**Starch based hydrogels: Formulation of self-assembled starchy hydrogels.**

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Hydrogels are defined as three-dimensional polymer networks, with hydrophilic properties since they are capable of retaining water in their structures without disintegrating 1,2. Concerning their molecular structure, hydrogels can be classified as regular hydrogels with a water absorption capacity of 1 g/g and as superabsorbent hydrogels with a water absorption capacity of 10-1000 g/g that can be formed either by physical or chemical procedures 1,3. Due to their unique properties, hydrogels have become extremely important for various applications in a variety of fields including food, biomedical, pharmaceutical sciences and have been commonly used in encapsulation, drug delivery, food packaging and also in biosensor technologies4. For the preparation of hydrogels, natural polymers are preferred, substituting unsustainable materials such as petrochemicals and synthetic polymers. Among these natural biopolymers, starch has been used to create hydrogels since it is a non-toxic, renewable, biocompatible and biodegradable plant polysaccharide. Starch is mainly composed of amylose (AM) and amylopectin (AP). Due to its nature, starch can be dissolved in excess water upon a specific Temperature, called Gelatinization Temperature. After the completion of this phenomenon (Gelatinization) starch forms a physical reorganization network (retrogradation). This physically formation strategy is the simplest method to create a hydrogel network that is characterized as a self-assembled hydrogel (Xiao, 2013). The ratio of amylose to amylopectin influences the functional properties of starch. High amylose maize starch is a type of Resistant starch that has been associated with the prevention and control of chronic health conditions, including type II diabetes, obesity, colon cancer and cardiovascular diseases.

In this study, we investigate the behavior of different corn starch hydrogels in order to better understand their structure as a hydrogel matrix. We study the effect of normal and high amylose corn starch on the physical crosslinking process used to create hydrogels. Characteristically, starch type and concentration levels (from 8% to 15% w/v) with RS substitutions (2 or 10%) are examined and further characterized for their textural, rheological and morphological characteristics. The study is solely focused on physically produced starch-based hydrogels elucidating the mechanisms of retrogradation in respect to storage time, to flourishing the knowledge on structural characterization of naturally formed hydrogels, due to their unique characteristics. All in all, our results are encouraging for the introduction of “eco-friendly” materials in the Food Industry.

**References**

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