CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This study described the fabrication of porous scaffolds of biopolymer blends between collagen and different molecular weight chitosans by freeze drying and dehydrothermal crosslinking techniques. Physical interaction between collagen and chitosan could affect both physical and biological properties of scaffolds. Furthermore, the different molecular weight chitosans had a remarked influence on mechanical and biological properties. The interconnection of pore structure could still be observed after increasing the proportion of chitosan. In addition, the pore sizes of the scaffolds were approximately 100-200 μm which was satisfied for fibroblast culture. The ability to resist lysozyme degradation of collagen scaffold was obviously augmented when blending with chitosan and thus could be manipulated by the changes of either molecular weight or blending composition of chitosan. The cell culture using collagen-based scaffolds containing 30% chitosan enhanced fibroblast proliferation compared to those of the pure collagen scaffolds. Additionally, the scaffolds containing low molecular weight chtiosan could accelerate cell proliferation more effectively than that of the high molecular weight ones, but not affect the initial cell adhesion. After culture periods of 72 h, both L929 mouse connective tissue fibroblasts and Detroit 551 human dermal fibroblasts proliferated and distributed well in collagen/low molecular weight chitosan scaffolds. The results from cell culture proved that collagen/low molecular weight chitosan scaffolds expressed the excellent biocompatibility and could successfully induce fibroblast infiltration. This study accomplished the utilization of collagen and low molecular weight chitosan via fabricating a highly porous hybrid scaffold. The scaffold of collagen and low molecular weight chitosan had promising properties of mechanical strength,

biodegradable rate, and cell proliferation ability. Therefore, they ensured a high potential to be applied in tissue engineering, especially, skin tissue engineering.

6.2 Recommendations

Although several points concerning the influence of different molecular weight chitosan on chemical, physical, and biological properties of collagen/chitosan scaffolds have been dealt with in this work, there still have some interesting points which can be further investigated. These are some recommendations.

1. The relationship between the blending compositions providing maximal cell stimulation and molecular weight of chitosan have to be further investigated.

2. Since chitosan contained many active amino groups, these active groups could be further chemically modified such as biomolecular conjugation and thus diversities the properties of the scaffold.

3. Further study on biocompatibility of collagen/low molecular weight chitosan scaffolds with other cell types such as chondrocyte and osteoblast should be explored in order to use in cartilage and bone tissue engineering, respectively.