ESRF	**Experiment title:** Self-assembly of colloidal superballs under uniform compression	**Experiment number**: 26-02-840
Beamline: BM26B	**Date of experiment**: from: 19/10/2017 to: 23/10/2017	**Date of report**: 15/11/2017
Shifts: 12	**Local contact(s)**: Daniel Hermida Merino	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Laura Rossi*, Lucia Baldauf*

Institute of Physics, University of Amsterdam, Science Park 904, 1098XH Amsterdam, NL

Samia Ouhajji*, Andrei Petukhov*

Van't Hoff Laboratory for Physical and Colloid Chemistry, Utrecht University, Padualaan 8, 3584CH, Utrecht, NL

Nicholas Orr*

Physical and Theoretical Chemistry Laboratory, Oxford University, South Parks Road, OX1 3QZ, Oxford, UK

Report:

The objective of this experiment was to determine the effect of shape on the assembly of colloidal particles under uniform compression in a spherical confinement.

Small droplets of aqueous particle dispersions were dried on superhydrophobic surfaces either in air or in a humidity-controlled environment provided by a set-up built ad hoc for the SAXS experiments (Figure 1). Diffraction patterns were measured at regular intervals during the drying process to reveal the evolution of the internal structure during crystal formation. The measurements were repeated at different initial particle concentration and with particles of different shapes. Typical diffraction patterns obtained at increasing time intervals for two samples are shown in Figure 2.

A first analysis of the diffraction patterns suggests that the degree of order in our samples not only depends on the particle shape but on the initial particle concentration and evaporation speed which is set by the relative humidity in the chamber. Some of the samples show distinct patterns, indicating that the macroscopic samples (~ 1 mm) possess a high degree of order.

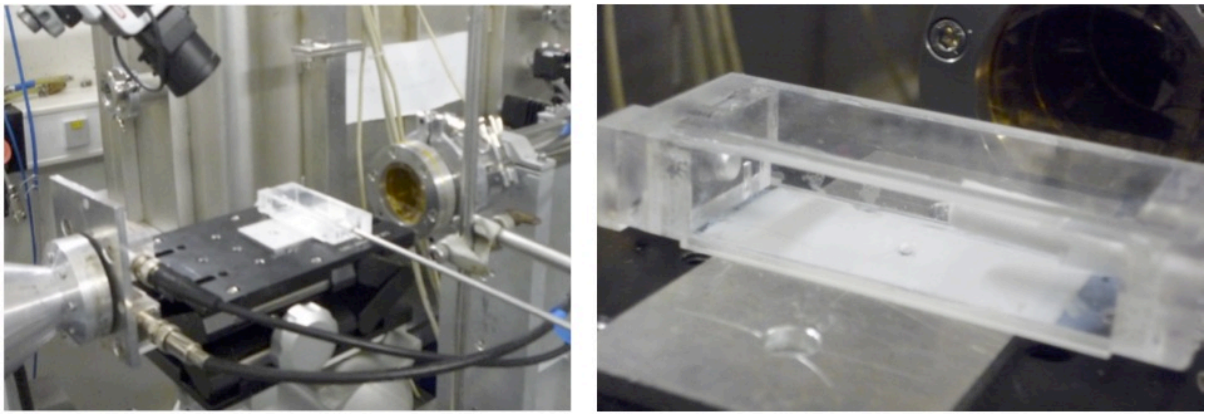

Figure 1 *Overview (left) and close-up (right) of the custom made humidity control setup used for the experiments*.

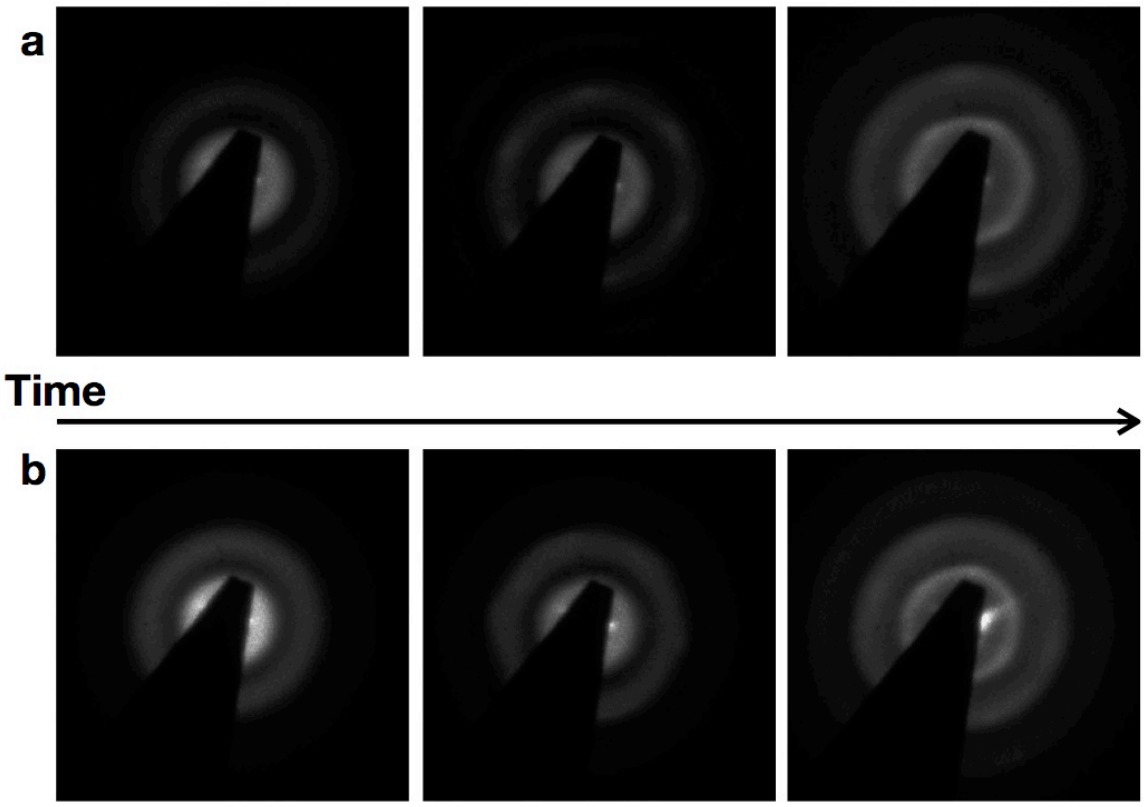

Figure 2 *Typical diffraction patterns obtained in time during the compression process for colloidal particles of different shape (a,b). In time we see the appearance of broad peaks that indicate the formation of ordered structures in the samples.*

Due to the failure of the safety system of the synchrotron, we lost a total of 3 shifts and we were not able to measure all the samples and form factors. However, we collected enough data to perform an in depht analysis of the influence of shape for colloidal particle under uniform compression, which is ongoing.

We would like to thank the DUBBLE team and especially Daniel Hermida Merino for the support throughout the experiment.