

CHAPTER I

INTRODUCTION

1.1 Statement of Problems

Chitosan has been recognized as a natural polymer that can be potentially used for biomedical applications due to a number of good properties, e.g. biocompatible, antimicrobial and biodegradable. However, the free-standing film of chitosan is mechanically brittle and difficult to handle. Several approaches have been introduced in order to overcome this problem in practical uses. Surface coating and polymer blends are among the successful approaches. Since chitosan is a cationic polyelectrolyte, it is capable of forming electrostatic interactions with anionic polyelectrolyte. The formation of polyelectrolyte complexes between chitosan and a number of anionic polyelectrolytes have been reported [5, 6, 12].

Self-assembly of oppositely charged polymers has been regarded as a simple and versatile approach for generating organic thin film potentially used in a wide range of applications including electronic, sensor. Here we focus our attention on assembling biocompatible thin film consisting of chitosan and poly(styrene sulfonate). Previous report suggests that blood compatibility of material is strongly dependent on the nature of surface charge at which blood is first in contact; positively charges promote blood coagulation while negatively charges suppress blood coagulation [5, 6]. We hypothesize that alternate blood compatibility can be achieved as long as the thickness of each layer is thick enough and the last deposited layer is responsible for overall biological responses. The outcome of this study should provide fundamental information that can lead to the development of chitosan and perhaps its derivatives for biomedical applications, another way of adding value to the locally abundant polymer.

1.2 Objectives

1. To prepare ultrathin polymer films containing chitosan by layer-by-layer adsorption with various thicknesses by controlling adsorption variables and the number of depositions
2. To study the blood compatibility of assembled thin films

1.3 Scope of the Investigation

The stepwise investigation was carried out as follows.

1. To survey for literature related research work
2. To prepare the amino-containing substrate
3. To investigate the effects of adsorption variables on the individual and overall thickness of assembled film
4. To prepare multilayer films of poly(styrene sulfonate) and chitosan
5. To characterize multilayer films
6. To investigate the blood compatibility of multilayer films against human blood protein and platelet adhesion