CHAPTER 8

SUMMARY AND FUTURE WORKS

8.1 Summary

1. The cuttlefish muscle contained high content of protein and mineral but low content of lipid. Phospholipids were the major cuttlefish lipids, which were rich in PUFA. The cuttlefish muscle consisted of myofibrillar proteins as the major protein. Myosin heavy chain, paramyosin and actin showed the varying transition temperatures.
2. The addition of metal ions to cuttlefish mince accelerated lipid oxidation, discoloration and loss of protein functionality, especially with multiple freeze-thaw cycles. Iron showed the highest prooxidant effect on lipid oxidation and discoloration, while copper mainly caused the alterations in the physical and chemical properties of cuttlefish muscle proteins.
3. Cuttlefish lipids dispersed into a liposome system were susceptible to lipid oxidation in the presence of iron and ascorbic acid. Lipid oxidation products derived from the cuttlefish lipids in the liposomes could react with the amine groups of phospholipids to form complexes of yellowness compound.
4. Nonenzymatic lipid oxidation induced by iron and ascorbate can promote both lipid oxidation and pigment formation in the microsomal fraction of squid. This pathway could be responsible for quality deterioration of squid muscle during the storage. As lipid oxidation in the microsomes or isolated microsomal lipids increased, yellow pigment formation coincidentally increased.
5. Lipid oxidation and aldehydic lipid oxidation products were able to produce yellow pigment formation in squid microsomes, squid phospholipid liposomes, and egg yolk lecithin liposomes but not in squid salt-soluble myofibrillar proteins. Yellow pigment formation in squid muscle would occur primarily between aldehydic lipid oxidation products and the amine groups of phospholipids.

6. Ascorbate (ASC), erythorbate (ERT), EDTA and tripolyphosphate (TPP) did not prevent lipid oxidation in frozen cuttlefish. Conversely, ASC and ERT exhibited the prooxidative activity and increased the yellow color formation in frozen cuttlefish. Soaking cuttlefish with 5% NaCl and 0.3% H_2O_2 together with 0.5% TPP could improve the color and reduce the decrease in solubility and thaw drip of frozen cuttlefish.

8.2 Future works

1. More research is needed to determine how the reactive aldehydes from lipid oxidation can partition in phospholipid membranes. Therefore, the formation of yellowness compounds in phospholipids can be better understood.
2. Type of phospholipids could affect the formation of yellow color. It would be informative to determine the influence of various phospholipids on color formation. Additionally, some factors affecting lipid oxidation and the formation of yellow compound in cephalopod should be further studied.
3. Alternative additives exhibiting the antioxidative activity in frozen cephalopod as well as the appropriate packaging technology should be focused to maintain the quality during extended storage.