Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Correlation Between Chain Architecture and Hydration Water Structure in Polysaccharides MICHAEL GROSSUTTI, JOHN DUTCHER, University of Guelph — The physical properties of confined water can differ dramatically from those of bulk water. Hydration water associated with polysaccharides provides a particularly important example of confined water, with differences in polysaccharide structure providing different spatially confined environments for water adsorption. We have used attenuated total reflection infrared (ATR-IR) spectroscopy to investigate the structure of hydration water in films of three different polysaccharides under controlled relative humidity (RH) conditions. We compare the results obtained for films of highly branched, monodisperse phytoglycogen nanoparticles to those obtained for two unbranched polysaccharides, hyaluronic acid (HA) and chitosan. We find similarities between water structuring in the two linear polysaccharides, and significant differences for phytoglycogen. In particular, the phytoglycogen nanoparticles exhibited high network water connectivity, and a large increase in the fraction of multimer water clusters with increasing RH, whereas the water structure for HA and chitosan was found to be insensitive to changes in RH. These measurements provide unique insight into the relationship between the chain architecture and hydration of polysaccharides.

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Date submitted: 05 Nov 2015 Electronic form version 1.4