



[Life](#)

S'pore and U.S. scientists invent food packaging that can kill bacteria

Fresher for longer.

By [Dale John Wong](#) December 31, 2021



A team of scientists from Nanyang Technological University (NTU), Singapore and the Harvard T.H. Chan School of Public Health, U.S. has come up with a new type of food packaging that addresses two major concerns within today's food industry – waste and eco-friendliness.

According to a [news release](#) by the Singaporean institution, the newly-developed packaging is able to eliminate bacteria while also being biodegradable. All of this is thanks to the main ingredient used in the creation of the packaging – zein.

A protein derived from gluten meal, zein was combined with starch and other natural compounds, and then processed via a method called electrospinning (using electrical force to produce fibers) to produce the material for the packaging.

In lab tests, the material was found to have antimicrobial properties due to its ability to produce just enough bacteria-killing compounds to eliminate microbes such as E. coli and common fungi – typically things that cause foods to turn bad quickly.



Professor Mary Chan and Dr. Suresh Kumar Raman Pillai of Nanyang Technological University posing with the newly-developed packaging. IMAGE: Nanyang Technological University (NTU)

Even more impressive was the fact that these compounds were released only when necessary – a feature that minimizes the risk of antimicrobials being ingested by consumers.

"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," said Mary Chan, the project leader and director of NTU's Center of Antimicrobial Bioengineering.

In one experiment, the team wrapped fresh strawberries in the new packaging and compared the fruits' freshness levels against strawberries packed in regular plastic boxes.

The result saw the strawberries stay fresh for seven days before developing mold, while the strawberries inside the plastic boxes went only four days before turning moldy.

While still in the development phase, the researchers behind the packaging are already excited about the potential upsides their creation could bring to the food industry.

First, the packaging directly addresses the problem of food waste, with an extra two to three days of shelf life potentially offering up the opportunity for businesses and consumers both to save plenty in terms of food and money.

Philip Demokritou, the co-lead for the project and a professor from the Harvard T.H. Chan School, said that "food safety and waste have become major societal challenges of our times, with immense public health and economic impact compromising food security."

"One of the most efficient ways to enhance food safety and reduce spoilage and waste is to develop efficient biodegradable non-toxic food packaging materials," he added.



Traditional plastic packaging does little to extend the shelf life of food, and is also bad for the environment. IMAGE: The Guardian

Additionally, the packaging is also being touted as a strong alternative to traditional plastic boxes, bags, and cartons due to its biodegradability – especially when used in scale.

As it stands, the world's climate and pollution problems are heavily contributed to by the consumption of fossil fuels and products derived from such sources, including plastics used to package and transport food.

According to the university's statement, 55 percent of Singapore's 1.76 million tons of domestic waste comprised of plastic, with one third of that number being food packaging.

So it's pretty obvious how using the new material could serve to alleviate the pains of food packaging today.

"The smart food package material – when scaled up – could serve as an alternative to cut down on the amount of plastic waste, as it is biodegradable,"



produce ethanol."

It all sounds promising, and appears to be one of hopefully many more other alternatives to regular plastic packaging, but it may be some time before we see the team's creation become commercially available.

Currently, the team is looking at finding an industrial partner to help them scale up the production of their packaging, with the plan being to go commercial "within the next few years".

They're also currently working on developing other ways of creating biopolymer-based smart food packaging materials, with food safety and quality retention the main goal.

The team's research has been published in the journal titled [ACS Applied Materials & Interfaces](#).