CHAPTER V
CONCLUSION

In the present contribution, ultrafine poly(1,4-butylene succinate) extended with 1,6-diisocyanohexane (PBSu-DCH) fibers were successfully fabricated by electrospinning from PBSu-DCH solutions in a 90:10 dichloromethane/trifluoroacetic acid co-solvent. The effects of processing parameters including solution concentration, applied electrical potential, and collection distance, on the morphological appearance and size of the as-spun fibers were evaluated. For a give applied electrical potential and collection distance, the diameters of the as-spun fibers increased with increasing concentration of PBSu-DCH solutions, a direct result of the increase in viscosity of spinning solutions. With increasing solution concentration, the tendency for bead formation was also decreased. For a given concentration and collection distance, increasing applied electrical potential caused the fiber diameters to decrease and smooth fibers without the presence beads were obtained at the electrical potential of 17 kV. With increasing collection distance, the average diameter was found to decrease. Among the various spinning condition investigated, 22% w/v PBSu-DCH solution at the applied electrical potential of 17 kV and collection distance of 20 cm was chosen as the optimum condition for further study. The average diameter of the obtained as-spun fibers was 172±3.4 nm. Mechanically, much improvement in the tensile strength and elongation at break was observed for the as-spun fiber mats over those of the film ones. The potential for using the as-spun fiber mats as bone scaffolding materials was evaluated *in vitro* with human osteoblasts (SaOS-2) in terms of biocompatibility, cell attachment, cell proliferation, and alkaline phosphatase (ALP) activity of the cells that were cultured directly on the scaffolds. The results were compared with those on solvent-cast films and TCPS. It found that the as-spun fibrous scaffolds promoted much adhesion and proliferation of the cells than the solution-cast film and TCPS. SEM images confirmed that the phenotype of SaOS-2 was maintained during the culture. Interestingly, the cells that were cultured on the fibrous scaffolds exhibited an expanded shape with discrete braches to help attach themselves on the fiber surfaces after only about 1 hr in culture, while those cultured on the solution-cast films and TCPS were still round. In addition,

at 3, 5, and 10 days, the ALP activity on different substrates can be ranked as follows: TCPS > fibrous scaffolds > film scaffolds. This evident implies the possibility of using the electrospun PBSu-DCH fiber mats as bone scaffolding materials.