

CHAPTER V

CONCLUSIONS

The use of admicellar polymerization to form ultra-thin polystyrene films is affected by many factors including surfactant loading, monomer loading and initiator concentrations. This research focused on the characterization of ultra-thin polystyrene films formed via admicellar polymerization on a non-porous silica substrate. CTAB was used as the surfactant and AIBN was the initiator.

Plateau CTAB adsorption was approximately 130 $\mu\text{mol/g}$ on the nonporous silica substrate. From this isotherm, feed concentrations were obtained that would result in adsorbed CTAB levels of 20 and 100 $\mu\text{mol/g}$. These two levels of adsorption were then used to solubilize styrene and initiator at various concentrations before polymerization.

CTAB and styrene loading significantly affect the amount and characteristics of the polymer formed. Results show that the molecular weight increased with increasing levels of CTAB adsorption and adsolubilized styrene. Styrene loading and initiator concentration are important factors affecting the molecular weight of polystyrene produced by admicellar polymerization. The molecular weight of the formed polystyrene increases with increasing styrene feed. Moreover, for two hours reaction time, the ratio of initiator to styrene should not be less than 1:15 in order to obtain high molecular weight polymer. An initiator concentration less than this ratio will either require more time to achieve high molecular weight polymer or will not produce high molecular weight polymer.

The ability to manipulate the amount of film coverage and the molecular weight of the polymer are important when considering the various current and potential applications of the process.