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Synthesis and Properties of Mixed Chitin Esters

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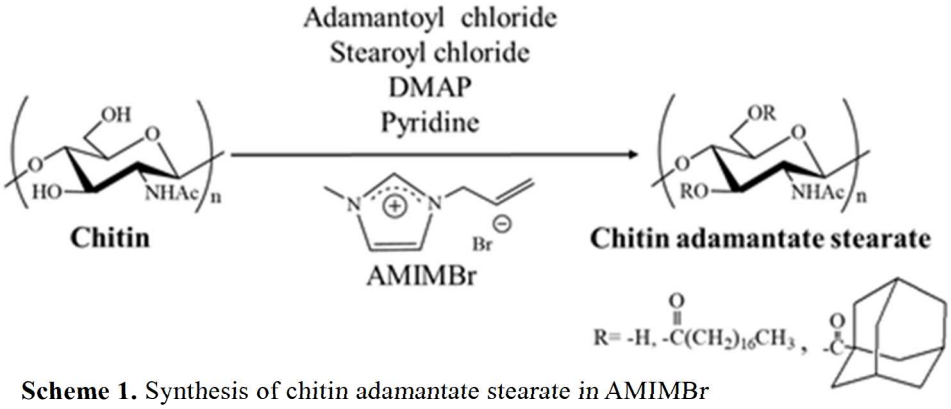
Abstract

Chitin is a natural polysaccharide abundantly present in nature, and thus, very important biomass resource. However, since chitin has strong crystallinity by intermolecular hydrogen bonding between acetamido groups, it is poor in solubility and processability, leading to mostly unutilization. We have already found that 1-allyl-3-metylimidazolium bromide (AMIMBr) dissolves chitin at most in 4.8 wt %. We also found that chitin acylates with high degrees of substitution (DSs) were obtained by acylation of chitin using acyl chlorides in AMIMBr [1]. However, processability of the products was not improved probably due to the remaining hydrogen bonds between acetamido groups. In this study, we synthesized mixed chitin ester having adamantoyl and stearoyl groups in AMIMBr, in which the hydrogen bond would be weaken by introducing bulky and long chain alkyl groups on the chitin chain **(Scheme1)**. The IR and ^{1}H NMR spectra of the product indicated that chitin adamantate stearate with high DS was obtained. In the XRD profile, the diffraction peaks assignable to chitin crystalline structure greatly decreased, and a diffraction peak ascribe to end-to-end packing of stearoyl groups was shown in $2\theta = 3.0°$. The DSC pattern showed an endothermic peak due to enthalpy relaxation of the packing structure at 7 °C. These results suggested that the chitin crystalline structure was disrupted, while the side chain was crystallized. As the product was dissolved in chloroform, the solution could be thinly casted to obtain a flexible film



Scheme 1. Synthesis of chitin adamantate stearate in AMIMBr

Reference

1) H. Hirayama, J. Yoshida, K. Yamamoto, J. Kadokawa, *Carbohydr. Polym.* , **200**, 567 (2018).

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