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Structure and Hydration of Highly Branched, Monodisperse Phytoglycogen Nanoparticles JOHN ATKINSON, University of Guelph, JONATHAN NICKELS, CHRISTOPHER STANLEY, SOULEYMANE DIALLO, JOHN KATSARAS, Oak Ridge National Laboratory, JOHN DUTCHER, University of Guelph — Monodisperse phytoglycogen nanoparticles are a promising, new soft colloidal nanomaterial with many applications in the personal care, food, nutraceutical and pharmaceutical industries. These applications rely on exceptional properties that emerge from the highly branched structure of phytoglycogen and its interaction with water, such as extraordinarily high water retention, and low viscosity and exceptional stability in water. The structure and hydration of the nanoparticles was characterized using small angle neutron scattering (SANS) and quasielastic neutron scattering (QENS). SANS allowed us to determine the size of the nanoparticles, evaluate their radial density profile, quantify the particle-to-particle spacing, and determine their water content. The results show clearly that the nanoparticles are highly hydrated, with each nanoparticle containing 250% of its mass in water, and that aqueous dispersions approach a jamming transition at $\sim$ 25% (w/w). QENS experiments provided an independent and consistent measure of the high level of hydration of the particles.

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