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Microstructure of food under changing external temperature

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The microstructure as well as the ingredients determine the sensorial perception of food. The mixture of various ingredients leads to complex interactions that are not completely understood. Understanding these is a necessary step towards controlling the microstructure, allowing for a wide range of applications in food industry and beyond. To complement the traditionally used imaging techniques, x-ray tomography can provide direct information about the microstructure in a non-invasive way at a high spatial resolution. A new sample environment for the TOMCAT beamline is under construction, allowing the precise control of the thermal boundary conditions in a sub 0°C regime and providing insights into the fundamental physics behind coarsening and other microstructure evolutionary effects. We present the design of the cold stage as well as first results showing the benefits of propagation based phase contrast imaging (PCI). Without PCI, a differentiation between the different phases, and thus quantitative evaluation, is not possible unless contrast agents are added. Measuring the phase contrast allows for an easy discrimination between liquid sugar solution and H₂O ice crystals.

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