Current issues and potential solutions for the electrospinning of major polysaccharides and proteins: A review

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ABSTRACT

Biopolymers, especially polysaccharides and proteins, are the promising green replacement for petroleum based polymers. Due to their innate properties, they are effectively used in biomedical applications, especially tissue engineering, wound healing, and drug delivery. The fibrous morphology of biopolymers is essentially required for the effectiveness in these biomedical applications. Electrospinning (ES) is the most advanced and robust method to fabricate nanofibers (NFs) and provides a complete solution to the conventional methods issues. However, the major issues regarding fabricating polysaccharides and protein nanofibers using ES include poor electrospinnability, lack of desired fundamental properties for a specific application by a single biopolymer, and insolubility among common solvents. The current review provides the main strategies for effective electrospinning of the major biopolymers. The key strategies include blending major biopolymers with suitable biopolymers and optimizing the solvent system. A systematic literature review was done to provide the optimized solvent system of the major biopolymers along with their best possible biopolymeric blend for ES. The review also highlights the fundamental issues with the commercialization of ES based biomedical products and provides future directions to improve the fabrication of biopolymeric nanofibers.

KEYWORDS

Biopolymers; Electrospinning; Nanofibers; Biological macromolecules

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