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Saccharide-Based Systems for Food Science and Biomedical Applications

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Over past years, using elastic and quasielastic neutron scattering, we studied saccharides and saccharide-lipid complexes of interest for biomedical and food science applications.
In food science, we focused on glucose and two of its polymeric forms, amylose and amylopectin: the two main components of starch. In the temperature range 20K - 350K, they show a dynamic transition similar to that of hydrated proteins. The fact that we observe this feature also in a relatively small molecule like glucose supports the hypothesis that this transition is driven by the interaction of the macromolecule with the fluctuating H-bond network of the solvent.
In pharmacology, nano- and microparticles made up from sugar-lipid complexes find applications as highly biocompatible drug carriers. A detailed understanding of particle–solvent interactions is of key importance in order to tailor their characteristics for delivering drugs with specific chemical properties. We investigated lecithin/chitosan nanoparticles prepared by autoassembling the components in an aqueous solution. The scattering can be described by a simple confined-diffusion model. In the lyophilized state only hydrogens in the polar heads are mobile within the experimental time-window. In hydrated samples, the diffusive dynamics involves also a significant part of the lipid tails.

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