Title: Effect of particle softness on the stabilisation of foams

The 4-years-PhD project aims the understanding of the effect of mechanical properties of soft particles on the structure and stability of foams that are stabilized by those soft particles. Temperature sensitive Polyethyleneglycol methacrylate (PEGMA) and poly-N-isopropyl acrylamide (PNIPAM) based microgels will serve as model systems for soft particles. The effect of size, stiffness and inner structure of the microgels on foam properties will be explored. The structure of the respective foams will be analysed by small angle neutron scattering (SANS). Based on models developed already by the project supervisors for simpler foams, a model is aimed to be developed which allows to fit SANS data of foams with different structures and different liquid content. Since foams consist of foam films with two opposite air/water interfaces, the structure and adsorbed amount of microgels at the air/liquid interface will be studied by neutron reflectometry (NR). The project also includes the synthesis and characterization of the microgels.

The proposal is in the broader context to understand foam properties via a multiscale approach from the properties of single microgels via the ones of single planar interfaces, foam films and bubbles towards macroscopic foams (Fig. 1).

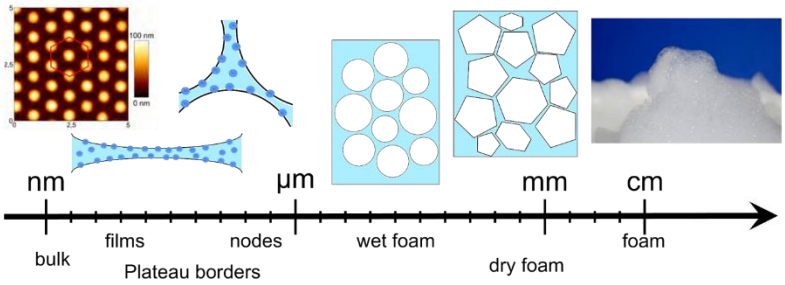

Fig. 1: Hierarchical representation of microgel stabilized foams, spanning from nm to macroscopic length scales.

The total duration of the project will be **4 years** (2 years financed by **TU Darmstadt**, 2 years financed by **ILL**). The doctoral researcher **will start the project (1 year) in the group of Regine v. Klitzing and Olaf Soltwedel (TU Darmstadt, Germany)** and will synthesize and characterize the PNIPAM microgels with light scattering, zeta potential measurements and mechanical indentation AFM experiments. In this period the doctoral researcher will also be introduced to the basics of foams and first characterization with a foam scanner will be performed. During the **following 2 years** the doctoral researcher will be located **at ILL (Grenoble, France)** focusing on NR studies at the air/water interface at Figaro and on SANS measurements at D22 and/or D33, including short visits to the TU Darmstadt. For the **final 1 year** of the project the doctoral researcher will **return to Darmstadt** to write papers and the thesis and defend the PhD thesis.

We are looking for a highly motivated candidate with a M.Sc. in Physics, Chemistry, Material Science or Chemical Engineering. We are offering a collegial, international and interdisciplinary working environment. The ILL is the most intense source of neutrons in the world, and the student will work on cutting-edge large-scale instrument, on a highly international and multidisciplinary campus located at the hearth of the French Alps.

How to apply: Please send an email to Prof. Dr Regine v. Klitzing (klitzing@smi.tu-darmstadt.de) and Dr. Leonardo Chiappisi (chiappisil@ill.fr) with the subject "SCM-2023-20-YourName". Please attach **one pdf** including a brief motivation letter, CV, Bachelor certificate and Master certificate (or score excerpt), a short abstract of your Master thesis and at least one contact person for a reference. You are also welcome to contact Regine v. Klitzing for further information. This project is open for applications until 10th April 2023 and will be closed after this date if a suitable candidate has been found.
Additional details about the specific conditions for the PhD and the application procedure, please consult the following link: https://www.ill.eu/careers/all-our-vacancies/phd-recruitment/open-phd-positions