Adsorption of hemicelluloses onto model cellulose surfaces studied by QCM-D

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Cellulose is the most abundant biopolymer on earth. It is the object of intense research which particularly focuses on nanocelluloses due to their excellent functionalities, such as surface properties, high mechanical performance, barrier properties or thermal stability. In nature, cellulose microfibers are embedded within a network of hemicelluloses and pectins forming the primary plant cell wall [1]. Hemicelluloses are key polysaccharides in the regulation of mechanical properties of plant cell walls during organ development and in fruit texture [2]. Yet the relation between their large structural variability and their mechanical functions remains to be discovered. The study of nanocellulose- hemicellulose complexes offers an attractive mean to further our understanding of the cell wall organization and to develop new biobased materials.

Adsorption of xyloglucan and different apple hemicelluloses [2] onto cellulose was investigated in an attempt to develop our understanding on cellulose-hemicelluloses interactions. Cellulose model surfaces were prepared by spin-coating one layer of cellulose nanocrystals (CNC) onto gold-coated quartz crystals. Hemicellulose adsorbed mass was monitored in situ using a quartz crystal microbalance with dissipation (QCM-D) [3,4]. The impact of hemicelluloses molar mass and sugar composition on adsorption will be reported as these results provide the first steps in the determination of the hemicellulose structural basis determining the regime of adsorption and allowing comparison of adsorption processes.

Références bibliographiques

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