

# Humidity chamber for grazing incidence neutron scattering

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The investigation of thin polymer films with neutrons allows a non-destructive probe on their structure and composition. In the framework of the FlexiProb project, which plans an interchangeable sample environment for different neutron experiments at the European spallation source (ESS), we designed a setup for grazing incidence small angle neutron scattering (GISANS). The new sample chamber offers a wide range of adjustable relative humidity with fast switching times. Moreover, a homogeneous heat distribution and reduced condensation of the humid air is realized by a spherical design with fluidic channels inside the chamber walls. A separate gas-mixing and air-flow setup, gives precise control over the air conditions inside the chamber. To demonstrate its options, thin microgel films constituted of thermos-responsive NIPAM with N,N'-methylenebisacrylamide as cross-linkers are placed inside and humidified. The film response is analyzed with time-of-flight GISANS in order to observe structural changes in the films over the course of the humidification.

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