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(I) Tuning the Physical Properties of Phytoglycogen Nanoparticles Through Chemical Modification

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Phytoglycogen (PG) nanoparticles are hyperbranched, dendritic polymers of glucose that are produced as compact nanoparticles in the kernels of sweet corn. Our measurements of their structure, morphology, hydration and mechanical properties illustrate the unique properties of native PG nanoparticles: they are soft, porous, hairy and hydrated. These physical properties, combined with their digestibility and lack of toxicity, make PG ideal for a broad range of applications in personal care, nutrition and biomedicine. The properties of PG can also be tuned through chemical modification, such as controlled digestion using dilute acids or enzymes, or through covalent attachment of a variety of different chemical groups that can impart charge and hydrophobicity. In this talk, I will describe the properties of native PG particles and how these properties are modified by acid hydrolysis and covalent attachment of cationic groups, anionic groups, and groups that are both anionic and hydrophobic. These simple modifications have produced significant and sometimes dramatic changes to the physical properties of these soft colloidal nanoparticles, opening up new possibilities for applications of this sustainable nanotechnology.

Keyword-1

biopolymer

Keyword-2

nanoparticle

Keyword-3

soft colloid

Author: Prof. DUTCHER, John (University of Guelph)

Co-authors: Dr BAYLIS, Ben (University of Guelph); Ms EL-RAYYES, Yasmeen (University of Guelph); Dr GROSSUTTI, Michael (University of Guelph); Ms MIKI, Carley (University of Guelph); Mr MORLING, Ben (University of Guelph); Dr SHAMANA, Hurmiz (University of Guelph); Mr VAN HEIJST, Nicholas (University of Guelph)

Presenter: Prof. DUTCHER, John (University of Guelph)

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