CHAPTER I
INTRODUCTION

"Biomedical" means suitable and/or adapted for use in biological, medical and physical science. "Vital fluids" includes but is not limited to physiological and parenteral solutions such as blood, anticoagulated blood, blood products, other body fluids, drugs, medicines, nutritive materials, and injectable grade substances such as dextrose solution, anticoagulants, or water. Therefore, "articles and containers for the handling of vital fluids" includes bags for the storage of medication, blood bags, catheters, tubes, food wraps etc.

An impact resistant film suitable for making medical solution pouches and medical drainage pouches generally includes an interior layer of a polyolefin such as an ethylene vinyl acetate copolymer, ethylene methyl acrylate copolymer, very low density polyethylene or blends thereof; and outer layers of high melt flow ethylene propylene copolymer. At least one of the outer layers also includes an elastomer such as a styrene ethylene butylene styrene copolymer. A flexible copolyester can be substituted for one of the outer high melt flow polymer layer. Additional interior layers can also be incorporated in the film structure.

Magnetic fluids are stable colloid suspensions of magnetic nanoparticles dispersed in different carrier liquids. Due to their special characteristics, they have gradually gained importance in numerous biological fields, such as drug targeting, cell isolation and purification, activity agents in hyperthermia therapy, etc. in recent years. Especially magnetic fluids composed by magnetite particles have been used widely in biological and medicinal fields because of its excellent magnetic properties and low toxicity.

Admicellar polymerization is an innovative method. It can be used to improve the compatibility at the interface between different materials. In previous work, admicellar polymerization has been used to improve the adhesion in polymeric composites, such as precipitated silica with polystyrene, the copolymer of styrene-butadiene, styrene-isoprene, glass fibers with polystyrene and the copolymer of isoprene-styrene. There are also many researchers applying the admicellar polymerization technique to other areas for various purposes by coating different

polymer on different materials. Admicellar polymerization generally consists of three main steps:

1. Surfactant adsorption
2. Monomer adsolubilization
3. Polymerization
4. Surfactant removal

The method makes use of the formation of surfactant bilayer or admicelle on a substrate at a surfactant concentration just below the critical micelle concentration (CMC). In the outer surfactant layer, the amphiphilic molecues are oriented with the ionic head groups in contact with the aqueous solution, while the long-hydrophobic tails interact to form a hydrophobic inner core. An inner layer oriented with the head groups in contact with the substrate completes the surfactant bilayer. When an organic monomer is added to the system, it will be preferentially adsorbed into the admicelle in process called "adsolubilization", and when an initiator is added, the monomer in the admicelle will undergo a polymerization reaction to form a polymeric layer on the substrate surface. After the polymerization, the accessible surfactant, especially the upper-layer surfactant, may be removed by washing to expose the polymeric layer on the substrate surface. The polymeric film formation in this process is controlled by several parameters including the characteristic of the substrate surface, the type of surfactant, the monomer molecule, the electrolyte, and the pH value. (Thirawudh et.al., 2008)

In this research, scope of work is study admicellar polymerization of natural rubber and nanomagnetic particles. According to this technique, the thin polystyrene (PS) and poly(methyl methacrylate) (PMMA) film covers each natural rubber (NR) particles by using bilayers of cetyltrimethylammonium bromide (CTAB) as a reaction template for the admicellar polymerization of PS-NR and PMMA-NR by varying styrene, methyl methacrylate and natural rubber concentrations. The confirmation of synthesizing admicelled PS-NR and PMMA-NR are investigated by FTIR. The admicellar polymerization of nanomagnetic particles are added to the admicellar polymerization of natural rubber particles to improve the viscosity of the polymer by using capillary rheometer.