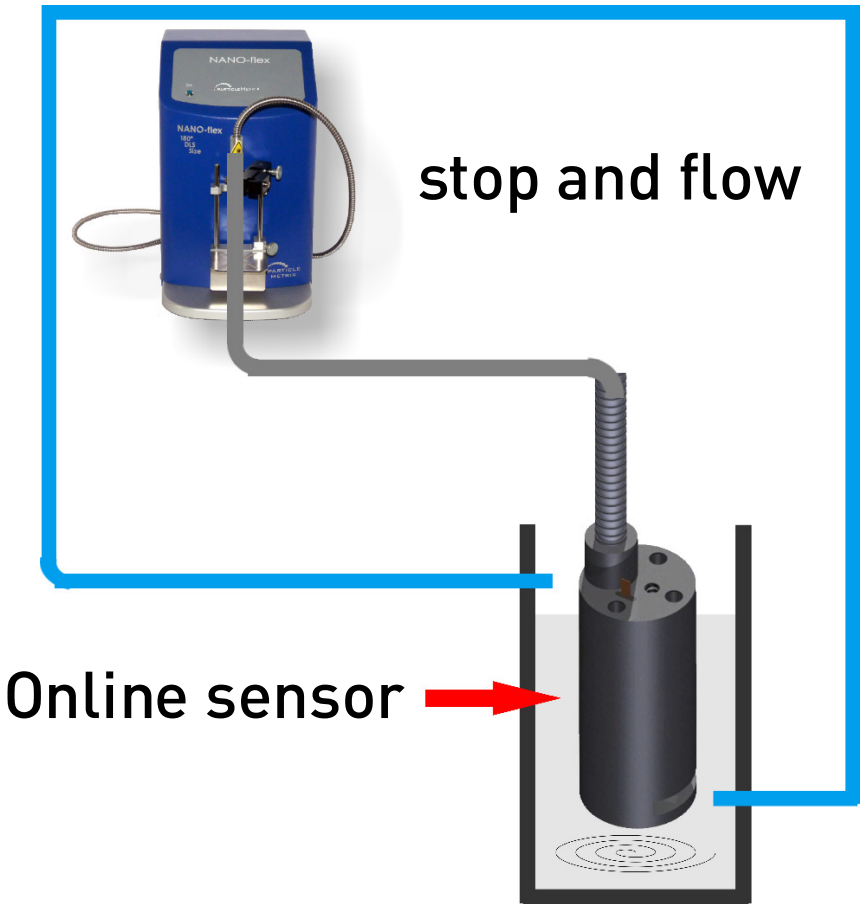

Figure 2: Newly developed online measuring head

The first tests with the new online measuring head have already been conducted and also been published. As can be seen in **Figure 3**, a sample with a size of ca. 300 nm particle diameter was measured. Part one shows an unstirred sample with the normal DLS sensor. In part two, the sample now was stirred. In the third section, the new online measurement head was mounted and the sample was measured unstirred, whereas in part four, the sample was stirred. [2]

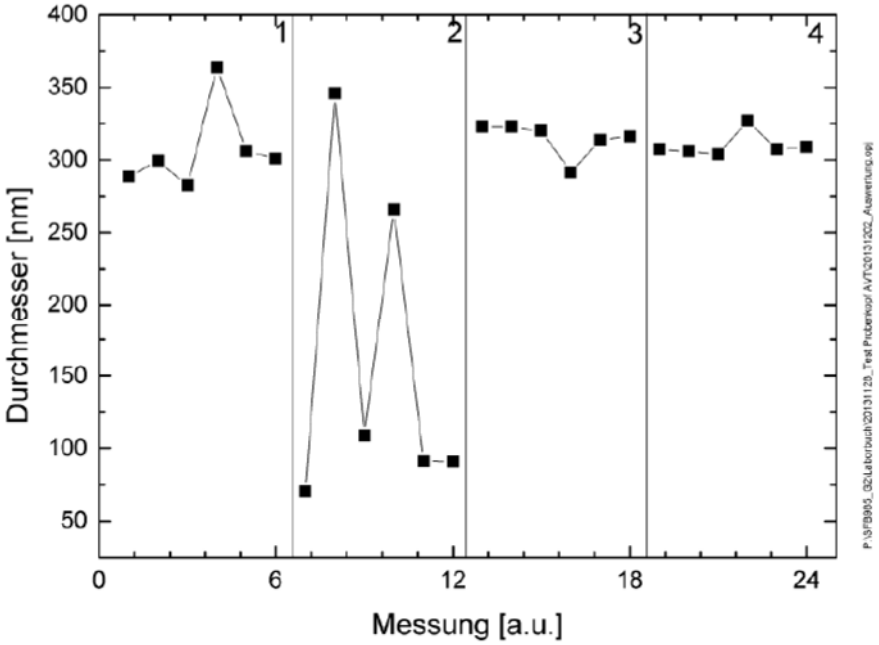

Figure 3: Measurements without online measuring head (1 and 2) and with online measuring head (3 and 4) in unstirred (1 and 3) and stirred (2 and 4) state (taken from [2]).

By those test measurements it can very good be seen that, in combination with the new IPAS online measuring head, DLS measurements now can also be performed in moved media.

(1) Newsletter Nanonetz Bayern e.V., Ausgabe Oktober 2016

(2) DE KANTER, Martinus, et al. Enabling the measurement of particle sizes in stirred colloidal suspensions by embedding dynamic light scattering into an automated probe head. Measurement, 2016, 80. Jg., S. 92-98.