APPLICATIONS OF NOVEL NANOMATERIALS
TO IMPROVE FOOD SAFETY

Zhong Zhang

Dr. Mengshi Lin, Dissertation Supervisor

ABSTRACT

Food safety is receiving much attention due to the increasing occurrence of food safety incidents in recent years. The emerging nanoscience and nanotechnology may provide novel solutions for the prevention of food safety incidents. This dissertation aims to apply novel nanomaterials and new techniques, such as dynamic light scattering and surface enhanced Raman spectroscopy (SERS) to build rapid analytical methods to improve food safety. Objectives of this study are to: (i) investigate a systematic approach to characterize, detect, and quantify the contamination of engineered nanoparticles in foods; (ii) incorporate gold nanoparticles into dynamic light scattering technique and use them for rapid analysis of aflatoxin in milk. The sensitive method can be easily adapted to determine other food contaminants if corresponding antibodies are used; (iii) develop two simple and reproducible methods to fabricate standing gold nanorod arrays. The standing arrays on gold-coated silicon can generate strong and reproducible signals for SERS. They were successfully applied in the detection of pesticides in apple juice and vegetables. Results of this study demonstrate that there is a great potential to use novel nanomaterials to help solve food safety issues.