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New Insights –How to use neutrons for food and bioprocessing applications

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The preservation of food is one of the most important tasks in food processing. A typical application is lyophilisation or freeze drying and refers to the sublimation of ice to vapour below the triple point. Lyophilisation is employed for dehydrating biopharmaceuticals and high-value foods in frozen state as the structural and nutritional attributes are not affected by the process in contrast to other dehydration techniques. As neutrons are very sensitive for hydrogen molecules, neutron imaging it is a perfect tool to investigate process characteristics.
In this work it is the aim to present an overview of different processes where neutron imaging can be a valuable tool. The focus will be on the freeze-drying experiments, which were carried out at the ANTARES beamline. The results will show the impact of particle size (x1 = 3550 µm and x2 = 70 µm) and solid concentration (c1 = 0.05 w/w and c2 = 0.2 w/w) on drying kinetics and the sublimation front. Also a timeline of different development steps of freeze-drying cells will be shown from the beginning until the current state. At the end an outlook will be given for further planned experiments.

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