Public Abstract
First Name:Trang
Middle Name:Ha Dieu
Last Name:Nguyen
Adviser's First Name:Mengshi
Adviser's Last Name:Lin
Co-Adviser's First Name:Azlin
Co-Adviser's Last Name:Mustapha
Graduation Term:FS 2016
Department:Food Science
Degree:PhD
Title:ANTIBACTERIAL, PLASMONIC, AND TOXIC PROPERTIES OF ENGINEERED NANOPARTICLES

There has been increasing application of novel nanomaterials in recent years in the area of agriculture and food science. This dissertation aims to study novel nanomaterials and investigate their applications in food safety, and to develop and use surface-enhanced Raman spectroscopy (SERS) as a rapid, simple, and sensitive analytical method to improve food safety. There have been increasing applications of nanomaterials in various areas, which may cause human exposure and environmental pollution. Therefore, it is important to study the toxicity of different nanomaterials against bacteria and human cells. The objectives of this study were to: (1) develop new types of substrate consisting of monolayer graphene, gold film, and/or gold nanorod structures; (2) detect and measure silver nanoparticles (Ag NPs) in consumer products using SERS and aminothiophenol as an indicator molecule; (3) investigate the effect of graphene oxide (GO) on human intestinal bacteria and human intestinal cells; (4) study the antimicrobial activity of selenium nanoparticles (Se NPs) against foodborne pathogens and the toxicity of Se NPs against Caco-2 cells. A simple, fast, and efficient method was developed to fabricate new SERS substrates by coating a gold nanorod-decorated graphene sheet on silicone substrate. The results demonstrate that GO is biocompatible and has a potential to be used in agriculture and food science, indicating that more studies are needed to exploit its potential applications. The data show that Se NPs can be used as an antimicrobial agent to inhibit the growth of Staphylococcus aureus in foods and can potentially be used as a chemopreventative and chemotherapeutic agent. More studies are needed to elucidate the mechanisms of Se NPs and GO’s cytotoxicity and their antibacterial properties. More research is also needed to improve the performance of SERS substrates using different materials and use them in improving food safety.