# FTIK-P14 NATURAL BIOPOLYMERIC SHELL MATERIALS FOR MICROENCAPSULATION OF CANNABINOIDS: ADVANTAGES, LIMITATIONS, AND FUTURE PERSPECTIVES

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Despite the growing interest in cannabinoids as therapeutic agents, their incorporation into pharmaceutical formulations remains challenging due to their hydrophobic nature, susceptibility to oxidation and photodegradation, and limited bioavailability. Microencapsulation has emerged as promising technology to enhance cannabinoid stability, protect bioactive compounds from environmental degradation, and improve delivery.

The aim of this review was to critically evaluate current evidence on natural biopolymeric shell materials used for cannabinoid microencapsulation, with emphasis on their physicochemical properties, encapsulation performance, advantages, limitations, and potential pharmaceutical applications. A narrative literature review was conducted using the PubMed, Scopus, and Web-of-Science, covering 38 research and review articles published between 2015 and 2025.

The available evidence demonstrates that diverse natural biopolymers, including polysaccharides, proteins and natural gums, have been investigated as shell materials for cannabinoid microencapsulation. Protein-based shell materials generally exhibit favorable emulsifying properties and high encapsulation performance, whereas polysaccharides provide excellent biocompatibility and support controlled-release. Composite protein–polysaccharide systems gained increasing interest due to their complementary properties, resulting in improved structural stability, encapsulation performance, and protection of cannabinoids against degradation. The reviewed literature indicates that formulation composition, polymer interactions, and processing conditions are critical for microencapsulation efficiency and product performance.

Overall, current evidence suggests that natural biopolymers represent safe, biodegradable, and sustainable shell materials with significant potential for cannabinoid delivery. Although chitosan, alginate, whey protein, and zein demonstrate promising encapsulation and controlled-release properties, no single biopolymer can currently be considered universally superior. Further investigations are required to optimize cannabinoid-loaded microcapsules and support their successful industrial translation.


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