

## **Integrating Waveguide Biosensor for Rapid Detection of Food-borne Pathogens**

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### **Background:**

Creatv MicroTech is developing a multi-step biosensor for the detection of food-borne pathogens. The immunoassay results are reported here. This research covers three areas: antibody evaluation, assay development and instrument development.

### **Method:**

The instrument technology is based on the Integrating Waveguide Biosensor developed by the Naval Research Laboratory. This biosensor provides a lower limit of detection by reducing background noise, thus improving the signal-to-noise ratio. The instrument was constructed for the use of capillary tubes as the waveguide. Sandwich immunoassays were performed on the inner surface of the capillary tubes using Cy-5 fluorescent dyes.

### **Results:**

A sandwich immunoassay using the Integrating Waveguide Biosensor was developed for detecting *Salmonella enterica* Typhimurium in food matrices. The limit of detection was determined to be about  $1 \times 10^4$  cells/ml in PBS buffer for a 40  $\mu$ l sample size. The biosensor was successfully used for detecting *Salmonella enterica* Typhimurium in food matrices, including apple juice, ground beef and chicken carcass rinse, without complicated sample preparation or enrichment.

### **Conclusions:**

The integrating Waveguide Biosensor is demonstrated to be a fast, sensitive and easy-to-use platform for food safety protection. We plan to further improve the instrumentation and increase detection sensitivity by using quantum dot fluorescent dyes.

**Key Words:** biosensor, food safety, immunoassay, *Salmonella enterica* Typhimurium