Cellulose-Based Hydrogels and Methods of Making Thereof

Published date: Aug. 16, 2019

Technology description

Unmet Need

Hydrogels are water-insoluble polymers with the ability to swell without dissolution and to retain a large portion of solution within their structure. They have many uses, including contact lenses, wound dressings, tissue regenerative applications, orthopedic applications, drug delivery systems, sanitary napkins, cosmetic implants, and other medical devices. As such, their material properties are highly critical and specific to application. Nonetheless, there is a need for improved hydrogels with customizable and desirable properties, such as high water content, biocompatibility, permeability, tensile strength, thickness, and transparency.

Technology Overview

Johns Hopkins researchers have created cellulose-based hydrogels which possess desirable qualities, and a method of creating them. This method involves activating cellulose with a solvent, optionally removing the solvent, dissolving the cellulose to form a solution and then allowing it to gel. The method includes an option to dry and rehydrate the gel, allowing for both wet and re-wet hydrogels. These gels can be customized with a large range in a variety of properties including cellulose content, tensile strength, strain to failure, suture retention strength, transparency, Young’ s modulus, puncture resistance, tear strength, thickness, transmittance, and water content. The gels can be molded to create contact lenses, corneal in- or on-lays, and medical implants. Several variations of cellulose were used to create the gels, and were subjected to analyses to determine chemical differences, phase differences, and ability to be washed successfully. Crystallinity and cellulose I to II ratios, water content, thickness, tear strength, suturability, and refractive index were also evaluated. Testing demonstrated the versatility and ability to optimize the hydrogels.

Stage of Development

Mechanical/material property testing has been performed extensively, showing a large range of potential property qualities. Tests have been performed with clinical applications in mind, but have yet to be evaluated in clinical settings.

Publications

Patchan MW et al. J Biomater Appl. 2016 Feb;30(7):1049-59.

Application area

适用于治疗眼部伤口的软性隐形眼镜

激光手术，化学灼伤，癌症治疗，活组织切除部位，病原体的疤痕，枪伤或刀刺，整容手术和重建手术引起的伤口

用于伤口敷料应用

Advantages

具有高含水量，高透明度，高透氧性，高生物相容性和高拉伸强度

低内毒素水平

Institution

Johns Hopkins University

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com