CHAPTER I
INTRODUCTION

Reinforced concrete is widely used for structural applications such as flooring, housing, precast and pavement. Normally, steel is used as reinforcing material due to its superior qualities, in terms of strength and compatibility with concrete. However, durability of reinforced concrete as a result of corrosion of steel is a serious problem. The introduction of innovation non-metallic materials is developed to overcome this problem. Fiber reinforcement polymer materials have evolved as a result of new developments in the fields of plastics and fiber composites.

In general, the character and performance of fiber reinforced concrete depends on the behaviors of both concrete and fiber. Moreover, the interfacial interaction (adhesion) between concrete and fiber surface is also influence the properties of the fiber reinforced concrete. The adhesion can be enhanced by surface modification of fiber surface.

There are numerous methods for surface modification such as chemical vapor deposition, plasma polymerization, physical vapor deposition, electrochemical deposition which increase the adhesion force but they have the drawbacks of high cost, high energy consumption, special equipment requirement and working with a gas phase, which is difficult to control. Admicellar polymerization is one of the surface modification methods which requires simple instruments and can be carried out easier.

Admicellar polymerization is a technique to create thin film on a substrate by polymerization of monomer solubilized in absorbed surfactant bilayer at a surfactant concentration below the critical micelle concentration (CMC). The thin-film polymerization process consists of 4 steps: 1) admicellar formation, which is the adsorption of surfactant at the solid/liquid interface to form bilayer (admicelle); 2) monomer adsobulization, which organic monomers preferentially partition into the core of the admicelle; 3) polymer formation, which initiator is added to start the polymerization in the admicelle; and, 4) surfactant removal, which the outer surfactant layer is washed out in order to expose the polymer thin film on the substrate surface.

In this work, admicellar polymerizations of poly(methyl acrylate) on the hydrophobic polyester fabric surface was studied. After the polymerization reaction, the treated polyester fabric introduces carboxylic groups to the surface of the fabric to improve the hydrophilicity of the polyester fabric. The study focused on determining the optimum conditions; e.g. adsorption time, surfactant adsorption isotherm to carry out admicellar polymerization using methyl acrylate as monomers. Also, morphology of polymer-modified surface and interaction between polymer-modified surface of polyester fabric and concrete were studied.