# CHAPTER II
# LITERATURE SURVEY

The modification of cotton has developed from the demand for cotton with improved properties. Dye ability and thermal stability are two of the problems that require improvement. For dye ability, large amount of salt is required to enhance dye adsorption in the dyeing of cotton with conventional anionic dyes. In addition, high temperature is needed to speed up the dyeing process. In the case of thermal stability, cotton can burn and degrade easily at high temperature. Admicellar polymerization offers an alternative method for producing ultra thin film on the substrate resulting in treated fabric having different properties from the original materials.

Wu *et al.* (1987) proposed that surfactant bilayers worked as two-dimensional solvents for the formation of ultra thin films from surfactant, monomer, and substrate systems by using styrene, sodium dodecyl sulfate, and alumina as monomer, surfactant, and solid surface, respectively. The results show that polymeric thin film can be formed and the film thickness is about 13.0 nm.

The kinetics of styrene polymerization in admicelle at or near saturation was studied by Wu *et al.* (1987). They found that the mass-transfer has an effect on the adsolubilization of monomer. A quasi-emulsion polymerization model with the incorporation of the mass-transfer effect was found to describe the kinetic behavior in admicelle well, and the variation of mass-transfer rate relative to the polymerization rate was simply related to the concentration of initiator.

O'Haver *et al.* (1994) applied admicellar polymerization technique to the silica. Results from the polymerization of styrene in cetyl trimethyl ammonium bromide (CTAB), octyl phenoxy poly (ethoxy) ethanol, and methyl tri (C8 – C10) ammonium chloride bilayers showed effective

conversion of adsolubilized styrene monomer to polystyrene, and the product had significantly different properties than the starting materials.

The formation of poly(tetrafluoroethylene) thin films on alumina by admicellar polymerization was studied (Lai *et al.*, 1995). They concluded that pressure variation was a main factor in the control of tetrafluoroethylene adsolubilization into surfactant bilayer, the concentration of initiator is a factor that has an effect on the consideration during the analysis of kinetic data, and the use of perfluoro surfactant with in situ formation of fluoro polymer has been successfully demonstrated on the alumina surface.

Waddell *et al.* (1995) applied the admicellar polymerization to particulate amorphous silica in an aqueous solution. They found that mono-polymer and copolymer could cover particulate amorphous silica. Moreover, copolymers reduced the cure time and hysteresis of rubber.

Sakhalkar and Hirt (1995) studied the admicellar polymerization of polystyrene on glass fibers. It appeared that polymer formation definitely occurred but the uniform coating was not achieved.

Lai *et al.* (1997) studied the adsolubilization of fluorocarbon alcohol into perfluoroheptanoate admicelles formed on alumina. The results showed that the higher monomer concentration and increasing hydrophobicity of the adsolubilizate enhanced surfactant adsorption below the plateau region. Partitioned amounts of the fluorocarbon alcohols rose with the alcohol supernatant concentration and chain length.

Grady *et al.* (1998) presented the polymerization of styrene-isoprene on glass cloth for promoting the adhesion of thermosetting resins to reinforcing fiber. This experiment compared properties of epoxy composites made with untreated cloth, silane-treated cloth, and admicellar treated cloth. The results showed that the composite made from admicellar-treated cloth had a flexural strength almost the same as that made from a commercial silane-treated cloth.

The production of hydrophobic cotton by admicellar polymerization was studied (Methacharn *et al.*, 2000). The results showed that polystyrene could be admicellar polymerized onto the cotton surface and the treated cotton had good hydrophobicity and air permeability.