

# Biopolymer Applications: Biomedical and Industrial

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## Editorial

The purposes of biopolymers can be categorised below two important fields, which vary due to their biomedical and industrial use.

### Biomedical

Because one of the fundamental functions for biomedical engineering is to mimic physique components to maintain everyday physique functions, due to their biocompatible properties, biopolymers are used vastly for tissue engineering, clinical gadgets and the pharmaceutical industry [1]. Many biopolymers can be used for regenerative medicine, tissue engineering, drug delivery, and normal scientific functions due to their mechanical properties. They supply traits like wound healing, and catalysis of bio-activity, and non-toxicity. Compared to artificial polymers, which can existing more than a few dangers like immunogenic rejection and toxicity after degradation, many biopolymers are commonly higher with bodily integration as they additionally possess greater complicated structures, comparable to the human body [2].

More specifically, polypeptides like collagen and silk are biocompatible substances that are being used in floor breaking research, as these are less expensive and without problems workable materials. Gelatin polymer is regularly used on dressing wounds the place it acts as an adhesive [3]. Scaffolds and videos with gelatin permit for the scaffolds to preserve tablets and different vitamins that can be used to provide to a wound for healing.

As collagen is one of the extra famous biopolymer used in biomedical science, right here are some examples of their use:

Collagen based totally drug transport systems: collagen movies act like a barrier membrane and are used to deal with tissue infections like contaminated corneal tissue or liver cancer [4]. Collagen videos have all been used for gene shipping carriers which can promote bone formation.

**Collagen sponges:** Collagen sponges are used as a dressing to treat burn victims and different serious wounds [5]. Collagen based totally implants are used for cultured pores and skin cells or drug carriers that are used for burn wounds and changing skin.

**Collagen as haemostat:** When collagen interacts with platelets it motives a speedy coagulation of blood. This speedy coagulation produces a brief framework so the fibrous stroma can be regenerated with the aid of host cells [6]. Collagen based totally haemostat reduces blood loss in tissues and helps manipulate bleeding in mobile organs like the liver and spleen.

Chitosan is some other famous biopolymer in biomedical research. Chitosan is derived from chitin, the important issue in the exoskeleton of crustaceans and bugs and the 2d most considerable biopolymer in the world [7]. Chitosan has many terrific traits for biomedical science. Chitosan is biocompatible, it is especially bioactive, which means it stimulates a recommended response from the body, it can biodegrade which can get rid of a 2d surgical operation in implant applications, can shape gels and films, and is selectively permeable. These residences enable for a range of biomedical purposes of Chitosan.

**Chitosan as drug delivery:** Chitosan is used basically with drug concentrated on due to the fact it has plausible to enhance drug absorption and stability [8]. In addition Chitosan conjugated with anticancer marketers can additionally produce higher anticancer outcomes by using inflicting gradual launch of free drug into cancerous tissue.

**Chitosan as an anti-microbial agent:** Chitosan is used to quit the boom of microorganisms. It performs antimicrobial features in microorganisms like algae, fungi, bacteria, and gram superb microorganism of one-of-a-kind yeast species.

**Chitosan composite for tissue engineering:** Blended energy of Chitosan alongside with alginate are used collectively to shape practical wound dressings. These dressings create a moist surroundings which aids in the recovery process [9]. This wound dressing is additionally very biocompatible, biodegradable and has a porous shape that lets in cells to develop into the dressing.

### Industrial

**Food:** Biopolymers are being used in the meals enterprise for matters like packaging, fit to be eaten encapsulation movies and coating foods. Polylactic acid (PLA) is very frequent in the meals enterprise due to its clear colour and resistance to water. However, most polymers have a hydrophilic nature and begin deteriorating when uncovered to moisture [10]. Biopolymers are additionally being used as suitable for eating movies that encapsulate foods. These motion pictures can elevate matters like antioxidants, enzymes, probiotics, minerals, and vitamins. The meals bump off encapsulated with the biopolymer movie can provide these matters to the body.

**Packaging:** The most frequent biopolymers used in packaging are polyhydroxyalkanoate (PHA), polylactic acid (PLA), and starch. Starch and PLA are commercially accessible and biodegradable, making them a frequent preference for packaging. However, their barrier residences and thermal houses are now not ideal. Hydrophilic polymers are no longer water resistant and permit water to get thru the packaging which can have an effect on the contents of the package. Polyglycolic acid (PGA) is a biopolymer that has exquisite barrier traits and is now being used to right the barrier barriers from PLA and starch.

**Water purification:** Chitosan has been used for water purification. It is used as a flocculant that solely takes a few weeks or months as a substitute than years to degrade into the environment. Chitosan

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purifies water by way of chelation. This is the manner in which binding websites alongside the polymer chain bind with the steel in the water forming chelates. Chitosan has been proven to be a terrific candidate for use in storm and waste water treatment.

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### Conflict of Interest

The authors declare that they are no conflict of interest.

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