A Novel Electrochemiluminescence Biosensing System Using Photonic Crystal as Luminescence-Enhanced Substrates for the Ultrasensitive Detection of Food-Borne Harmful Substances

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Safeguarding food quality and safety is essential to people's livelihoods. Over recent years, the ingestion of food-borne pathogens and their related metabolic toxins increasingly affects public health, leading to food poisoning reactions such as diarrhea or fever and even severe risks of cancer. To ensure food safety and public health, it is urgent to develop a novel, highly sensitive detection method for tracing harmful food-borne substances to accurately and quickly identify food-borne pathogens and their metabolic toxins that exceed regulatory standards. In this novel food-borne harmful substance detection approach, TiO2 photonic crystal is used as the enhanced substrate. Through light scattering and plasmon resonance effects, the ECL signal strength of CdS quantum dots is greatly increased, and the detection sensitivity of the ECL sensor is improved, which provides a new idea for the design of POCT-ECL biosensors based upon enhanced substrates. This biosensor can accurately identify typical food-borne pathogenic bacteria such as Salmonella and metabolic toxins such as Aflatoxin, providing a powerful tool for ensuring food safety.

Awards Won:

First Award of $5,000