CHAPTER- I

1. Introduction

Cellulose is one of the most widespread natural polymers and it undergoes maximum possible chemical modifications. It is interesting, the modification and utilization of cellulose due to its good biodegradability and biocompatibility. The modifications of cellulose with graft copolymer or compounds expand the applications as functional hybrid materials [1-3]. Accordingly there are numerous studies that deal with its behavior when exposed to external stimuli and its chemical modification [4]. Cellulosic polymers like, cotton, cyclodextrins and chitosan have variety of applications to human society as medicines, cosmetics and textile materials etc., [5-7]. Cellulosic cotton is one of the most important materials for the production of textile fabrics. Also β-cyclodextrin is a vital polymer for medicinal textiles, antimicrobial agents and drug delivery systems.

Medicinal textiles account for enormous market due to widespread and not only in hospitals, hygiene and healthcare sectors, sophisticated hotels and other environments where hygiene is required. There is a sharp increase in the use of natural polymers and synthetic polymers in producing various medical products [8].

Generally microorganisms create and aggravate problems in hospitals and other environments by transmitting diseases and infections through clothing, bedding etc. The axillae and perineal regions of the body are more susceptible to microbial growth that leads to undesirable body odor [9]. Microorganisms are deteriorating cellulosic fibers and decrease
the wear life of the materials [10]. The surface of the fibers, gradually corrode inwards layer by layer disintegrating the primary and secondary walls of the fibers causing considerable damage [11]. Thus microorganisms exist in rich quantities on textile materials. In order to struggle these difficulties, it is highly required to impart antibacterial resistance properties on textile materials.

Such textile materials and composite polymers, considerable research has been carried out by creating use of organic and inorganic compounds as antibiotics. Some vital bactericide example used in various personal care (shampoo, toilet soap, deodorants and tooth paste) and consumer (footwear, plastic wear) products [12]. Recent developments in antibacterial products include a procedure concerning synthesis of antibacterial membranes and fabrics [13].

The development for formulating an antibacterial preparation by reaction of carboxymethyl starch with trimethylated melamine in the presence or absence of cupric ions to render cotton fabric antibacterial was discussed [14]. The cellulose has been modified chemically and re-generable antibacterial activity on cotton and other cellulosic fabrics [15]. Many infectious diseases can be prevented or sterilized by wearing antibacterial fabrics protective clothing. The burn patients and people who do not have functioning resistant systems also need to wear these germ free medicinal fabrics and membranes to avoid infection. Antimicrobial materials such as fabrics, polymers and even toys are becoming more and more popular due to the public concerns on pathogens [16].

Today, with increasing awareness of environmental concerns, a significant amount of regulation on ecological attentions has been announced [17]. It has showed the challenges
faced and accordingly the changes required in functional finishes for cotton fabrics [18]. The major factors that will act as a driving force for change in modification of cellulosic polymers in the next decade and with good quality fabrics need for various sectors.

**OBJECTIVES**

This work falls on synthesis of novel cellulose composites and sprays into six distantly related parts. All of these parts investigate in details about synthesis of cellulose composites and its useful applications.

This work split into two major parts such as cellulose/PVP and cellulose/sb-cd composites. Each major part divided into three chapters based on its treatment methods.

First three chapters aimed to synthesis of Cellulose/PVP/ZnO composite fabric for improved dyeability and antibacterial activity; Cellulose/PVP composite fabric treated with natural extracts for improved antibacterial activity; Cellulose/PVP membranes synthesized from Ionic liquids for antibacterial activity.

Another three parts designed to synthesis of Cellulose/sb-cd/ZnO composite fabric, Cellulose/sb-cd with natural extracts treatment and Cellulose/sb-cd composite membranes synthesized from Ionic liquids for improved antibacterial activity.

All the synthesized composites were characterized to study the effect of modification by FTIR, SEM and EDX. In addition, XRD, TG/DTA, Tensile strength and Elongation measurements were done for composite membranes only. The antibacterial property tested for composite polymers and treated materials against S.aureus and E.coli bacterium.