


Gels Horizons: From Science to Smart Materials


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# Ionically Gelled Biopolysaccharide Based Systems in Drug Delivery

 Springer

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## Chapter 4

# Ionic Gelled Chitosan for Drug Delivery

Supriyo Saha and Dilipkumar Pal

**Abstract** The natural polysaccharide obtained from crustacean orthopods like shrimp, lobster, crabs followed by demineralization, decolorization, and deacetylation, known as chitosan which was reacted with tripolyphosphate as crosslinking agent with pH adjustment obtain micro/nanoparticle. This technique was a way to deliver a formulation with improved surface topology, particle size, polydispersity index, and modified surface charge for attachment of functional groups of positively charged polymer as chitosan, that have been used for drug delivery of MDA-MB-231, doxorubicin to treat breast/skin/colorectal cancer, bovine serum albumin, *Saturejahortensis* essential oil to treat acaricide, of zinc in MACS 3125 and UC1114 wheat cultivars, particular gene, tacrine, amoxicillin to treat *Helicobacter pylori*, luciferase PVAX1-Luc with in vitro transfection efficiency and also these nanoparticles showed inhibition of *Aedes aegypti*, *Candida albicans* with wound healing and mercury adsorption properties. The chapter describes preparations, physicochemical properties, and drug delivery applications of various ionically gelled chitosan.

**Keywords** Chitosan · Sodium tripolyphosphate · Drug delivery · Acaricidal · Antifungal · Anticancer · Peptic ulcer · Gene delivery

## 1 Introduction

Chitosan was discovered from the shells of crustacean orthopods like shrimp, lobster, crabs, etc. [15, 29]. Then the shells were treated with lactic acid or *Pseudomonas aeruginosa* followed by treatment with protease enzyme or base treatment to make it free from mineral and protein, respectively [19, 27, 28]. Then the extract was reacted with acetone to become colorless followed by reacting with deacetylase enzyme to

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