CONDUCTIVITY STUDIES OF CONDUCTING LIQUID CRYSTAL POLYMER WITH LOW 2-ACRYLAMIDO-2-METHYL-1-PROPANESULFONIC ACID CONTENT

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ABSTRACT

The purpose of this study is to study the conductivity of the polymer with different ratio of conductivity block and liquid crystal block. and to determine optimal conductivity based on polymer structure. Low content of conducting block which 2-Acrylamido-2-Methyl-1-Propanesulfonic Acid (AMPSA) are synthesized with liquid crystal polymer which is Methyl Methacrylate (MMA) with ratio sample 10%, 25% and 50% of AMPSA to the MMA. This sample was synthesized with randomly polymerized structure and was demonstrated by Electrochemical Impedance Spectroscopy Hioki 3532-50 (EIS) for conductivity studies at frequency 50Hz to 1MHz from temperature 30°C to 100°C with 10°C interval. As result, the conductivity of the sample ratio are increases with increasing of ratio AMPSA to the MMA where 50% ratio have the highest conductivity follow by 25% and 10% at temperature range 70°C and 80°C. Based on the study of dc conductivity versus 1000/T, the temperature dependency with conductivity by using of Arrhenius plot and Vogele-Tammanne-Fulcher (VTF) model are discussed where the higher ratio sample have well develop temperature dependency compare to low ratio sample. Finally, the benefits involved with low content of AMPSA to MMA was low affected with the increasing of conductivity.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Recently, over these five decades liquid crystalline (LC) polymer have interesting in industry after the found of liquid crystalline (LC) state of synthetic rigid-rod polymer. The well-developed LC polymer structure are believed to be a beneficial application in wide range field of new devices, energy, environment, resources and biotechnologies as shown in Figure 1.1 (Kato, Uchida, Ichikawa, & Soberats, 2017)

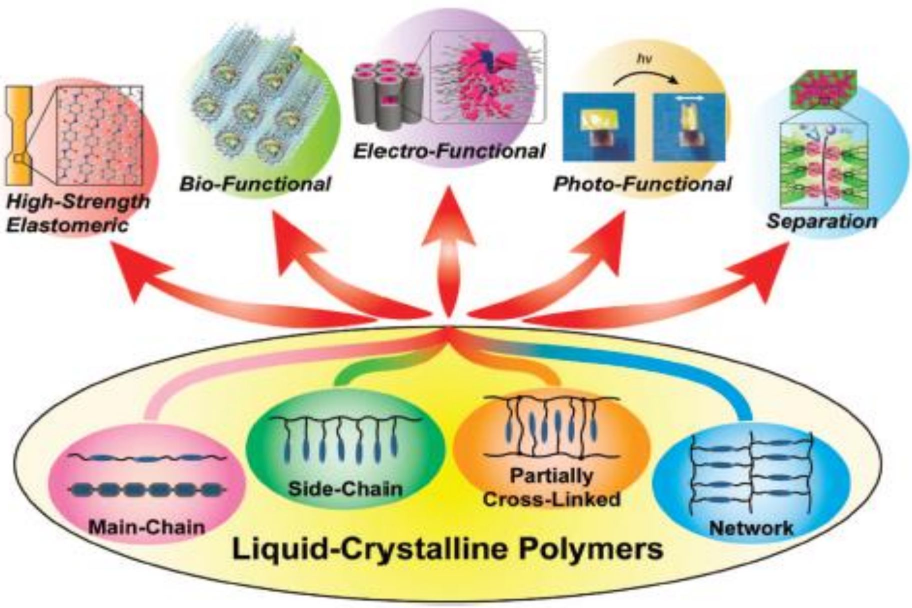

Figure 1.1 Design and type of application of liquid crystalline (LC) polymer (Kato et al., 2017)