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In shipment real-time pathogen monitoring device for sampled food products

Food safety testing is an essential step when bringing food from manufacturers to consumers. In the US, standard practices for foodborne pathogen detection involve collecting food product samples and sending them to a central laboratory for microbiological testing. This method typically takes 1-3 days in total, including a 12-24 hour "dead time" during shipping. Distribution to consumers is often allowed before test results are complete, resulting in potential outbreaks of dangerous contaminants like E. coli. The lag between food sample shipment and testing results significantly increases the likelihood of contaminated food making it to consumers before detection.

Researchers at Purdue University are narrowing the gap between sampling and testing results with a portable, real-time, high-sensitivity pathogen monitoring device called MPACT (Monitoring of Pathogen Concentration and Tracing). MPACT takes advantage of the traditional shipping dead time to significantly reduce the time-to-detection of conventional testing protocols and specifically targets E. coli bacteria, one of the most common and detrimental contaminants found in food. The system monitors food samples during shipment, alerts when E. coli is detected, and provides a quick readout of which samples need to be prioritized for screening at the testing facility. Designed to fit seamlessly as a cap on standard shipping containers, MPACT will easily integrate into the current food testing system. Bluetooth capabilities will also allow MPACT to alert testing facilities and manufacturers while the samples are still in transit, improving reaction time even further.

Technology Validation:

MPACT was tested with artificial light by placing a laser in front of it with optical density (OD) filters added and removed to measure sensitivity. MPACT was then compared with a lab luminometer. MPACT was able to detect light at extremely high levels compared to the lab luminometer. Different sensors and lens arrays are being considered to improve the sensitivity of MPACT.

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Category
Agriculture, Nutrition, & AgTech/Food Safety & Traceability

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Advantages:

-Streamlined food testing with ability to prioritize likely-contaminated samples

-Decreased lag time between shipping and test results

-Improved consumer safety

-Provides real-time and in-transit monitoring of the contamination status of food samples

-Design fits easily on current standard shipping containers

Applications:

-Consumer food testing, specifically designed to target E. Coli.

-Pathogen monitoring

-Microbiological testing

Publications:

Noah Boursier, Kal Holder, Bruce M. Applegate, Bartek Rajwa, J. Paul Robinson, and Euiwon Bae "Design of real-time pathogen monitoring device for sampled food products during shipment", Proc. SPIE 13060, Sensing for Agriculture and Food Quality and Safety XVI, 1306008 (6 June 2024); https://doi.org/10.1117/12.3016191

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Intellectual Property:

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