

## CHAPTER I INTRODUCTION

Electrospinning technology is the best candidate method to produce continuous fibers with sub-micrometer diameters to nanometers from polymer solutions or melts in high electric fields because this technique has shown to be a simple but powerful technique and low cost for the fiber preparation. Due to the high surface area to volume of the fibers and the high density of pores on the sub-micrometer length scale of the obtained electrospun fibers, are of great interest for a wide range of applications such as high-performance adsorption, filtration, protective clothing and biomedical usage, tissue engineering and sensor application (Huang *et al.*, 2003).

Heavy metals can cause serious environmental damage because they are very toxic and non-biodegradable and they release to water can affect human health. Thus, the removal of heavy metals from wastewater has become concern.

Previous study, polybenzoxazine, a new high performance thermosetting resin and a porous material, is selected as a chelating polymer for wastewater treatment. As a result of during polymerization, benzoxazine undergoes thermally activated ring-opening polymerization to form a Mannich base bridge (Ning and Ishida, 1994), which is known to form complexes with transition metal ions (Chaisuwan *et al.*, 2010).

Electrospinning of polybenzoxazine to obtain high aspect ratio can be increased the efficiency of using polybenzoxazine aerogel for the removal of heavy metals from wastewater. However, electrospinning of polybenzoxazine is limited by its extend structure and its poor to form fiber. Overcome this limitation by adding poly(ethylene oxide) solution into polybenzoxazine solution before electrospinning process. Poly(ethylene oxide) was selected because it is high viscosity and is soluble in dimethylformamide (DMF), has shown to produced ultrafine fibers using electrospinning (Son *et al.*, 2004).

The purpose of this work is to preparation the polybenzoxazine/poly(ethylene oxide) blend fibers by using electrospinning technique to increase the surface area form complexes with transition metal ions. By optimizing the composition of

poly(ethylene oxide) solution in polybenzoxazine solution and electrospinning process parameters such as the applied voltage, the distance between the tip of the needle and the target and the needle diameter.