CHAPTER 11

SUMMARY AND FUTURE WORKS

11.1 Summary

1. The proteins compositions and myoglobin varied with species and muscle types. Higher content of myoglobin was noticeable in sardine muscle, especially dark muscle, compared with mackerel. Myoglobin could be removed with washing, particularly with increasing NaCl concentration and washing cycle.

2. Alkaline solubilizing process could remove myoglobin from sardine muscle effectively, leading to the improved whiteness of sardine surimi. However, surimi prepared from conventionally washing process showed the superior gel to that from alkaline solubilizing process. This was caused by the denaturation of muscle protein induced by the alkaline solubilizing process.

3. Extended storage of sardine and mackerel in ice caused the oxidation and denaturation of pigment, mainly myoglobin, leading to the discoloration of muscle and less extractability of myoglobin. Sardine lipids were also susceptible to the hydrolysis and oxidation during iced storage. The lipid changes might be associated with the lowered heme protein removal during washing process of surimi production.

4. Myoglobin isolated from the sardine dark muscle had the molecular weight of 15.3 kDa. Its absorption spectra and thermal properties depended on the form as well as oxidation states. Sardine myoglobin was prone to oxidation and denaturation at temperature above 40°C and at very acidic or alkaline pHs.

5. The interaction between fish myoglobin and myofibrillar proteins was enhanced at higher ionic strength, higher temperature and longer incubation times. The interaction was more pronounced in the presence of aldehydes, especially unsaturated aldehyde. The changes in myofibrillar proteins during frozen storage induced the binding of myoglobin to myofibrillar

proteins during incubation. Among myofibrillar proteins, myosin was mainly involved in the interaction with myoglobin. During this interaction, the oxidation of oxymyoglobin to metmyoglobin readily took place. These changes would be associated with the discoloration of processed fish muscle.

11.2 Recommendation

The high quality gel with the acceptable color from surimi of dark-fleshed fish, particularly sardine, can be obtained when fresh fish are used as raw materials to prevent the pronounced binding of myoglobin to myofibrillar proteins. The dark muscle should be removed as much as possible prior to processing to surimi. If necessary to use the aged fish, fish stored in ice less than 1 week were suggested to be used as raw materials for surimi production. Conventional washing with 0.2% (w/v) NaCl or alkaline solubilizing process with prewashing can be used to improve the whiteness of surimi produced from sardine.

11.3 Future works

1. Additional factors including the prooxidants affecting the interaction between fish myoglobin and myofibrillar proteins in a model system are still needed.

2. The oxidative stability of fish lipid and/or myoglobin during extended storage and during washing process should be further studied.

3. Surimi production from dark-fleshed fish to obtain the good gel quality with the improved whiteness should be intensively investigated.