



PACKAGING

Deanna Rosolen

Smarter thinking about packaging

Technological advances in packaging mean safer products for consumers

Intelligent packaging. Smart packaging. Active packaging. The terms have been bandied about for some time now, maybe 10 years, but it's not always clear what each one means.

Paul Takhistov, associate professor in the Food Sciences department of New Jersey's Rutgers University, is part of a team that has defined these terms and detailed some of the research, prototypes and products out there. He's also involved in developing new food packaging. In this case it's a new form of active packaging that Takhistov describes as the next level of food safety.

Right now, he says, antimicrobials are incorporated into packaging materials where they are released immediately upon contact with food. "At the onset we have a pretty large amount of the antimicrobial agent, but with time the amount decreases because we have just a finite amount of this compound inside the packaging materials," he says. "But bacteria grow over time. Therefore, at a certain point we won't have enough antimicrobial agents to protect our food." According to Takhistov, that's essentially what active packaging is right now. What he and other scientists envision is a packaging material that incorporates both immunosensors (or biosensors) and antimicrobials. This means the antimicrobials won't

be released on contact – they'd be released if the immunosensors detect a pathogen.

Takhistov and his team are currently experimenting with *E. coli* and *listeria monocytogenes* in an attempt to create a packaging material that could be used with any food product, from meat to biscuits to beverages. "The reason to develop new packaging materials is that it expands their application for ready-to-eat and perishable food products," he explains. "The second reason is that it increases food safety. And thirdly, it's possible to manage or control the shelf life of the product." It also gives food processors another option for increasing shelf life rather than just reformulating. "It's

much more convenient and safe to control food or shelf life with packaging materials than through food formulation, because usually the food is contaminated from the surface," says Takhistov.

While this type of technology is still several years away, the reality is that it will someday be available for a variety of products. It's likely that in the future food processors could see packaging with biosensors that, when and if they sense a pathogen on the food, will command the material to release antimicrobials – and protect food for consumers.

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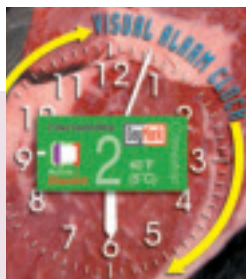
WHAT'S IN A NAME?

Labels can often be misleading. Here's a quick primer on the newest packaging technology:

Intelligent packaging (IP): This technology can carry out intelligent functions such as detecting, sensing, recording, tracing, communicating and applying scientific logic. It can monitor the quality/safety condition of a food product and provide early warning to the consumer or food manufacturer.

Active packaging (AP): While IP is the component responsible for sensing the environment and processing information, AP is the component responsible for taking action, for example, the release of an antimicrobial. All AP technologies involve some physical, chemical or biological action. Microwave susceptors, which provide crispness and browning of foods during microwave heating, are also an example of AP.

Smart package devices: These are small, inexpensive labels or tags that are attached onto primary (pouch, tray or bottle) or secondary packaging



(shipping containers) to facilitate communication through the supply chain. They include data carriers (barcodes and radio frequency identification) and package indicators (biosensors and gas or time-temperature indicators).

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INNOVATION AT WORK

Here are just two creative examples of packaging-related innovations:

- U.K.-based Timestrip Ltd. offers single-use, disposable smart labels, called Timestrip, which monitor lapsed time from under one day to six months. Once activated by the consumer, Timestrip shows how long the food has been opened.
- Radlo Foods of Watertown, Mass., has launched laser-etched eggs in U.S. test markets. The technology etches eggs with expiration dates and numerical codes that trace each egg from the farm to the store.

Photo: Courtesy of Timestrip Ltd.