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Preparation and characterization of hydrogels using biopolymers

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Hydrogels are hydrophilic, three-dimensional and expandable matrices that are produced through chemical and/or physical crosslinking of certain polymers. These cross-linked polymers have excellent characteristics, such as swelling, mechanical, permeation, surface and optical properties. In some cases, polysaccharide-based hydrogels have been prepared from a single polysaccharide such as carboxymethyl cellulose (CMC) and starch. In particular, oxidative modification of starch is carried out in order to improve the functionality of compound. The hydroxyl groups, primarily at C-2, C-3, and C-6 positions, are transformed to aldehyde and carboxylic acid by oxidation. In this study, starch aldehyde was formed by oxidation. Polysaccharide hydrogels were prepared by chemical reaction of CMC and starch aldehyde with cross-linker. Epichlorohydrin (ECH) or citric acid was used for crosslinking. The number of aldehyde substitution (DS) was estimated from chemical titration. Depending on the amount of oxidants, the DS of starch aldehydes ranged from 0.47 to 1.52. In case of ECH crosslinking, carboxylate and hydroxyl groups of polysaccharides attack to either epoxide or CH2Cl groups of ECH to form ester linkage. In case of citric acid crosslinking, ester linkage was formed because of anhydride formation and crosslinking between polysaccharide and citric acid. The maximum swelling ratio of hydrogel was about 32.

Biography

Jongshin Park has completed his PhD from North Carolina State University in 1988. He is the Professor of Department of Biosystems and Biomaterials Science and Engineering, Seoul National University. He has published more than 40 papers in reputed journals and has been serving as a Member of Korean Fiber Society.

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