

such as lysozyme and nisin in food. Preserving the food item with these combined technologies will result in better antimicrobial effects, which helps in improving the shelf life of the food product [87–89]. In another study, Mecitoglu *et al.*, [90] examined the effect of incorporation of lactoperoxidase (LPS), separated from bovine, into alginate films. The findings revealed immobilization of the enzyme resulting from the treatment, emphasizing the role of antimicrobial components of thiocyanate present in the films. Some authors even showed that antimicrobial films facilitate constant migration of antimicrobial agents from film to food, rendering safety during shipment and storage [91]. For safe production of such biofilms, plasma treatment or electron irradiation has been practiced.

In a similar endeavor, researchers have developed polyelectrolyte structured packaging with antimicrobial properties [19]. Prepared with cationic starch, sodium alginate, and starch, the film promises high antimicrobial potency, as reported. These films showed good thermal stability and increased glass transition temperature with the increase in sodium alginate content. The experiment proved that polyelectrolyte sodium alginate packaging has good antimicrobial property and can be used as suitable food packaging material.

11.7 Effect of Alginate on the Quality of Food

Alginate employed in the design of food packaging materials has a considerable effect on the food also. According to Cha and Chinnan [10], alginate coatings prepared with glucose oxidase extend the shelf life of raw fish, including the winter flounder fish [92]. Other advantages include delayed purification and consequent prolonged sensory acceptance. In another study, maintenance of color and gloss was observed in alginate-coated cheese [93]. Additionally, alginate packaging reduces the loss of moisture and resists microbial spoilage in food materials, and this packaging could be made as an edible biofilm. Unlike conventional polymers, alginate packaging shows no negative impact on the quality of foods.

There are several other findings as well, reflecting beneficial effects of alginate in food packaging. Recently, Jost *et al.*, [17] described the use of calcium alginate as edible coating for the improvement of quality of pork patties. Alginate can also be used to enhance the color and flavor properties of frozen shrimps [94]. In another study on meat, Williams *et al.*, [31]