Formulation and characterization of thermosensitive Hydrogels based on Cellulose and Xyloglucan.

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Résumé

The Plant cell wall is a very commonly used system as a source of inspiration for understanding hydrogel systems. Indeed, it's composed of cellulose, hemicellulose and pectin. These compounds form a complex swollen network that can be described as a hydrogel. Cellulose is closely associated with hemicelluloses, for example Xyloglucan, which gives the wall amazing mechanical properties. In this context, we are interested in the formulation of Cellulose-Xyloglucan hydrogels with the objective of formulating materials with high-performance physicochemical and mechanical properties. We will benefit from enzymatic tools such as the presence of the enzyme "b-galactosidase" to obtain hydrogels with thermosensitive properties. A phase diagram has been developed to identify the different CNC-XG systems. We were able to observe between liquid systems, weak gels, strong gels and thermosensitive gels. The liquid-gel phase transition was observed at XG/CNC, XG-DG/CNC ratios greater than that required for full CNC recovery. This increase is probably due to the effective hydrodynamic volume of CNCs due to the formation of XG-CNC complexes. Concentrated hydrogels were developed by dialysis in a 5% PEG solution. The mechanical properties of the systems were evaluated by rheology. The microscopic evaluations were correlated with the viscoelastic moduli (G', G"). Thermosensitive hydrogels have been observed with a reversible thermal transition that varies between 35 and 40 ∘C depending on the concentration. This thermal reversibility offers the possibility of applying these systems in various application, particularly in the biomedical field.

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