

**Probing the microstructural origin of complex flow behaviour with in situ Small Angle Neutron and X-ray Scattering**

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Abstract

Soft matter materials can classically be characterized by their mechanical response to shear flow which is called rheology. Knowledge of the material structure in flow is, however, crucial to understand, predict and tune flow behaviour and therefore the rheological response. In this talk I will show how time-resolved scattering techniques that probe the structure of materials *in situ*, so during the rheological experiment, can be exploited to make the link between micro structure and macroscopic response. First I will introduce stroboscopic- SANS as a technique to probe at a high time-resolution the response of several rod-like colloids to a dynamic oscillating shear flow. It will be shown that subtle differences between the systems cause different microscopic responses, although the macroscopic rheological response is very similar. Second, we studied ordered dispersion of colloidal platelets, the most common colloidal system in nature, in shear flow. A novel X-ray set-up was used, which allows 3—D reconstruction of the structure and highlights the effect that confinement has on complex flow behaviour.