

# School of Pharmacy PhD Project 2017 / 2018

Nanomaterial-Based Artificial Enzyme for Determination of Food Contaminants

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Natural enzymes can catalyse chemical and biological reactions with very high specificity and catalytic activity under mild and friendly conditions. Unfortunately, as possessing intrinsic nature of protein, applications of the biocatalysts are restricted by many factors: high cost of production, low stability (easily be degraded by enzymatic digestion, e.g. by protease), requirements of rigorous conditions for either storage or reaction process (i.e. pH, temperature, pressure), and complication in conjugation chemistry.

Recent advances in nanomaterials and nanotechnology have revealed that metallic nanomaterials exhibit an enzyme-like activity (nanozyme). As being made of inorganic materials, the enzyme-like nanomaterials are more resistant to all physical and chemical denaturation, potentially allowing them to replace and overcome the above-mentioned disadvantages of the natural enzymes. However, this capability has not been fully realized yet as the enzyme-like nanomaterials possess relatively low catalytic activity.

The main aims of this 3 year PhD project are to explore the enzyme-like activity of a number of different nanomaterials. Successful outcomes of the research project are the identification of highly active nanozymes, and thereby to integrate them into a simple, specific, and sensitive platform for point-of-care and low-cost detection of chemical and biological contaminants in foods. The scientific and technical objectives are:

1. Synthesis and characterization of iron oxide-, cobalt oxide-, and other metal-based nanomaterials
2. Investigation of the nanomaterial-based artificial enzyme activities
3. Development and evaluation of assays exploiting the nanozymes for food contaminants (bacteria, heavy metals, etc.)

## General Email Enquiries

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## Project Email Enquiries

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## How to Apply

Postgraduate applications should be made using Queen's University [Direct Applications Portal](#). Please note that there are two application processes: one for admission to the university and another for postgraduate awards.

## Further Information

Additional information for prospective postgraduate students can be found on the [School of Pharmacy website](#) and the [Queen's Postgraduate website](#).