

Chitosan-Alginate Membranes encapsulated with antimicrobial nanoparticles for wound healing purposes

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Skin is considered the largest organ of the human body, and its principal function is to protect against diverse agents, being a barrier against bacteria, chemicals and temperature loss. Due to these factors, the skin may become damaged; therefore, treatments involving wound healing and sometimes antimicrobials must be considered. Considering conventional treatments, it is imperative to find alternative solutions to accelerate wound healing. Environmental concerns have promoted the use of natural substances to exploit the available resources and wastes in a circular and, according to the EU policy, blue economy principles, using marine-derived resources; thus, utilizing biopolymers will have a considerably lower impact on pollution [1]. These biopolymers are biodegradable, biocompatible, eco-friendly, and low-cost materials with antimicrobial potential [2]. Among these biopolymers, polysaccharides are the most prominent biomaterials for biomedical applications. Chitosan (CS) and alginate (ALG) have been widely used in wound healing issues [3]. Both are extracted from marine resources, which makes them suitable for such applications. Also, due to the capability to absorb, various bioactive compounds could be encapsulated. The method used for developing this type of membrane is the casting method. Therefore, incorporating nanoparticles such as silver (Ag) and/or zinc oxide (ZnO) with antibacterial, antioxidant and antifungal properties could enhance healing [4, 5]. The presented study aimed to develop chitosan-alginate membranes encapsulated with antimicrobial nanoparticles for wound healing applications. The as-synthesized bio-membranes were characterized by FTIR spectroscopy, SEM, DSC/TGA analysis and water absorption capacity.

Keywords: biopolymers, polysaccharides, antimicrobial nanoparticles, wound healing.

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Figures

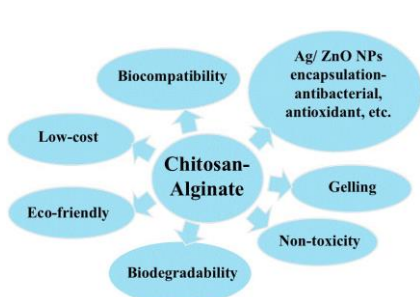


Figure 1. Chitosan-Alginate properties.

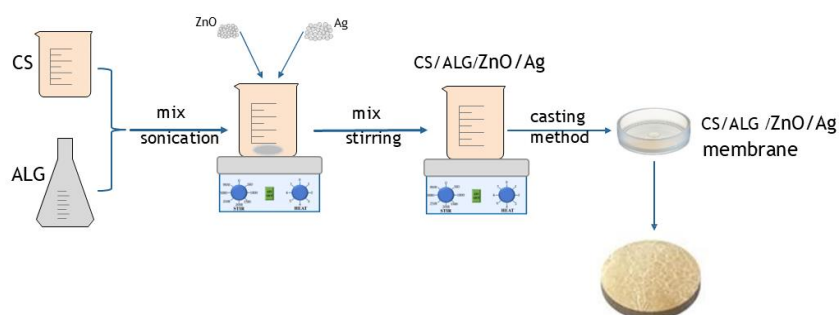


Figure 2. Schematic synthesis - Casting method