

Combination of Alginate and Chitosan Polymers in the Preparation of Nanoparticles-A Mini Review

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ABSTRACT:

Natural polymers, commonly include polysaccharides (chitin/chitosan, hyaluronic acid derivatives, alginate, etc.) and proteins (albumin, collagen, etc.), are non-toxic and biocompatible biomaterials widely used in various biomedical applications (such as drug and/or imaging agent delivery system, tissue regeneration scaffolds, as excipients in pharmaceutical formulations). Especially, alginate and chitosan are widely used for the preparation of drug delivery systems. Unfortunately, the primary drawback of both alginate and chitosan is the lack of strong mechanical properties. However, using the combination of these polymers can enhance their mechanical properties. Besides, the alginate-chitosan nanoparticles had higher drug encapsulation and a slower drug release due to the polyelectrolyte complex structure formed by the interaction between chitosan and alginate.

Keywords: Alginate, chitosan, nanoparticles, polyelectrolyte complex

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1. INTRODUCTION

Polymers can be classified according to their origin (natural or synthetic), function, source (from plants, animals, and microbial sources), polymerization mechanism, polymer structure, preparation techniques, or thermal behavior [1,2]. Natural polymers, commonly include polysaccharides (chitin/chitosan, hyaluronic acid derivatives, alginate, etc.) and proteins (albumin, collagen, etc.), are non-toxic and biocompatible biomaterials widely used in various biomedical applications (such as drug and/or imaging agent delivery system, tissue regeneration scaffolds, as excipients in pharmaceutical formulations) [3,4]. Chitosan is a cationic polysaccharide polymer while alginate is an anionic polysaccharide polymer. Chitosan is obtained by the alkaline deacetylation of chitin that is found in the cells walls of fungi, the exoskeletons of crustacean and insects [5-8].

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