

TAL 797 – Seminary

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## CHITIN AND CHITOSAN: SUSTAINABLE BIOPOLYMERS FOR INNOVATIVE FOOD APPLICATIONS

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**Level:** (x) MS ( ) PhD”


Chitin is widely recognized as the second most abundant natural biopolymer present in the exoskeletons of marine animals, insect cuticles, and significantly within the cell walls of fungi. Chitin possesses valuable characteristics for the food industry. However, its use in food has limitations such as low biodegradability and insolubility in some solvents. These restrictions are due to its high crystallinity and hydrogen bonding between its hydroxyl and carbonyl groups. In this sense, chitin has been converted into chitosan through deacetylation process. Chitosan is soluble and offers various advantages such as biocompatibility, biodegradability, antifungal properties, non-toxicity, and antimicrobial properties. Typically, chitosan has been applied as matrices for encapsulation, food additives, and agents for wastewater treatment. However, the source of chitosan has raised some concerns since it is derived from the exoskeletons of marine animals. According to the literature, chitin and chitosan of animal origin contains allergenic proteins such as tropomyosin. Until recently, commercial chitin extraction from fungal sources and its derivative chitosan has gained prominence. The fungal source differs from crustaceans due to its organization as crystalline microfibrils, the predominance of  $\alpha$ -chitin, and the absence of tropomyosin. Fungal-origin chitosan offers many advantages compared to animal-sourced chitosan, such as being a vegan alternative, control over physicochemical properties, year-round production, freedom from heavy metals, and the absence of myosin chains, tropomyosin, and arginine kinase, which are responsible for allergic reactions. Moreover, chitin and chitosan derived from fungi have gained prominence in the global market due to their functional properties and unique characteristics. These advancements represent a promising opportunity to improve the quality and sustainability of products in the food industry, particularly in food packaging. Understanding the chemistry and characteristics of mushroom chitins paves the way for future innovations in this field.

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