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Equilibrium swelling, interstitial forces and water structuring in phytoglycogen nanoparticle films MICHAEL GROSSUTTI, ERIC BERGMANN, JOHN DUTCHER, Univ of Guelph — Phytoglycogen is a natural, highly branched polymer of glucose that forms dendrimeric nanoparticles. This special structure leads to a strong interaction with water that produces exceptional properties such high water retention, low viscosity and high stability of aqueous dispersions. We have used ellipsometry at controlled relative humidity (RH) to measure the equilibrium swelling of ultrathin films of phytoglycogen, which directly probes the interstitial forces acting within the films. Comparison of the swelling behaviour of films of highly branched phytoglycogen to that of linear and slightly branched polysaccharides in both the high and low disjoining pressure regimes shows that chain architecture plays an important role in determining the short-range repulsion of the chains at low RH and the hydration forces at high RH. By combining ellipsometry with infrared spectroscopy, we find a correlation between the structural rearrangement of the hydrogen-bonding network of the tightly bound hydration water and the inter-chain separation in the highly branched phytoglycogen nanoparticles.

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