

CHAPTER IV

CONCLUSIONS AND SUGGESTION

Positively or negatively- charged chitosan films were prepared by chemical modification at the film surface. The positively-charged film was prepared by methylation at the amino groups of chitosan. The negatively-charged film was produced by reductive alkylation. Bulk characterization technique like NMR is an elementary choice that proves the success of reaction. The extent of surface modification was influenced by experimental variables; reaction time and reagent quantity. According to air-water contact angle data of both surface-modified chitosan films, the surface hydrophilicity increased as the reaction time and reagent concentration increased. Two surface analysis methods; XPS and ATR-IR confirmed the success of reactions. In addition, the charge characteristic and density on surface were verified by zeta potential measurement. As expected, the quaternary ammonium chitosan films and sulfonate chitosan films show positive and negative charges, respectively.

Protein adsorption studies at pH 7.4 on the charged chitosan films was conducted using proteins having distinctive charge and size in order to correlate the charge character on the films surface and the adsorbed amount of protein. The result of protein adsorption on negatively-charged chitosan film could be explained in terms of the electrostatic attraction and repulsion depending on charge type on the proteins. The anomalous absorption behavior of quaternary ammonium chitosan film was mainly caused by film swelling. This study therefore has shown that chitosan films can be chemically modified to contain charges, that somewhat affect the adsorption behavior of proteins on the films.

In vitro cellular responses to the charged surface of chitosan in terms of cell adhesion, cell proliferation, cell viability and reactivity is a subject of future investigation in order to assure the applicability in the field of biomaterials or biomedical application.