

## CHAPTER VI

### CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 Conclusions

The bioactive wound materials were developed with the antimicrobial or anti-inflammatory properties, which aim to promote wound healing. Based on the concept of preparation and maintenance of a moist environment around the wound area, the biocompatible polymeric hydrogel was chosen, in a matrix formation, because of its unique and interesting properties. These properties can meet the essential requirements of ideal wound dressings. Ideal wound dressings should include immediate pain control, easy replacement, and transparency to allow healing follow up and absorption and prevention of loss of body fluids. In addition, ideal wound dressings should create a barrier against bacteria and have oxygen permeability and good handling. Nanofibers were also chosen as polymer matrix due to their extremely high specific surface area, non-woven form with microporous structure that is effective against bacterial permeation and attraction of fibroblasts to the dermis, which are necessary for the repair of damaged tissues. Nanofibers are also attractive in appearance, are practical and are comfortable. In order to achieve the antimicrobial property, silver nanoparticles and doxycycline hyclate drew special attention and were selected because of their effective inhibition of a wide range of microorganisms, especially ones that can cause wound infection. Furthermore, silk sericin was proposed as a natural anti-inflammatory agent.

Silver nanoparticles-embedded poly(vinyl pyrrolidone) hydrogel was fabricated by gamma irradiation synthesis while poly(acrylic acid) containing doxycycline hyclate was fabricated into nanofiber mats in order to obtain antimicrobial activity of the dressing. Silk sericin were loaded into the alginate nanoparticles and further formulated to achieve a natural anti-inflammatory gel preparation. The physical and chemical properties of these materials were investigated to achieve the desired properties. These materials can provide the active substances with effective levels for in vitro and in vivo evaluations. Based on the

obtained results, it can be concluded that these bioactive wound materials can have practical applications in wound care.

## 6.2 Recommendations

Many factors have contributed to the wide range of wound dressings available in today's healthcare market. Different wound types require the use of different dressings for wound management and healing. In addition, the wound healing process has several different phases that require different wound treatments. Thus, the development of composite dressing from nanofiber and hydrogel pads that contain active agents is challenging.

An understanding of a number of different factors, such as the healing process, patient health conditions (such as long-term illnesses), the environment and social settings, the wound type under treatment and the physical and chemical properties of the dressing are vital in the wound management process. Therefore, it is important for wound dressings to be evaluated and tested in specific settings including *in vivo* or in animals, as well as in clinical settings for different wound types and in different stages of the wound healing process, before being considered for regular use.