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Methods to modify and improvement of bacterial cellulose properties for versatile applications

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Statement of Problem: Nowadays, due to the importance of green materials using bio-products or bio-based products such as biopolymers has attracted much attentions. These biomaterials have many applications in food industry, drug delivery, tissue engineering, and wound dressing and etc. Among all the biopolymers, bacterial cellulose (BC) is one of the most important candidates for such versatile usage. Chemical stability, high degree of polymerization, purity, renewability, high water holding capacity, tensile strength, and nontoxicity are important properties that make it an excellent choice for such applications.

Research Purpose: BC needs to be mixed with other biological or nonbiological material to be used in industries. But it has low affinity to these materials. Therefore, we need to find new ways to modify BC to improve its affinity.

Research Method: In this research related publications were extracted from various sources like Google scholar, PubMed, and Web of science based on key words like cellulose surface modification and bacterial cellulose.

Results and Conclusion: According to our investigation, different ways have been reported to improve the affinity of BC to other compounds, polymers such as chitosan can be crosslinked with BC and donate strength and high water holding capacity to BC for food preservation, functionalizing with nanoparticles and biomolecules, making BC an interesting material for biosensor application, BC can be used as a drug delivery system and wound dressing to deliver antibacterial and antiseptic agents to limit bacterial growth. As an example, it has been used to

control the delivery of curcumin to improve tissue granulation, in addition to its antifungal, anticancer, antibacterial and antioxidant properties. It has been used to deliver lidocaine to promote tissue repair in third degree burns in rats. Also, BC is considered generally recognize as safe by Food and Drug Administration since 1992 and can be used as a dietary fiber.

Keywords: Bacterial cellulose, Biopolymers, cellulose modification