Clean, green containers for food and drink

The US Centers for Disease Control and Prevention estimate that 48 million people in the United States get sick each year and 3000 die from food-borne illness. A report published in 2010 by the Produce Safety Project estimates that food poisoning costs the US $152 billion a year.

Reducing this toll requires effective sterilization of food and beverage packaging. When choosing technologies to do this, industry is increasingly taking into account the environmental impacts.

A package must protect food quality as well as guard against contamination, so the compositions of both food and packaging material have to be taken into consideration when choosing a sterilization technology, says Susan Duncan, a scientist in the Food Science and Technology Department at Virginia Tech and spokesperson for the Institute of Food Technology. "These choices also have an environmental influence, and the industry is starting to have conversations about reducing its carbon footprint," she says.

Traditional methods for sterilizing empty packaging are simple and effective, but have environmental drawbacks. Steam and heat sterilization consume energy and water, and heat can damage materials. Sterilizing with chemicals such as hydrogen peroxide is energy efficient but can leave residues that seep into the food.

Low-energy electron beams from particle accelerators provide an environmentally friendly alternative.

"Electron beams are more efficient and chemical free," says Josh Epstein, the director of marketing at Advanced Electron Beams, a company based in Wilmington, Massachusetts that specializes in accelerator technology.

The packaging material passes through an electron beam from a compact 80- to 150-kilovolt accelerator, which kills any microbes. Then it moves through a clean area of the factory to a different area for filling.

Using electron beams has environmental advantages, Epstein says. Companies can use lighter-weight packaging, reducing waste and consuming less energy during transport. This in turn allows for new package concepts, such as pouches for liquids and purees, which use less material and provide longer shelf life. Meanwhile, the biggest and fastest-growing application for electron beam sterilization of food packaging is bottles, Epstein says.

So far, most of the companies using electron beam technology to sterilize food packaging are in Europe. Italy's Gualapack sterilizes pouches for beverages and snacks such as pudding and yogurt. In the United Kingdom, Dairystix uses accelerated electrons to sterilize its novel tear-and-pour sleeve packaging for milk and cream, which can't be sterilized by the usual means. Each flexible sleeve holds enough cream for a single cup of coffee while consuming 50 percent less material and taking up 40 percent less space than the traditional container. This reduces the company's transportation costs and greenhouse gas emissions.

Epstein says he is working with the US Food and Drug Administration and hopes to get the agency's approval for electron beam sterilization of food packaging in the United States in 2011.

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