SAFETY

New Food Packaging Material May Kill Harmful Microbes

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Scientists from Nanyang Technological University in Singapore (NTU Singapore) and the Harvard T.H. Chan School of Public Health at Harvard University in Boston have developed a food

packaging material that is biodegradable and sustainable and kills microbes that are harmful to humans. The product could also extend the shelf-life of fresh fruit by two to three days. The findings were published recently in the American Chemical Society's journal *ACS Applied Materials & Interfaces.*

The waterproof food packaging material is made from a corn protein called zein, starch, and other naturally derived biopolymers, and is infused with a cocktail of natural antimicrobial compounds. These include oil from thyme and citric acid.

In lab experiments, when exposed to an increase in humidity or enzymes from harmful bacteria, the fibers in the packaging were shown to release the antimicrobial compounds, killing common dangerous bacteria that contaminate food, such as *E. coli* and *Listeria innocua,* as well as the fungi *Aspergillus fumigatus*.

The packaging is designed to release the necessary amounts of antimicrobial compounds only in response to the presence of additional humidity or bacteria. This ensures that the packaging can endure several exposures and last for months.

The compounds combat any bacteria that grow on the surface of the packaging as well as on the food product itself, so the product potentially can be used for a large variety of products, including ready-to-eat foods, raw meat, fruits, and vegetables.

In an experiment, strawberries that were wrapped in the packaging stayed fresh for seven days before developing mold, compared with counterparts that were kept in mainstream fruit plastic boxes, which only stayed fresh for four days.

“This invention would serve as a better option for packaging in the food industry, as it has demonstrated superior antimicrobial qualities in combating a myriad of food-related bacteria and fungi that could be harmful to humans, said Professor Mary Chan, director of NTU’s Centre of Antimicrobial Bioengineering, who co-led the project, in a statement. “The packaging can be applied to various products such as fish, meat, vegetables, and fruits. The smart release of antimicrobials only when bacteria or high humidity is present provides protection only when needed, thus minimizing the use of chemicals and preserving the natural composition of foods packaged.”

The researchers hope to scale up their technology with an industrial partner with the aim of commercialization in the next few years. They are also currently working on developing other technologies to develop biopolymer-based smart food package materials to enhance food safety and quality.

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