



Sample environment for control of temperature and gas phase composition during the neutron spectroscopy of soft materials

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The gas phase sorption of small molecules into solid soft matter materials has important effects on the transport and mechanical properties of the material. This bulk behavior is often framed at the microscopic level in terms of the activation of certain molecular scale dynamics by the sorbed molecules in a manner analogous to temperature, sometimes referred to as plastisization. Thus the tight control of the temperature and gaseous composition during a neutron spectroscopy measurement may provide important molecular scale understanding. Practical outcomes of the perspective may include the role of sorbed water in: the stability and barrier properties of foods and pharmaceutical excipients; rehydration of bacteria and its applications to biotechnology; and the environmental stability of packaging materials. While often cryostats are used in conjunction with neutron spectroscopy to understand the thermal activation of important dynamics, the deployment of a sample environment for the control of the gas phase environment and temperature around the sample would seem important. Here we show our current state of development of such a sample environment within the geometric measurement constraints of a range of spectrometers: the two-circle cold diffractometer MORPHEUS (Paul Scherrer Institute, Villigen), and two spectrometers at the Heinz Maier-Leibnitz Zentrum (Garching) time-of-flight TOFTOF, and a cold triple axis spectrometer, LaDIFF. The platform, involving 3D printing of the sample chamber, and control of gas mixing system in a flow through system is under active development.

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Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Soft Matter