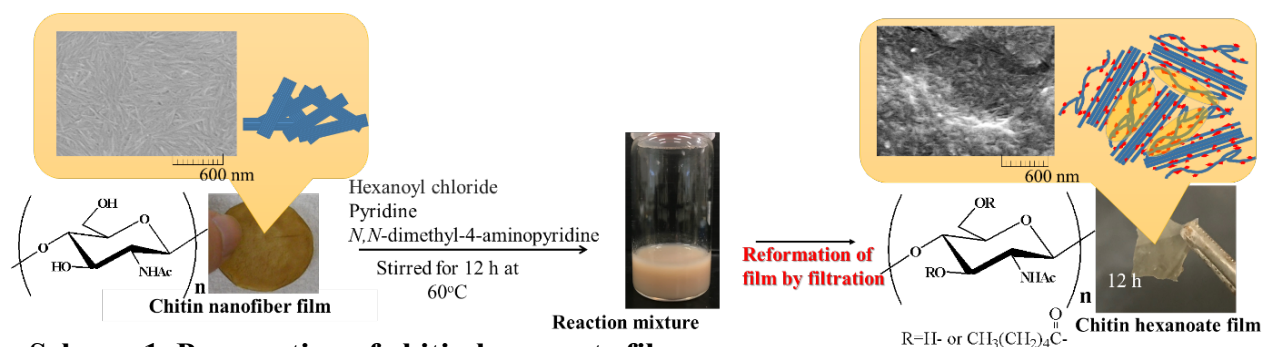


Fabrication of New Hierarchical Structured Materials by Acylation on Chitin Nanofibers

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Abstract

Chitin is a natural polysaccharide, which shows poor solubility and processability because of highly crystallinity due to strong intra- and intermolecular hydrogen bonding. Nanofiberization of chitin has attracted attention as one of effective materializations. We have already reported that an ionic liquid, 1-allyl-3-methylimidazolium bromide (AMIMBr), dissolves chitin and forms ion gels at high contents.¹⁾ We also reported that a self-assembled chitin nanofiber (CNF) film was obtained by regeneration with methanol from the chitin/AMIMBr ion gel, followed by filtration.²⁾ The film was constructed by highly entanglement of nanofibers during the isolation procedure. In this study, we examined the fabrication of new hierarchical structured materials by hexanoylation on CNFs under dispersion conditions as shown in Scheme 1.³⁾ After the reaction, the resulting chitin hexanoate reformed film, but which showed little nanofiber morphology. In the XRD profiles of the products after hexanoylation, diffraction peaks different from the crystalline structure of chitin were observed at lower angle area. The XRD results indicated that layered structures were constructed, in which side chains were sandwiched between chitin chain assemblies. In addition, the TEM images of chitin hexanoates by the different reaction times showed that the nanofiber surfaces were gradually collapsed and amorphous regions were formed. From these results, it was considered that amorphous regions were gradually formed from the nanofiber surfaces by preferential hexanoylation at the nanofiber surface areas. In addition, the film formation was owing to fusion of amorphous regions near the nanofiber surfaces.



References

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