CHAPTER V
CONCLUSIONS AND RECOMMENDATION

In this research, a novel bionanocomposite for wound dressing based on bacterial cellulose, chitosan and sericin was successfully developed. The *Acetobacter xylinum* was used to synthesize bacterial cellulose in from of ultrafine nanofibril network structure. Bacterial cellulose pellicle was used as wound dressing matrix. Chitosan and sericin were used as antimicrobial and antioxidant agent. According to FT-IR spectra of chitosan and sericin-incorporated bacterial cellulose exhibited the peak of bacterial cellulose, chitosan and sericin. SEM images demonstrated the chitosan and sericin solution filled the porous structure and homogeneously distribute in bacterial cellulose matrix. Kjeldahl analysis also suggested the presence of an amount of chitosan and sericin in bacterial cellulose consistent with the chitosan/sericin blend ratio. The incorporation of chitosan and sericin in bacterial cellulose pellicle could be enhancing antibacterial activity to against both Gram-positive *S. aureus* and Gram-negative *E. coli* and protect the wound from bacterial invasion and antioxidant activity to prevent cell and tissue from oxidative damage of reactive oxygen species such as hydroxyl and peroxyl radicals. The water vapor transmission rate exhibited that chitosan and sericin-incorporated bacterial cellulose has potential to create and maintain moist environment around wound area. The amount of released chitosan and sericin was crucial in terms of enhancing antibacterial activity and antioxidant capacity, and wound healing process. In contrast, the remained chitosan and sericin in bacterial cellulose was beneficial because sericin can encourage collagen production in wound area and chitosan can maintain moist environment at wound site. In comparison between low MW chitosan and high MW chitosan, this study has demonstrated that low MW chitosan showed higher antibacterial and antioxidant activity than high MW chitosan. On the other hand, high MW chitosan showed lower WVTR then low MW chitosan. Thus, the chitosan and sericin-incorporated bacterial cellulose is a promising approach to prepare wound dressing with appreciable synergic benefit of those materials.

In the future, the biocompatibility is one of the important factors during wound repairing. Chitosan and sericin-incorporated bacterial cellulose should to test the safety testing by sensitization test in guinea pig (*Cavia porcellus*) in order to confirm which these materials are compatible with the skin during the using process.