SMART PACKAGING BREATHES LIFE INTO INDUSTRY WITH OXYGEN-SENSING TECHNOLOGY

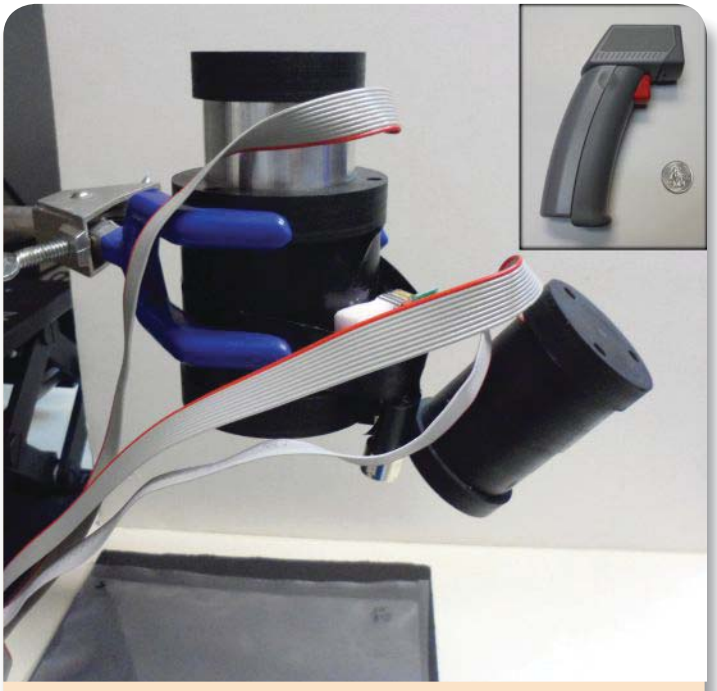
The smart packaging market is expected to grow significantly due to stricter food safety regulations, manufacturers' concern for longer shelf life, supply chain inefficiencies, and bioterrorism threats. According to a report from **NanoMarkets, LC,** *Smart Packaging Markets; 2006-2013,* the global smart packaging market will grow from $4.8bn in 2011 to $14.1bn in 2013.

Redmond, WA-based **Photonic BioSystems** has developed a smart packaging solution in the form of an oxygen-sensitive luminescent dye that can be incorporated into sealed packages. The dye is integrated into the packaging polymers of flexible film packages, rigid containers, and glass bottles.

"The standard approach to oxygen detection has been invasive sampling, which requires testing samples as they come out of the packaging machinery, inserting a needle or probe into the package, and getting a read on the oxygen level," said Dr. David Putnam, president of Photonic BioSystems. "We started receiving inquiries from companies that they wanted a less invasive approach."

That less invasive approach turned out to be an optical interrogation, which eliminates destructive package testing and enables non-contact, rapid, real-time oxygen measurements. Light from either a handheld or bench-top scanner hits the package and the dye gives off an intensity response to the instrument. The sensory approach can measure O_2 levels in the gas phase environment of a dry package, in the headspace of a liquid package, or of dissolved-oxygen in fluids and beverages.

O_2-sensing polymer films can be made from nearly any grade of packaging plastic designed for food, pharmaceutical or electronics packaging. The multilayer barrier packaging films have been fabricated with oxygen-sensing layers that demonstrate functionality for O_2 measurements with no harmful effect on the film's other properties. Alternatively, sensors can be made singly as small discrete labels or tags that are put in packages. Dye quantities vary depending on the packaging material and the concentration of oxygen that needs to be sensed. However, the dye concentration can be so low that it is not visible to the human eye.



A bench-top scanner detects oxygen levels within sealed food packages.

Because the instrument that optically interrogates the package is small, practical for use as a portable O_2-scanner, it is deployable as a hand-held inspection tool to monitor product in the distribution path. Product inspection could be performed anywhere in the supply chain – up to the point of sale or use – to ensure storage, shipping, handling abuse, or other manner of breach has not compromised package integrity and quality.

Photonic BioSystems is currently seeking companies to co-develop and co-commercialize the oxygen-sensitive dye. "As we are an R&D company, we want to team up with a film producer to bring the product to market," said Dr. Putnam.

Packaging Strategies' Perspective: *Intelligent, smart, active, or modified atmosphere packaging (MAP) are all permeating the market as a means for both consumers and brand manufacturers to "communicate" with the package.* PS

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