CHAPTER V
CONCLUSIONS

In this work, Polypyrole(PPy) was successfully coated onto both aligned and random Poly(lactic-acid) (PLA) nano-fibrous scaffolds via admicellar polymerization. Dodecylbenzenesulfonic acid (DBSA) was the chosen surfactant for this work and conforms to an S-shaped adsorption isotherm for an ionic surfactant on neutral substrate. From the adsoption isotherm, a concentration of 1.0 mM. DBSA, which is close to the CMC of DBSA, was chosen below CMC 0.8 mM. for subsequent polymerization reactions. The effects of varying surfactant to monomer ratios (DBSA:Py) were studied and compared by SEM and surface conductivity. SEM images showed that increasing the amount of monomer would lead to excess monomers partitioning into the admicelle and reacted to form additional polymer which could have contributed to the increase in fiber thickness. This would also leads to the drop in surface conductivity in the higher DBSA:Py ratio region. The optimal DBSA:Py ratio is 1:8, where the surface conductivity is highest. Although both aligned and random PLA fiber meshes shared the same trend, aligned PLA fiber meshes showed higher values for all conditions. The prepared aligned PLA fiber meshes had degree of fiber alignment in the range of 86 – 90°.

Aligned and random PLA fiber meshes coated with Polypyrole via admicellar polymerization at pH 4 with DBSA:Py ratio of 1:8 and chloride:oxidant ratio of 1:1 were chosen to be characterized further. Nitrogen, chlorine, and sulfur atoms were detected in XPS, whereas they were absent in the aligned (uncoated) PLA fiber meshes samples. The doping level of PPy–coated PLA fiber meshes were 0.33 and close to that for oxidized PPy. On top of that, ATR-FTIR showed characteristics of skeletal C-C that stretches from the pyrrole ring and sulfonate groups which also concurred with previous findings explained previously. Coating of PPy had increased the hydrophobicity of PLA fiber meshes where the effect is greater on aligned fibers.

Cytotoxicity was tested via indirect MTT assay. In the case of both PLA fiber meshes and PPy-coated PLA fiber meshes, showed that these materials also implied that aligned and random PLA fiber meshesand aligned PPy-coated PLA fiber

meshes were cytocompatible and did not release cytotoxic substance in culture medium towards Neuro 2a. The materials were also viable to Neural Stem Cells but PPy-coated random PLA fiber meshes did not show to be viable towards Neural Stem Cells after three days.

In addition, PPy-coated aligned PLA fiber meshes were improve by Laminin coated on the electrospun fibers found that increase cells interact with materials. In electrical stimulation at 100 mV for 2 hours, Laminin coated on (PPy-coated aligned fiber meshes) is showed expression c-Fos gene of rat hippocampal neural stem cell increase compare to non-electrical stimulation.