Dynamics of pulse protein arrested states – an in situ giSAXS study

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Pulses and beans are important protein sources in the current protein transition, but much of the behavior of pulse proteins in food systems is still unknown. In particular in interface-dominated materials (emulsions, foams, etc), the nanoscopic behaviour of a protein – how they fold, stretch, and lock into place – governs whether a protein assembly ends up as a soft gel, a rigid glass, or something in between.
In our lab we have used high resolution AFM to reveal the intricate superstructures of pulse proteins on air-water interfaces. While the resulting structures are very insightful, they are ex situ and do not provide access to the dynamic mechanisms that give rise to them. In this work we combine high-resolution AFM with synchrotron grazing incidence small-angle X-ray scattering on a liquid interface. This experiment allows us to uniquely follow how protein superstructures are formed in situ during the adsorption and aging process.

Keywords:
Pulse proteins, SAXS, giSAXS, AFM, interfacial structure