CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

The ability of the admicellar polymerization process, using a nonionic surfactant template, to modify the surface of silica particles has been demonstrated. The modified silicas have significantly different properties than the starting materials. The important factors that affect the characteristics of polymer formed were both surfactant and monomer loading. The investigation of the distribution and characteristics of polymer film formed on silica surface has been achieved by several methods. All results were concluded as follow.

The sigmoidal Triton X-100 adsorption isotherm showed a maximum Triton X-100 adsorption value of approximately 150 μmol/g on the nonporous silica. In order to prevent the formation of micelles, adsorbed Triton X-100 levels of 50 and 100 μmol/g of silica were chosen to adsolubilize styrene monomer. The amount of styrene adsolubilized increased with increasing styrene concentration in the aqueous phase for both the two adsorbed Triton X-100 levels. The formation of polystyrene film formed at these two levels of Triton X-100 was confirmed by FTIR, TGA, GPC, and AFM.

However, the polymer film of reasonable molecular weight can be obtained only at high Triton X-100 level (100 μmol/g of silica adsorption). The molecular weight and extent of polymer film coverage increased with increase in the amount of monomer loading. The average thickness of the polystyrene is approximately 3-7 nm.

The result shows that, by using non-ionic surfactant, thin polystyrene can be formed on the nonporous silica. Therefore, in future work, it is interesting to use polymers such as styrene-butadiene copolymer or styrene-isoprene copolymer, the properties of which are closer to natural rubber, leading to their application in rubber industry.