

# Porous starch: A Comparative study of Aerogels, Xerogels, and Cryogels

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Porous starches are a special class of bio-based materials with great potential for various biomedical fields, from scaffolds to drug carriers. To control material porosity and morphology is one of the prerequisites for a successful application; the one considered in this work is the substitution of parts of cancellous bones. In this work different porous starch-based materials were made starting from starch dissolution and retrogradation. To make starch aerogels, water in hydrogels was replaced by a non-solvent (ethanol or acetone), and drying was performed with supercritical CO<sub>2</sub> [1]. Xerogels were obtained by drying by evaporation under low vacuum [2]. Finally, cryogels were made by applying freeze-drying on starch hydrogels [1]. Hierarchical morphology was created by leaching-out approach to obtain a material with a structure and properties similar to those of cancellous bone. The influence of concentration and process parameters on material density, porosity, specific surface area and morphology will be presented.

1. Fangxin Zou, Tatiana Budtova, "Tailoring the morphology and properties of starch aerogels and cryogels via starch source and process parameter" *Carbohydrate Polymers* 255, 117344 (2021)
2. Fangxin Zou and Tatiana Budtova, "Starch Alkogels, Aerogels, and Aerogel-like Xerogels: Adsorption and Release of Theophylline" *ACS Sustainable Chem. Eng.* 11, 5617–5625 (2023)