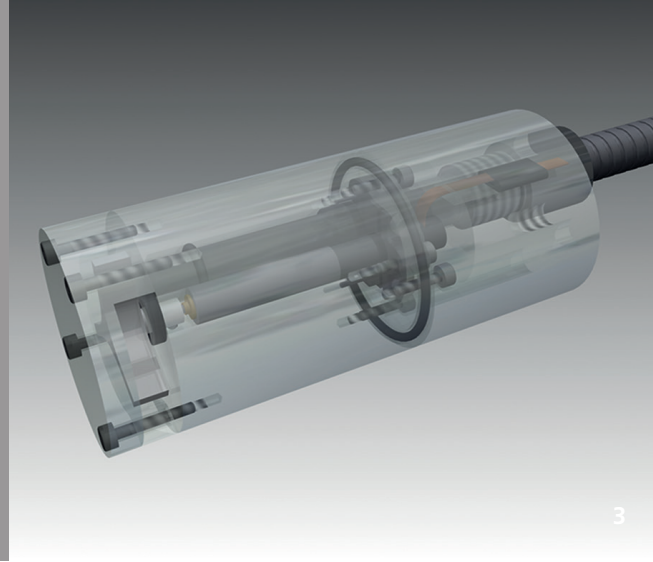


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## INLINE PARTICLE ANALYSIS WITH DYNAMIC LIGHT SCATTERING

### Task

Particle sizes ranging from a few nanometers up to several micrometers play a crucial role in many chemical processes and influence a product's properties decisively. Optical methods for particle analysis in this size range – such as dynamic light scattering (DLS) – are usually off-line processes so that it is not possible to directly monitor production processes such as polymerization reactions or grinding and dispersing processes.

### Method

Dynamic light scattering is based on an optical measurement of the natural movement of particles in liquids (Brownian motion). The movements of the particles are superimposed by convection movements in an active mixed reactor so that DLS measurements cannot be used in such an environment. A fiber-optic backscatter probe was equipped with a new sensor head which enables »in-situ sampling«, and a small sample volume was separated from the surrounding fluid by means of a rotary impeller. This makes it possible to conduct in-line monitoring of particle size in actively intermixed fluids.

### Result

The new probe was developed and built in cooperation with the RWTH Aachen University (SFB 985 – Functional Microgels and Microgel Systems). Comparative measurements between an offline measurement after sampling and an inline measurement in a vigorously stirred beaker show the functionality of the new measuring head.

### Applications

Inline DLS measurement technology can be applied in all processes in which particle sizes between a few nanometers and a few micrometers have to be process monitored inline and measured without sampling. Examples are the monitoring of chemical polymerization reactions, the production of paints and varnishes, processes in the food industry (milk and dairy products) and various grinding and dispersion processes.

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- 2 *Measuring head for inline DLS measurements.*  
3 *Construction drawing of the measuring head.*