

Preparation of antibacterial food packaging paper using Hinoki oil
 ヒノキ精油を用いた食品包装用抗菌紙の開発
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Abstract Bacterial growth is the primary reason for food spoilage. In the field of food packaging paper, the use of non-toxic antibacterial agents is an effective way to retard the growth. Natural essential oil Hinoki oil (HO) contains bioactive compounds with great antibacterial properties. However, they are highly volatile and heat sensitive. Encapsulation using β -cyclodextrin (β -CD) to form inclusion complexes (ICs) can mitigate these drawbacks. This study aimed to use an ultrasound-aided co-precipitation method to prepare HO- β -CD ICs which could be used as an antibacterial agent for food packaging paper later.

Introduction β -CD possesses a hydrophilic exterior surface and a hydrophobic interior cavity which can encapsulate hydrophobic HO, resulting in the formation of ICs. An ultrasound-aided co-precipitation method was used in this study owing to its ease of operation and cost feasibility.

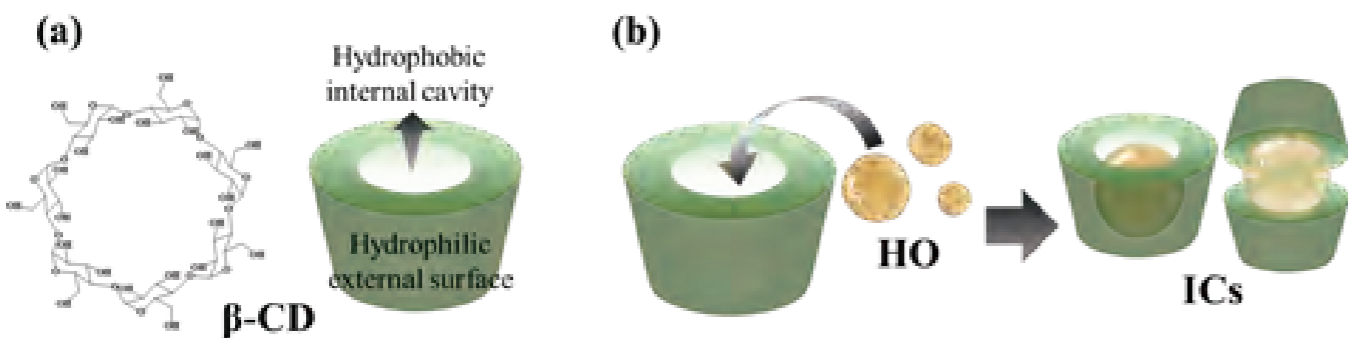


Fig. 1. Chemical and tridimensional structures of β -CD (a) and schematic of the ICs formation (b).

Experimental

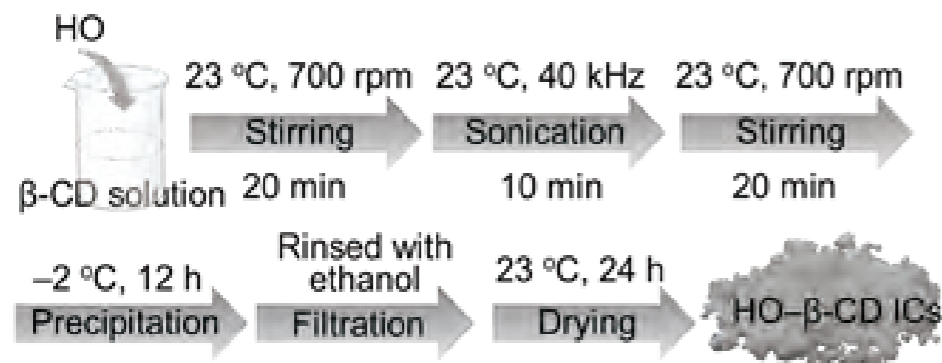


Fig. 2. Preparation steps of HO- β -CD ICs using ultrasound-aided co-precipitation method.

Results

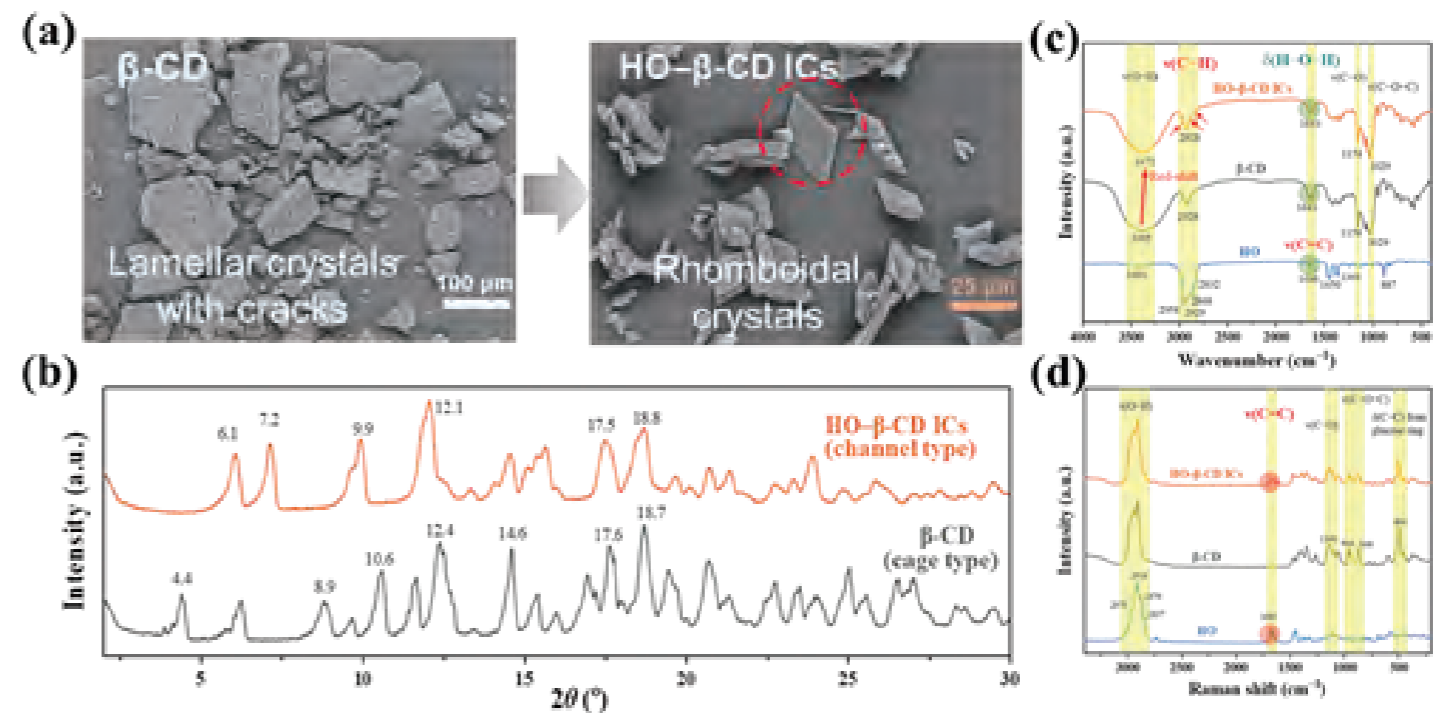


Fig. 3. SEM images (a), XRD patterns (b), FT-IR spectra (c), and Raman spectra (d) of β -CD and HO- β -CD ICs.

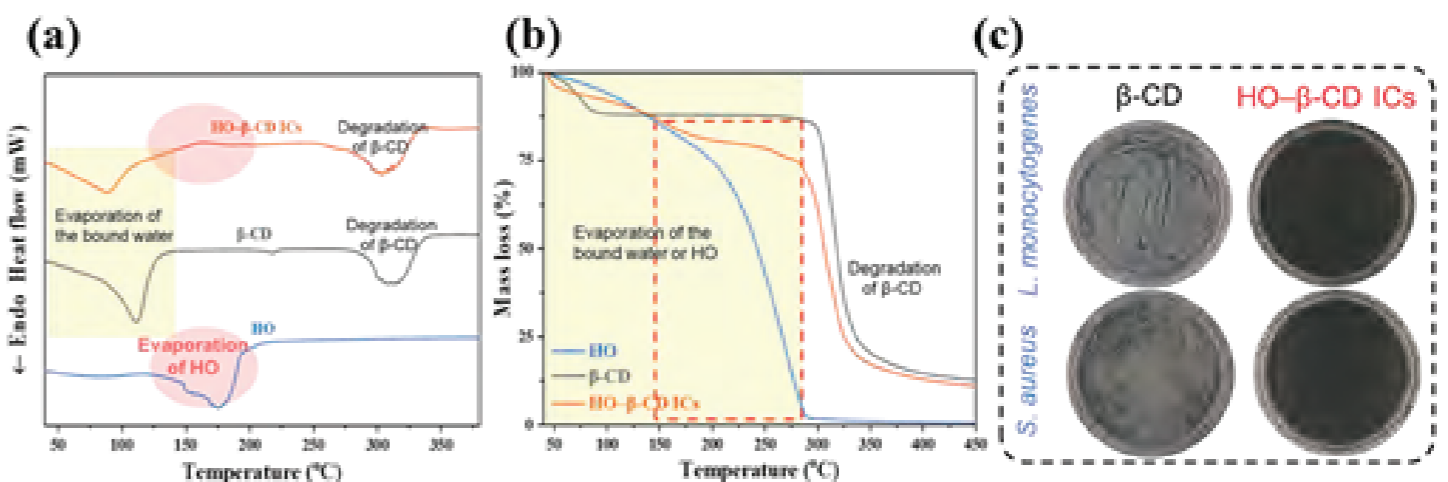


Fig. 4. DSC curves (a), TG curves (b), and antibacterial activities (c) of β -CD and HO- β -CD ICs.

Conclusions

- The formation of HO- β -CD ICs was successful.
- A greater thermal stability of HO- β -CD ICs was confirmed compared to the free HO.
- Satisfactory inhibitory abilities to *L. monocytogenes* and *S. aureus* were observed.

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