**Project Rationale**

The development of inexpensive sensors with analytical attributes to detect product tampering or adulterations from chemical contaminants would facilitate our nation’s ability to protect its food supply and minimize damage during a chemical contamination event (inherent or intentional). The bioreporter-based chemical sensors consist of genetically programmed cells (bioreporters), a porous microenvironment containing the bioreporters, an enclosure that houses the microenvironment, and a detection/communication system for on-line detection capabilities. With the successful development of this technology, it is anticipated that the bioreporter-based chemical sensors will have the analytical attributes required to fill a critical need in the food industry. Besides being potentially inexpensive, these biosensors are being developed to: 1) detect a hazardous agent(s) typically below immediately immediately dangerous to health or life (IDHL) limits; 2) minimize false positives and negatives; 3) have a typical response time of less than one hour; and 4) be used in field environments by personnel with minimal to no training. We envision that the sensors will be used with standard food defense practices to further facilitate a safe food supply.

**Project Objectives**

- Combine the most successful strategies of objectives 1 and 2 to enhance selectivity (reducing false positives) for constructing novel bioreporters with optimal analytical performance for point-of-use and long-term monitoring experiments.
- Model the systems to improve all aspects of analytical performance and develop application-specific biosensors for food and agriculture systems.

**Project Highlights**

Our bioreporter-based chemical sensor technology used to detect a sodium arsenite spiked in water, milk, and orange juice samples demonstrates that our sensor technology can be used to detect food contaminants in a complex food matrix with minimal sample preparation. Arsenite levels of ten parts per billion in undiluted milk matrices were detected in two hours (response time is inversely proportional to analyte concentration). This technology could potentially be used by minimally trained personnel in numerous food and agriculture environments at or below immediately dangerous to health or life (IDHL) limits.

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