Department of Biomedical Engineering

Faculty of Engineering

Mahidol University

Wisdom of the Land

EGBE 693 Research Seminar for Biomedical Engineering II
EGBE 691 Biomedical Engineering Seminar II

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Department of Biomedical Engineering
Mahidol University (Room 6373)

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National Nanotechnology Center

"Functionalized Magnetic Polymeric Nanoparticles for Detecting Food Pathogen"

Magnetic polymeric nanoparticles (MPNPs) represent one of the most exciting prospects in current nanotechnology. Due to their biologically and chemically inert, the MPNPs have been considered as efficient support material for biomolecules and chemical substances. Interestingly, it has been discovered that Fe3O4 nanoparticles possess an intrinsic peroxidase-like activity to catalyze the breakdown of hydrogen peroxide similar to that found in natural peroxidases such as horseradish peroxidase (HRP). In this work, we, therefore, employed combination of peroxidase-like activity of Fe3O4 and polymerase chain reaction (PCR) to detect Escherichia coli (E. coli), which is the most frequently encountered bacteria found in environmental water. Sensitivity and specificity were evaluated and compared to those of the classical PCR-gel electrophoresis technique.

In addition, MPNPs were prepared via the co-precipitation method and subsequently miniemulsion polymerization process. The obtained MPNPs were functionalized with mannose-rhodamine molecule and used to fluorescently detect E. coli.