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Improving Gelatin-based Composite Gels' Rheological and Textural Properties by Adding Sesame Seed Oleosome-protein Fillers

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Abstract

Gelatin-based composite gels have been widely used in the food and pharmaceutical industries due to their versatile properties and ability to form gels at low temperatures. However, these gels often lack the desired rheological and textural properties. This study explores the incorporation of sesame seed oleosome-protein fillers as a novel approach to enhance the rheological and textural characteristics of gelatin-based composite gels. Through a comprehensive review of the literature, we delve into the properties of gelatin, sesame seed oleosomes, and the potential synergy between them, shedding light on the mechanisms responsible for the improved rheological and textural properties of the resulting gels. Composite gels play a significant role in the food and pharmaceutical industries. Gelatin, a widely used gelling agent, has been a popular choice due to its unique gelling properties. It forms gels at low temperatures, making it suitable for various applications. However, gelatin-based gels often lack the desired rheological and textural properties, which are crucial for the quality and acceptability of products. To address these limitations, researchers have explored the addition of fillers to improve the overall properties of these gels. This study focuses on enhancing the rheological and textural characteristics of gelatin-based composite gels by incorporating sesame seed oleosome-protein fillers. Gelatin is a protein derived from collagen, which is found in animal connective tissues. It consists of polypeptide chains with high levels of proline, hydroxyproline, and glycine, which provide its unique gelling properties. Gelatin molecules have a helical structure, which unravels upon heating, allowing them to form a network structure during cooling..

Keywords: Gelatin • Oleosomes • Rheological

Introduction

Gelatin gels form at relatively low temperatures, typically between 30 °C and 35 °C, which is advantageous for many food applications. The gelling strength of gelatin can be tailored by adjusting concentration, temperature, and pH. Gelatin gels retain water effectively, contributing to the juiciness and mouthfeel of products. Gelatin is compatible with a wide range of ingredients, allowing for the creation of complex composite gels. Despite these benefits, gelatin-based gels often exhibit weak mechanical properties and poor texture, making them less suitable for certain applications. Sesame seeds are a rich source of oil, and within their structure, they contain oleosomes, small organelles that store lipids. These oleosomes also contain proteins, and they have been gaining attention for their potential to enhance the rheological and textural properties of various food products [1].

Oleosomes are natural emulsifiers, composed of a triglyceride core surrounded by a phospholipid monolayer. The addition of oleosomes can enhance the mouthfeel and creaminess of food products. Oleosomes can serve as a partial fat replacement strategy, reducing the calorie content while maintaining desirable texture. Sesame seed proteins can stabilize emulsions and prevent phase separation in composite gels. The incorporation of sesame seed proteins can lead to changes in gel texture, potentially improving the mechanical properties of composite gels.Gelatin gels tend to be brittle, with low gel strength. Sesame seed oleosome-protein fillers can provide structural reinforcement to the gelatin matrix, resulting in gels with enhanced strength and improved resistance to deformation. Sesame seed proteins possess unique structural properties that can contribute to the elasticity of composite gels. This elasticity is an essential factor in various food products, such as desserts and confectioneries, where a pleasing mouthfeel is critical. The water-retention capabilities of gelatin can be further improved by the incorporation of sesame seed oleosome-protein fillers. This enhanced water-binding capacity can lead to gels with improved moisture retention and prolonged shelf life. To assess the impact of sesame seed oleosome-protein fillers on gelatin-based composite gels, various rheological and textural analyses are essential [2,3].

Literature Review

Gelatin-based composite gels have been widely used in the food and pharmaceutical industries due to their versatile properties and ability to form gels at low temperatures. However, these gels often lack the desired rheological and textural properties. This study explores the incorporation of sesame seed oleosome-protein fillers as a novel approach to enhance the rheological and textural characteristics of gelatin-based composite gels. Through a comprehensive review of the literature, we delve into the properties of gelatin, sesame seed oleosomes, and the potential synergy between them, shedding light on the mechanisms responsible for the improved rheological and textural properties of the resulting gels.

Composite gels play a significant role in the food and pharmaceutical industries. Gelatin, a widely used gelling agent, has been a popular choice due to its unique gelling properties. It forms gels at low temperatures, making it suitable for various applications. However, gelatin-based gels often lack the desired rheological and textural properties, which are crucial for the quality and acceptability of products. To address these limitations, researchers have explored the addition of fillers to improve the overall properties of these gels. This study focuses on enhancing the rheological and textural characteristics of

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gelatin-based composite gels by incorporating sesame seed oleosome-protein fillers. Gelatin is a protein derived from collagen, which is found in animal connective tissues. It consists of polypeptide chains with high levels of proline, hydroxyproline, and glycine, which provide its unique gelling properties. Gelatin molecules have a helical structure, which unravels upon heating, allowing them to form a network structure during cooling [4].

Discussion

Viscosity measurements can reveal changes in the flow behavior of composite gels. Gelatin gels often exhibit low viscosity, while the incorporation of fillers can increase viscosity and provide a better mouthfeel. Stress-strain curves are essential to evaluate the mechanical properties of the gels, such as hardness, cohesiveness, and adhesiveness. Dynamic rheological measurements provide insights into the viscoelastic properties of composite gels, including storage and loss moduli, which can indicate the gels' ability to withstand deformation. The force required to penetrate the gel is a critical parameter, and sesame seed oleosome-protein fillers can lead to gels with improved hardness. Cohesiveness measures how well the gel maintains its structure when bitten or chewed. Springiness indicates the ability of the gel to return to its original shape after deformation, which is essential for a pleasant mouthfeel. Understanding the mechanisms by which sesame seed oleosome-protein fillers interact with gelatin is crucial for optimizing the formulation of composite gels. The proteins in sesame seed oleosomes may interact with the gelatin molecules, forming a protein network within the gel matrix. This network can reinforce the gelatin structure, leading to enhanced mechanical properties and improved texture [5,6].

Conclusion

Oleosomes can act as emulsifiers, dispersing the lipid content within the gelatin-based gels more uniformly. This can lead to a creamier texture and improved overall mouthfeel. Sesame seed oleosome-protein fillers may have a higher water-binding capacity than gelatin alone. This can result in gels that retain moisture more effectively, providing better texture and extended shelf life. The improved rheological and textural properties of gelatin-based composite gels with sesame seed oleosome-protein fillers have broad applications in the food and pharmaceutical industries.

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None.

Conflict of Interest

There is no conflict of interest by author.

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