CHAPTER I
INTRODUCTION

Conductive or conducting polymers are recently interesting materials. Their intrinsic nature behaviors provide interesting both in electronic properties (electrical conductivity, photoconductivity and optical properties (i.e., absorption and emission). Therefore, they have been developed for various applications both in composite and electronic applications. The previous studies of conductive polymers have been usually focused on the properties of either the solutions or the films thereof. Therefore, it is interesting to explore the properties of conductive polymer fibers with a high surface area to volume or mass ratio and a high aspect ratio which were expected to be applied in small scaled composite and electronic applications in the future.

Electrospinning was selected to produce the fibers because it is an interesting method for fabricating ultra fine fibers with nanometer to micrometer range in diameters from various kinds of materials including conductive polymers. The electrospinning of various conductive polymer derivatives such as a poly(p-phenylene vinylene) (PPV) based polymer (i.e., poly(2-methoxy-5-(2'-ethylhexyloxy)-1,4-phenylenevinylene) (MEH-PPV)), a poly(p-phenylene ethynylene) (PPE) based polymer (i.e., poly(ethylhexyloxy-octyloxy-p-phenylene ethylene) (EHO-OPPE)), and a poly(fluorere) based polymer (i.e., poly(2,7-(9,9-bis(2-ethylhexyl)fluorene)) (BEH-PF)) will be studied. Moreover, the overall properties such as morphological, chemical and optical properties both in solutions and their electrospun fibers will be investigated.

Firstly, in Chapter II, basic concepts of conductive polymers and electrospinning are briefly addressed. In addition, reviews of the electrospinning of various derivative conductive polymers are listed.

In Chapter IV, the investigation of the color change from orange to yellow of the electrospun MEH-PPV fibers produced from the polystyrene (PS)/MEH-PPV solution in 1,2-dichloroethane (DCE) with addition of pyridinium formate (PF), a volatile organic salt, for 1 month. Systematic experiments to study the optical properties change of MEH-PPV in DCE solutions containing the PF, which could

lead to a simple procedure for controlling the electronic properties of this polymer. Effects of concentration of MEH-PPV and PF were investigated. The changes of absorption and photoemission spectra were followed as a function of time. Structural change was characterized by Fourier transformed infrared (FT-IR) spectroscopy and nuclear magnetic resonance (NMR) spectroscopy.

Chapter V and VI show the electrospinning study of binary blends of EHO-OPPE with PS and BEH-PF with PS, respectively. Morphological appearance and chemical functional group of the electrospun products were investigated by Scanning electron microscopy (SEM) and FT-IR, respectively. Additionally, optical properties of the as-prepared solution and its corresponding e-spun products were investigated by UV-Visible (UV-Vis) and photoluminescence (PL) spectroscopy for absorption and emission, respectively. The solution-cast and spin-coated films of binary blends were prepared for comparison. The aggregation of PPE molecules in the annealed electrospun fibers at above glass transition temperature of PS (i.e., 110 °C) at various annealing time also studied.