CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

Polycaprolactone (PCL) and poly(3-hydroxybutyrate-co-2-hydroxyvalerate) (PHBV) blended film mats in various blending ratios were prepared by solvent casting process. To determine miscibility, crystallinity, and topology of the film mats after blending occurred, DSC, ATR-FTIR, XRD, and AFM were used. The results of blending showed that miscibility and degree of crysatllinity decreased as PHBV content increased. In contrast, surface roughness increased as PHBV content increased. Moreover, Bioactive proteins, bovine serum albumin, were coated on the surface of substrates. Amount of adsorped proteins increased as PHBV content increased. In addition, water contact angle showed that hydrophilicity on the surface of materials improved after coating with protein.

The potential use as bone scaffolds in tissue engineering was evaluated with a mouse-calvaria-derived preosteoblastic cells(MC3T3-E1). The cytotoxicity test showed all types of cast film mats released no substances at levels which were harmful to cells. All of the coated scaffolds exhibited much better support for cell attachment and proliferation than the uncoated bioactive proteins. Among the various coated scaffolds investigated, the PCL/50PHBV blend showed the highest cellular attachment and proliferation. SEM and confocal images showed the morphology of attached cells on TCPS and film mats. It was found that cells cultured on all types of materials were still round at 6 hours after cell seeding. Nevertheless, after 24 hours of cell seeding, all of the investigated cells extends showed an evidence of the extension of their cytoplasm. All the obtained results showed that coated substrate is a good candidate to be used as a bone scaffold because it supported cell attachement, proliferation, differentiation and mineralization of osteoblast-like cells.

The recommendation for future work is to modify the surface of the films before coating which may enhance protein adsorption and effect on regulation of bone cell growth. Another recommendation may be required in designing and creating the suitable

form of materials to investigate the *in vivo* of bone regeneration with implantation of such those materials.