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GISANS at high pressure

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The investigation of thin films with Grazing Incidence Small Angle Neutron Scattering (GISANS) has been established as an advanced characterization method in the last years. Lateral structures from the nanometer to the micrometer range are accessible and different sample environments were developed for GISANS experiments under controlled environmental conditions. However, so far the access to high pressure GISANS was very limited. Therefore, we present recent and ongoing developments at MLZ for GISANS experiments under high pressure. This is a joint collaboration between MLZ and ILL. Based on an existing pressure cell [1] that had originally been used for neutron reflectometry experiments and was used successfully elsewhere, we develop a novel pressure cell for GISANS to be used primarily at MLZ. The pressure cell enables a pressure range between 1 bar to at least 1000 bar, which is highly relevant for thin films in the soft matter area. Particular emphasis is placed in the optimization of the sample volume and cell windows for a robust and versatile operation in GISANS mode to probe thin polymer films. GISANS tests are going to be launched at SANS-1 beamline.

[1] Martin Kreuzer, Thomas Kaltofen, Roland Steitz, Beat H. Zehnder, and Reiner Dahint, “Pressure cell for investigations of solid–liquid interfaces by neutron reflectivity”, Review of Scientific Instruments 82, 023902 (2011)

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