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Polysaccharides are considered to be inexhaustible and renewable resources for modern industrial application as being bioactive, biocompatible and biodegradable. Due to ever-increasing prices of petroleum-based polymers, more interest has been directed to polysaccharide-based materials. Hemicelluloses: polysaccharides, from the agriculture and forest industry and its potential utilization as a green and environment friendly material has not been yet fully explored.

Aerogels are diverse class of porous, solid materials with low weight and density, high surface area, and high mechanical properties. Aerogel is formed by the removal of liquid from a gel, e.g., evaporation of water from a hydrogel. The liquid phase is replaced with air using techniques that maintain the gel structure, enabling the formation of porous materials.

Figure 1: Hemicellulose-based aerogel cubes.

To prepare a Polysaccharide aerogel, first polysaccharides are dissolved into water to make a hydrogel and then water is removed using freeze drying; a process called sublimation, which maintains the structure of gel (Figure 1). The proposed research focuses on the development of novel functional materials from upgraded biopolymers: polysaccharide aerogels. The potential of polysaccharide aerogels is great due to their high water absorption capacity, safety, renewability, sustainability, and low cost. Thus new polysaccharide-based aerogels could find applications as water absorbents, providing mechanical support, biocompatible delivery systems, and encapsulation of active components, such as antioxidants.