CHAPTER I
INTRODUCTION

Climate change is caused by the drastic increase in greenhouse gases in the atmosphere. Water shortages, especially in semi-arid and arid areas are negatively affecting agriculture. Furthermore, most of these countries are challenged with soils, which are not suitable for cultivation, e.g. sandy soils. In order to solve these problems, use of synthetic materials with good absorption and retention capacities has been made.

Polymers are popular materials because of their wide range of applications and simple processing techniques. The properties of polymers can be modified into the desired direction, by varying the atomic composition of the repeat units and structure. Polymers for agricultural applications have been used successfully in the reduction of required irrigation water, leading to a lower death rate of plants. Additionally, improve fertilizer retention in soil was found, and an increased plant growth rate (Raju *et al.*, 2001). A novel highly porous polymer is PolyHIPE (High Internal Phase Emulsion) polymers, classified as spongy polymers.

Poly(High Internal Phase Emulsion) is highly porous material obtained from high internal phase emulsions (HIPE), consisted of oil(continuous) phase and water(disperse) phase, calls polyHIPE. PolyHIPEs are attracting interest due to their excellent properties from their high porosity, high surface area, open-cell structure, low density and low degree of interconnectivity (Pakeyangkoon, 2009; Anatoly *et al.*, 2002).

PolyHIPE can be modified to a variety of application such as column filtration/separation, catalyst support, media for tissue engineering and soil addition (Fabrice *et al.*, 2012; Burke *et al.*, 2010; Haifei and Andrew, 2005). Most polyHIPEs are hydrophobicity; produce by water-in-oil (W/O) system. However there are two methods to synthesis of hydrophilic polyHIPE, the first method is direct synthesis hydrophilic polyHIPE in an oil-in-water (O/W) system such acrylamide (Haifei and Andrew, 2002) or acrylic acid (Krajnc *et al.*, 2005). Another method is modified surface of hydrophobic polyHIPE to enhancing hydrophilicity (Shulamit *et al.*, 2009; Cameron and Sherrington, 1996).

The additional of a functionalizable comonomer to polyHIPE base on non-functionalizable comonomer is usually medthod for modification (Shulamit *et al.*, 2009). Layer-by-Layer (LBL) is a useful technique for preparing thin films on polyHIPE surface. In 1990, Gero Decher's group was created the simple concept, the alternating of polycation and polyanion are adsorbed on a surface base on electrostatic interaction. This study focus on the enhancement of hydrophilicity on poly(S/DVB)polyHIPE and poly(S/EGDMA)polyHIPE as a water absorbent material by the LBL polyelectrolyte membrane technique (Chularat *et al.*,2011; Stephan and Joseph, 1999, 2011). This present will described the growth of polyelectrolyte membrane on polyHIPE surface and the characteristic of polyHIPEs after modified their surface.