

# Food & Beverage Packaging

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## Development of anti-insect food packaging materials containing encapsulated essential oils at a pilot plant scale

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*Plodia interpunctella* (Hübner) is a major storage pest that penetrates into food packaging and causes serious economic losses, as well as posing health risks. The goal of this study was to develop effective anti-insect packaging materials against *P. interpunctella* by using plant essential oils (EOs). Several EOs were used as insect repellents, and fumigant mortality and the repellent activity of EOs were measured to evaluate subsistent anti-insect properties. Anti-insect packaging films containing EOs encapsulated by polyvinyl alcohol (PVA) for repelling *P. interpunctella* larvae were manufactured using pilot plant-scale instruments. The microcapsule emulsion of EO and PVA was printed onto polypropylene (PP) film as an ink mixture using the gravure printing method. The printed PP film was then laminated with a low-density polyethylene (LDPE) film to protect the printed side. Different types of multilayer films were produced based on EO concentration. Repellent activity of the developed films was also examined with several foods to simulate the storage environment, and EO films repelled *P. interpunctella* larvae effectively. In a release test using a gas chromatography, the anti-insect packaging materials showed remarkable controlled release of EOs. For sensory evaluation, which was performed using milk chocolate, caramel soft candy, and cookies packaged with the produced films, the films did not affect the sensory characteristics. Therefore, the films printed with emulsions of EO and PVA could be applied in the food industry to help protect foods from infestation by *P. interpunctella*.

### Biography

Jaejoon Han has obtained his BSc from Department of Food Science and Technology, Korea University, Seoul, Korea. He received his MSc and PhD from the Texas A&M University, USA. He was a Research Associate at the INRS-Institut Armand-Frappier, Québec, Canada. He joined the Sungkyunkwan University, Korea as an Assistant Professor in 2009. Currently, he is an Associate Professor in Dept. of Food Bioscience and Technology at Korea University since 2013. His present research interests include the active/intelligent packaging films, nano- and microencapsulation technology for functional ingredients, controlled release mechanisms, and biopolymeric plastics. He has published more than 40 papers in reputed journals.

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