PSI Center for Neutron and Muon Sciences

NEUTRONS FOR SOCIETY

PhD Position in Soft Matter science

This PhD project aims to investigate structural and rheological responses of wormlike micelles (WLMs) – a dynamic, viscoelastic model system - under high-shear conditions. This PhD project, embedded in a collaboration led by PSI and ILL - with NIST, ISIS, and Diamond Light Source – also focusses on developing a high-shear capillary rheometer for Small-Angle Scattering (SAS), and enable soft matter studies under controlled shear – bridging local nanostructure (SANS) and macroscopic rheology. Using the rheometer's high-shear rates, we hypothesise that WLM lengths will become detectable via SANS, allowing simultaneous structural and rheological analysis, coupled with high-speed birefringence measurements. In collaboration with experts, the PhD student will develop experimental and modelling tools to explore parameters related to fluid dynamics, flow control, geometry, composition, and temperature. This research seeks to bridge fundamental science and industrial applications, creating a framework for optimising processes (*e.g.* mixing, pumping, extrusion). Insights will enhance manufacturing design, material performance, and process efficiency, advancement of soft matter physics, and will demonstrate the power of an additional sample environment for the user community.

This PhD project is in collaboration between PSI and ILL. Throughout the PhD, the student will be enrolled at ETH Zürich. The PhD student will spend the first year in Switzerland at PSI in the Soft Matter group, supervised by Dr. Ashley Williams (co-responsible SANS-I), Dr. Viviane Lutz-Bueno (co-responsible SANS-LLB) and Prof. Peter Fischer (ETH). The student will then spend the subsequent 3 years in France at the ILL with Dr. Lionel Porcar (co-responsible D22) in the Large Scale Structures group, making visits to PSI and ETH when needed.

Your tasks

Throughout the PhD you will:

- Be an integral part in the commissioning of the capillary rheometer offline and *in-situ* with SANS.
- Investigate three key wormlike micellar systems under extreme flow to determine their interaction strengths, coupled with flow-induced birefringence and SANS.
- Develop modelling tools to connect scattering and rheological data, relating changes in micellar structure to shear stresses.

Your profile

We are seeking a motivated student who:

- Holds a Master's degree in chemistry, physics, materials science or a related discipline.
- Is actively interested in soft matter science.
- Has experience with Rheology and Small-angle scattering (highly desirable)
- Has experience in programming (*e.g.* Python, MATLAB).
- Has great communication and writing skills in English.

Application

To apply, please send an email including your CV and cover letter to Dr. Ashley Williams (ashley.williams@psi.ch). Applications will be considered until 31st January 2026.