Advances in film innovation based on renewable biomaterials

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Abstract
Smart film innovation was gaining interest in various applications owing to the film characteristics present protective properties, controllable thickness, flexible, etc. Film has low thickness so physical properties are crucial in the fabrication process. Additionally, filler, which improves film performance, must eventually regulate the amount of addition and dispersion on film. The synthetic polymer utilized to fabricate the films has good physical properties and optical properties, but it is difficult to recycle and biodegradable. The organic polymeric material that attracts attention in particular for application in smart film fabrication is bacterial cellulose, which has distinctive characteristics that set it apart from other polysaccharide-based polymers. The high surface area, high crystallinity, and ease of modification allow it to be customized to have specific characteristics that are appropriate for application. Our group's research focuses on the development of composites of bacterial cellulose films for sustainable application to establish green environments. To enhance the performance, bacterial cellulose is modified to exhibit a specific functional group or size, according to the film characteristic and utilization. Moreover, chemical filler which has specific properties can be introduced into film in various methods. However, the compatibility and dispersibility of filler and additive are challenging for film formation. In conclusion, because of its unique characteristics (e.g., its high crystallinity and 3D network structure) and an abundance of hydroxyl groups that promote chemical modification, bacterial cellulose is a viable option for the fabrication of smart films.

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References
[1] M. Techasamran, S. Charoensuk, B. Than-ardna, M. Sain, H. Manuspiya, Fabrication of a colorimetric film based on bacterial cellulose/metal coordination framework composite for monitoring food spoilage gas, Int. J. Biol. Macromol. 253 (2023) 127038.