




11th Annual Purdue/USDA Food Safety Engineering Meeting

Overview of CFSE


Richard H. Linton
 Director, Center for Food Safety Engineering
 October 27-28, 2009





Center Goals

- ◆ The purpose of the CFSE at Purdue University is to *“develop new knowledge, technologies, and systems to detect and prevent microbial and chemical contamination of foods”*
- ◆ Primary goal of detection is to build technology platforms to detect:
 - ◆ Low numbers
 - ◆ Accurate and specific
 - ◆ Viable vs. non-viable
 - ◆ Infectious vs. non-infectious
 - ◆ Manageable costs
 - ◆ *L. monocytogenes, Salmonella, Campylobacter, E. coli*



Center Structure/Involvement

- ◆ Purdue (5 Schools)
 - ◆ Agriculture (Home – AGAD)
 - ◆ Engineering
 - ◆ Consumer and Family Sciences
 - ◆ Science
 - ◆ Veterinary Sciences
- ◆ Industry
 - ◆ Food production and manufacturing
 - ◆ Testing
- ◆ Regulatory/Government
 - ◆ USDA-ARS Cooperative Agreement



Overall Research Objectives

1. Development of diagnostic tools for rapid identification of biological and chemical foodborne contaminants
2. Development of models to predict and track foodborne contaminants
3. Identification, design and evaluation of alternative processing, handling, packaging, transport, and storage systems to minimize and/or reduce food contaminants
4. Development of technology transfer of information and knowledge related to food safety for the food industry, government agencies, academia, and the public



Overall Goals



Challenges	Processing/Separations	Detection/ID	Data Analysis/Results
<ul style="list-style-type: none"> • Decontamination • Diversity of Samples 	<ul style="list-style-type: none"> • Extraction of Bacteria (live) • Diversity of Samples • Macro → Micro → Nano 	<ul style="list-style-type: none"> • Highly Sensitive (Single Cell) • Live Cells • Rapid and Accurate 	<ul style="list-style-type: none"> • User Friendly • Automated
Our Solutions	<ul style="list-style-type: none"> • Antibody Conjugated Beads • Bio-separations • Dielectrophoresis • Membrane Filtration and Recovery 	<ul style="list-style-type: none"> • Antibody Development • Bioluminescence • Cell-Based Sensors • Integrated Biochips • On-chip Cell Culture • Phage Display • PCB Detection • PCR and ELISA • Light Scattering • FTIR 	<ul style="list-style-type: none"> • Electrical • Optical • Handheld and Integrated Device



Core Project Objectives

To develop:

- ◆ microbiological procedures that can be used to effectively *concentrate viable cells from food matrices* in a self-validating subsystem.
- ◆ *novel biochip based solutions* for rapid concentration, identification, detection and quantification of live microorganisms from fluid samples.
- ◆ *optical light scattering instrument* for detection of bacterial pathogens, known as BARDOT (Bacterial Rapid Detection using Optical light scattering Technology) to rapidly detect bacteria.
- ◆ *multiplexed detection platforms* for detection of food borne pathogens using a Fluorescence Resonance Energy Transfer Spatial Detection Format.
- ◆ *Fourier-transform infrared spectroscopy techniques* and sensors for identification and detection of foodborne pathogens.



CFSE WEBSITE (www.cfse.purdue.edu)



- ◆ Annual Research Report
- ◆ Current CFSE News
- ◆ Information about food safety and detection

The Center for Food Safety Engineering
Purdue University
"Collaborating to make our food safer!"
PURDUE



ACKNOWLEDGEMENTS..