Mini Review
Volume 13:05, 2023

Journal of Textile Science & Engineering

ISSN: 2165-8064 Open Access

Alginates Purpose in Textile Antimicrobial Finishing

Maxwell Easte*

Department of Textile Science and Technology, University of Alabama, Tuscaloosa, USA

Abstract

Alginate, a natural polysaccharide derived from seaweed, plays a pivotal role in the antibacterial finishing of textiles, marking a significant advancement in the realm of functional textile treatments. This biopolymer possesses unique properties that make it an ideal candidate for incorporating antibacterial functionalities into textiles. One of the primary functions of alginate in antibacterial finishing is its ability to serve as a carrier for antimicrobial agents. Alginate can form stable complexes with a variety of antibacterial compounds, including metal nanoparticles and organic antimicrobial agents. This encapsulation not only protects the active agents from premature release but also facilitates their controlled and sustained release onto the textile surface. This controlled release mechanism ensures prolonged antibacterial efficacy, enhancing the durability of the treated textiles. The interaction between alginate and the textile substrate is another crucial aspect of its role in antibacterial finishing. Alginate has excellent film-forming properties, allowing it to adhere to diverse textile surfaces effectively. This film formation creates a protective layer on the textile, preventing the leaching of antimicrobial agents and ensuring their retention on the fabric. Moreover, alginate-based finishes exhibit good compatibility with various textile materials, making it a versatile choice for imparting antibacterial properties to textiles without compromising their inherent characteristics.

Keywords: Metal nanoparticles • Alginate based finishes • Antibacterial efficacy

Introduction

The biocompatibility of alginate is a notable advantage in the context of antibacterial finishing. Being derived from natural sources, alginate is non-toxic and environmentally friendly. This aligns with the growing demand for sustainable and eco-friendly textile treatments. The use of alginate in antibacterial finishing reflects a commitment to green chemistry practices and meets the evolving standards of the textile industry for sustainable and responsible production. In addition to its carrier and film-forming functions, alginate contributes to the overall comfort and aesthetics of the treated textiles. Its soft and breathable nature ensures that the fabric retains its desirable hand feel and comfort, making it suitable for a range of applications, including apparel, home textiles, and medical textiles. The antibacterial finishing of textiles with alginate is particularly relevant in applications where hygiene is paramount, such as healthcare and active sportswear. The sustained release of antimicrobial agents from alginate-treated textiles can inhibit the growth of bacteria, fungi, and other microorganisms, thereby minimizing the risk of unpleasant odours and infections.

Literature Review

The role of alginate in the antibacterial finishing of textiles is multifaceted and underscores the synergy between natural polymers and advanced functional treatments. Its ability to encapsulate and deliver antimicrobial agents, form stable films on textile surfaces, and provide biocompatibility aligns with the growing demand for sustainable, effective, and comfortable antibacterial textiles. As research and innovation in textile finishing continue, alginate stands out as a promising component in the development of textiles that not only meet performance criteria but also adhere to environmentally conscious and socially responsible principles, Moreover; the versatility of alginate in the antibacterial finishing of textiles extends beyond its role as a carrier and film-forming agent. Alginate can be easily combined with other functional finishing agents, expanding the range of performance attributes that can be imparted to textiles. This versatility allows for the development of multifunctional textiles with properties such as moisture management, UV protection, and flame resistance, in addition to antibacterial capabilities. The cross-linking ability of alginate is another noteworthy aspect that enhances its effectiveness in antibacterial finishing. Alginate can be cross-linked with various agents, such as metallic ions or polycations, to improve the stability and durability of the antibacterial finish. This cross-linking not only enhances the wash fastness of the treated textiles but also contributes to the long-term efficacy of the antibacterial treatment [1-3].

Discussion

In medical textiles, alginate's inherent biocompatibility and gentle nature make it a suitable choice for applications like wound dressings and surgical textiles. The controlled release of antimicrobial agents from alginate-based wound dressings can aid in preventing infections and promoting the healing process. Furthermore, alginate's moisture-retaining capabilities contribute to creating an optimal environment for wound healing. Research and development in the field of antibacterial finishing continue to explore innovative formulations and application methods involving alginate. The ability to tailor the release kinetics of antimicrobial agents from alginate-based finishes allows for customization based on specific textile applications and performance requirements. This adaptability positions alginate as a dynamic and responsive material in the ongoing efforts to enhance the functional attributes of textiles, As the textile industry faces increasing scrutiny regarding environmental impact, the use of alginate in antibacterial finishing aligns with the broader trend towards sustainable and biodegradable materials. The biocompatibility and eco-friendly nature of alginate contribute to the overall sustainability profile of treated textiles, meeting the demands of environmentally conscious consumers and regulatory standards [4-6].

Conclusion

The role of alginate in the antibacterial finishing of textiles encompasses a range of functions, from being a carrier and film-forming agent to offering

***Address for Correspondence:** Maxwell Easte, Department of Textile Science and Technology, University of Alabama, Tuscaloosa, USA, E-mail: Maxwelleastepee@gmail.com*

Received: 01 September, 2023, Manuscript No jtese-23-120630; **Editor assigned:** 02 September, 2023, PreQC No. P-120630; **Reviewed:** 18 September, 2023, QC No. Q-120630; **Revised:** 22 September 2023, Manuscript No. R-120630; **Published**: 29 September, 2023, DOI: 10.37421/2165-8064.2023.13.562

biocompatibility and versatility. This natural polysaccharide not only contributes to the durability and efficacy of antibacterial treatments but also aligns with the industry's goals of sustainability and functionality. As technology continues to advance, the integration of alginate in textile finishing processes is likely to evolve, offering new possibilities for creating textiles that combine performance, comfort, and environmental responsibility.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Oluleye, Benjamin I., Daniel WM Chan, Timothy O. Olawumi and Abdullahi B. Saka. "Assessment of symmetries and asymmetries on barriers to circular economy adoption in the construction industry towards zero waste: A survey of international experts." *Build Environ* 228 (2023): 109885.
2. Dow, Noel, Jesús Villalobos García, Leslie Niadoo and Nicholas Milne, et al. "Demonstration of membrane distillation on textile waste water: Assessment of long term performance, membrane cleaning and waste heat integration." *Environ Sci Water Res Technol* 3 (2017): 433-449.
3. Deslandes, Dominic and Ke Wu. "Design consideration and performance analysis of substrate integrated waveguide components." *EuMIC* (2002): 1-4.
4. Ebrahimi, Amir, Withawat Withayachumnankul, Said Al-Sarawi and Derek Abbott. "High-sensitivity metamaterial-inspired sensor for microfluidic dielectric characterization." *IEEE Sens J* 14 (2013): 1345-1351.
5. Upadhyay, Arvind, Tim Laing, Vikas Kumar and Manoj Dora. "Exploring barriers and drivers to the implementation of circular economy practices in the mining industry." *Resour Policy* 72 (2021): 102037.
6. Laqbaqbi, M., M. C. García-Payo, M. Khayet and J. El Kharraz, et al. "Application of direct contact membrane distillation for textile wastewater treatment and fouling study." *Sep Purif Technol* 209 (2019): 815-825.

How to cite this article: Easte, Maxwell. "Alginates Purpose in Textile Antimicrobial Finishing." *J Textile Sci Eng* 13 (2023): 562.