

# **DEVELOPMENT OF A FLUORESCENCE-BASED PROTEASE BIOSENSOR USING NANOSCALE PLATFORMS**

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## **ABSTRACT**

The development of a protease biosensor utilizing nanomaterials is presented in this dissertation. Peptide substrates and nanomaterial platforms were investigated to increase the sensitivity and response time for the detection of protease analytes. Nano-sized platforms, including nanoparticles and nanofibers, offer the advantage of a higher surface area-to-volume ratio contributing to increased immobilization points and a capability of an enhance signal output. Nanoparticles (Silica Nanoparticles, Quantum Dots, and Gold Nanoparticles) in solution and solid surface (Polymer) nanofibers were tested with immobilized peptide substrates that contained fluorophores to acquire fluorescence for signal transduction. A full characterization was accomplished through a variety of optical characterization techniques and an optimized protocol has been developed for each of the sensing systems. The results from these studies are reported for each of the sensing platforms with response to protease analytes.