Thesis Title
Utilization of Carrageenan from Philippine *Eucheuma* Species in Gene/Protein Delivery System and Anti-bacterial Surface Coating

Thesis Summary
The thesis is about the evaluation and assessment of Philippine carrageenan from *Eucheuma* species for potential applications in gene/protein delivery as well as antibacterial surface coating. It is supported by the assumption that carrageenan being a polysaccharide and a hydrocolloid can be used in the said applications and can be interacted electrostatically with other polymers like polyethylenimine (PEI) and chitosan.

The structure of thesis is composed of nine chapters. These are as follows:

*Chapter 1* presents the general introduction that includes the background, the statement of the problem, purpose of the study, objectives, scope and limitations of the present study.

*Chapter 2* is the literature review which provides the general overview of gene delivery and drug delivery system, and anti-bacterial surface coating using carrageenan, PEI and chitosan.

*Chapter 3* demonstrates the addition of iota-carrageenan to plasmid DNA (pDNA)/PEI complexes which resulted to the formation of a ternary polyion complex that showed potential use and its viability in gene delivery.

*Chapter 4* shows the potential ability of carrageenan and chitosan to form a controlled release system for glucose oxidase (GOD). The encapsulation efficiency of GOD in chitosan/carrageenan complexes, physicochemical characterization and controlled release of GOD from the complexes were investigated.

*Chapter 5* focuses on examining the capability of chitosan/carrageenan complex formed by electrostatic interaction as a carrier system for protein such as bovine serum albumin (BSA).

*Chapter 6* discusses the two oligosaccharides isolated from iota-carrageenan by mild acid hydrolysis and its application for protein delivery. The oligosaccharides were characterized in terms of chemical structure and sugar units. It was also evaluated for its efficiency to encapsulate BSA.

*Chapter 7* describes the forming of the bilayer of PEI and carrageenan monitored by atomic force microscopy and biomolecular binding analysis.
Chapter 8 shows the formation of multi-layers of PEI and carrageenan by layer-by-layer assembly and its antibacterial activity against *Enterobacter cloaceae*, *Staphylococcus aureus* and *Enterococcus faecalis* 29505 for potential use as coating on biomaterial surface. All the multi-layers exhibited growth inhibition.

Chapter 9 discusses the summary and conclusion.