

# Synthesis of clove essential oil loaded chitosan based edible films with different plasticizers

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## Abstract

**Statement of the Problem:** Chitosan is a natural polysaccharide with excellent biodegradable, barrier-free, and antimicrobial properties. Therefore, it is one of the preferred polymers for preparing edible films. To meet consumer demands for more environmentally friendly and synthetic preservative-free foods, researchers have incorporated various essential oils to enhance chitosan's antimicrobial and antioxidant properties. Despite all the positive effects of chitosan on its application as food packaging, its films are fragile and brittle. Therefore, adding plasticizers is usually used to improve the chitosan's mechanical properties.

In this study, the effect of different plasticizers, namely Glycerol, Polyethylene glycol, and polyvinyl alcohol, on the mechanical and physical properties of chitosan films with incorporated clove essential oil is examined. The researchers use Fourier-transform infrared spectroscopy (FT-IR) to determine the intermolecular interactions, scanning electron microscopy (SEM) to observe the surface morphology, and a universal testing machine to test the mechanical properties such as elongation, tensile strength, and tensile modulus. The thermal stability and the compound's physical state are investigated using differential scanning calorimetry. Antioxidant activity and CIELAB color parameters are evaluated. Water adsorption isotherms and water vapor permeability are also determined.

**Conclusion & Significance:** The addition of plasticizers improves the properties of chitosan films, making them suitable for food packaging and additives.

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## Image

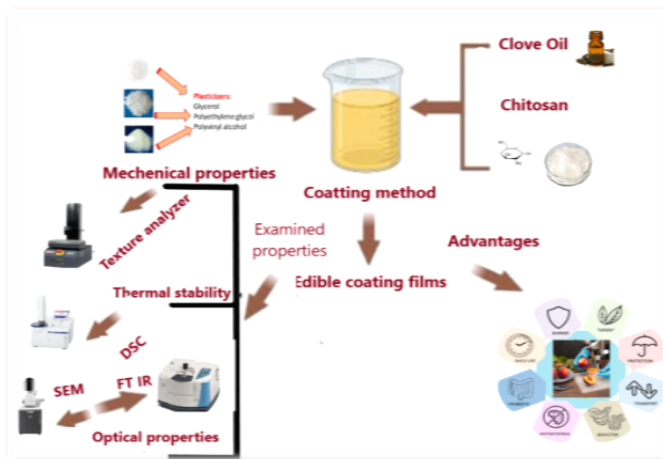


Fig. 1 Main investigated properties of edible coating

## Recent Publications

1. Gechev, B., Zsivanovits, G., Iliev, A., & Marudova, M. (2023). Chitosan/grapeseed oil multicomponent edible films-design and properties. In *Journal of Physics: Conference Series* (Vol. 2436, No. 1, p. 012029). IOP Publishing.
2. Zhelyazkov, S., Zsivanovits, G., Stamenova, E., & Marudova, M. (2022). Physical and barrier properties of clove essential oil loaded potato starch edible films. *Biointerface Res. Appl. Chem*, 12, 4603-4612.
3. Gechev, B., Zsivanovits, G., Iliev, A., & Marudova, M. (2023). Chitosan/grapeseed oil multicomponent edible films-design and properties. In *Journal of Physics: Conference Series* (Vol. 2436, No. 1, p. 012029). IOP Publishing.
4. Nikolova, K. R., Panchev, I., Kovacheva, D., & Pashova, S. (2009). Thermophysical and optical characteristics of bee and plant waxes. *Journal of optoelectronics and advanced materials*, 11(9), 1210-1213.
5. Nikolova, K., Panchev, I., & Sainov, S. (2007). Van der Waals parameters, refractive indices and dispersion equation of pectin. *Journal of optoelectronics and advanced materials*, 9(2), 468-470.
6. Petrova, K., Nikolova, K., Leonkeiva, V., Kitova, S., & Sainov, S. (2007). Refractometric investigations of thin organic films. *Journal of optoelectronics and advanced materials*, 9(2), 464-467.

## Photograph



## Biography

Prof., PhD Krastena Nikolova is a full professor in the Department "Physics and biophysics" at Faculty of Pharmacy, Medical University of Varna, Bulgaria. The topic of scientific publications is directly related to laser refractometry for the study of biopolymer films, physical methods for the study of wax films and emulsions, physical methods for evaluating the quality of food products, physical methods for the study of biopolymers, development of long-period grating sensors, application of mathematical modeling, optical techniques for the analysis of tinctures and oil extracts of medicinal plants, Raman spectroscopy of pharmaceutical products and nutritional supplements, physicochemical properties of emulsions. Scientific works and participation with scientific announcements in national and international forums have been published (over 130).

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