CHAPTER V
CONCLUSION

Poly(S/EGDMA) porous foams can be fabricated via the high internal phase emulsion polymerization technique. Poly(S/EGDMA) porous foams can meet all of the requirements for the ideal scaffolds such as having high porosity with interconnected pores, light weight, permeability, and 3D architecture.

The addition of hydrophilic component such as EGDMA into the organic phase destabilized the HIPE. Such destabilization of HIPE produces bigger droplets. When the droplet sizes increase, the average pore size of the polyHIPEs found to increase as well. Besides, the openness and interconnectivity of polyHIPE porous structure decreases with increasing EGDMA content.

Poly(S/EGDMA) porous foams can be modified with hydroxyapatite. Hydroxyapatite affected scaffold porosity, interconnectivity and mechanical properties similar to Gleeson and co-worker results (Gleeson *et.al* (2010)). Adding hydroxyapatite into the aqueous phase of HIPE destabilizes the HIPE leading to increasing the average pore sizes. This structure indicated that there was coalescence of droplets or Ostwald ripening. Incorporation of hydroxyapatite significantly enhances mechanical properties of polyHIPE porous foams. PolyHIPE loading with hydroxypatite scaffolds have showed significantly greater Young's modulus compressive strengths and compressive modulus as compared to unmodified with hydroxypaaite polyHIPE scaffolds. Mechanical analysis of the polyHIPE scaffolds revealed compressive strengths similar to that of human cancellous bone about 1– 10 MPa (Gibson *et.al* (1985)). Hydrophilicity of poly(S/EGDMA) porous foams increases with increasing the amount of hydroxyapatite. Since the hydroxyapatite is a hydrophilic material. Because of a large number of hydroxyapatite particles on the surface of scaffolds and therefore a large amount of hydroxyl groups could be expected, which leads to an increase in hydrophilicity. At 0.8% of hydroxyapatite provides the biggest average pore sizes. This is the best condition for poly(S/EGDMA) which is used as scaffold applications.

These results show that by adjusting processing parameters, polyHIPE scaffolds can obtain a controllable pore size, show suitable pore structure and high porosity, as well as good mechanical properties, and may serve as an excellent substrate for bone tissue engineering.