The study of protein-based biodegradable films prepared from lizardfish Saurida wanieso viscera

［課程博士］
Doctoral Course

博士学位論文内容要約
Summary

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論文題目 Title	The study of protein-based biodegradable films prepared from lizardfish *Saurida wanieso* viscera		

In order to obtain the renewable and eco-friendly for food packaging, bio-based polymeric films are more paid attention as an alternative approach for conventional petroleum-based materials. Protein-based film, one of the natural polymer-based film materials, is an outstanding candidate compared to other biological materials, including polysaccharides and lipids. Generally, proteins are abundantly available from sustainable animal resources; they are also biodegradable, and exhibit film-formation with suitable mechanical as well as barrier properties, and are of nutritional value. Viscera is previously unsuitable for human consumption and are often discarded, although to some extent it is by-products. Thus, in this context, using of fish viscera as the main protein component in producing biodegradable films might investigate the new method for the potential biomaterial. This is not only the production of value-added products in food packaging industry but also the solution for decreasing pollution.

The obtained results showed that protein-based films prepared from lizardfish viscera could be achieved at different pH 2, 3, 4 and 13, indicating their utility as new material for food packaging in the context of environmental protection. Protein-based films in this study could lock UV light transmission. At pH 3 and 4, the protein films were mechanically strong and slightly deformable. Moreover, obtained protein-films

at pH 4, that is near neutral pH presented the potential in sustainable biomaterials in food packaging.

The tensile strength of films was influenced by heat treatment which presented dominant hydrophobic interaction. Therefore, the positive impact of protein-based film properties from lizardfish viscera by heating was found and these films could be applied as biodegradable films. These films could perform renewable biomaterials in food packaging.

In addition, high and low molecular weight chitosan, the bioactive polysaccharide, incorporation with viscera protein could elevate mechanical and functional properties for biodegradable film. The incorporation with low and high MW of chitosan, the increase of tensile performance was found for blend films. The blend films between polysaccharide-protein were elevated to become more stable and functional. Therefore, these biodegradable films between chitosan and viscera protein could be used and applied in food packaging.

Next work was the use of biodegradable films for preserving Bigeye tuna (*Thunnus obesus)* slices to find protected capability by resulted films. Slices of tuna could be stored by chitosan films and blend films during 6 days based on testing of chemical and microbial properties, in comparison with covered tuna and protein film-covered tuna. The blend films could not illustrate the antimicrobial impact compared to LDPE in storage of tuna slices. Nevertheless, it might be presented when comparing with unwrapping control samples. Hence, the biodegradable films from viscera and chitosan showed good properties in enduring the quality for Bigeye tuna slices through eight days of storage (4 ^{o}C).