

## CHAPTER VI

### CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 Conclusions

In this work, the active wound dressings were developed with the wound healing or antimicrobial activity. Based on the concept of the provision and maintenance of a moist environment around the wound area, the biocompatible polymeric hydrogel was chosen to be matrices because of their unique interesting properties which can meet the essential requirements of ideal wound dressings including: immediate pain control, easy replacement, transparency to allow healing follow up, absorb and prevent loss of body fluids, barrier against bacteria, oxygen permeability and good handling. In this work, special attention has been paid to gelatin and alginate because of their relatively low cost and excellent biocompatibility and biodegradability in physiological environments.

Wound dressing from gelatin was fabricated to be nanofibers and hydrogel pad by electrospinning process and  $\gamma$ -radiation synthesis, respectively, while wound dressing from alginate was fabricated into thin film hydrogel. Phyto-chemical substances extract from the medicinal plant; *Centella asiatica*, known for its wound healing ability or the antimicrobial agent were loaded into these gelatin- and alginate-based matrices in order to enhance the wound healing and antimicrobial property of the dressing. The swelling and weight loss behavior of these hydrogels were depended on both the cross-linking agent concentration and the length of time to cross-link. The release of active substances from these hydrogels was achieved by both the swelling and the erosion of the matrix in the phosphate buffer solution. And these hydrogels can sustain the active substances released for 1, 7, and 10 days in case of alginate film, electrospun gelatin fibers and gelatin hydrogels, respectively, with the level of almost 100%. The potential for use of both the gelatin- and alginate-based hydrogels as wound dressings was assessed by indirect cytotoxicity evaluation using normal human dermal fibroblasts (NHDF). The results showed that these materials were non-toxic to the skin cells. With all of the obtained results, it can be

concluded that the gelatin- and alginate-based hydrogels have high potential to be developed as the active wound dressing.

## 6.2 Recommendations

Many factors which have contributed to the wide range of wound dressings include the different type of wound (e.g. acute, chronic, exuding and dry wounds, etc.) and the fact that no single dressing is suitable for the management of all wounds. In addition, the wound healing process has several different phases that cannot be targeted by any particular dressing. Thus the development of composite dressing composes of nanofiber and hydrogel pad is challenging.

Effective wound management depends on understanding a number of different factors such as the type of wound being treated, the healing process, patient conditions in terms of health (e.g. diabetes), environment and social setting, and the physical chemical properties of the dressings. It is important therefore, that different dressings should be evaluated and tested *in vivo* or in an animal and clinical performance for a given type of wound and the stage of wound healing, before being considered for routine use.