UNIVERSITI TEKNOLOGI MARA

THERMAL, PHOTORESPONSIVE AND CONDUCTING PROPERTIES OF POLYOXYAZOBENZENE HEXYLMETHACRYLATE HOMOPOLYMERS AND TERPOLYMERS

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ABSTRACT

The liquid crystal polymer in this study, Polyoxyazobenzene hexylmethacrylate homopolymers and terpolymers were characterized by using the DSC, TGA UV–visible spectrophotometry and EIS. The polymers can be used in wide range of temperature and they showed low Tg value which is under 60°C and the terpolymers is said to be in smectic phase at 148°C. Thus, polymer is said to be thermally stable. Photoresponsive properties shown clearly as both polymers performed thermal relaxation under same duration in range of 24 to 48 hours. Lastly, the terpolymers showed highest conducting properties at 110°C with dc conductivity measured, 1.69x10e-^{11} S/cm which comparable with other studies.

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CHAPTER 1
INTRODUCTION

1.1 Research Background

Throughout the recent years, the liquid crystalline polymers (LCPs) have gathers a lot of attention and interest in academic and industrial purpose (Liu et al., 2014). In general, the term LCPs itself can define that the materials is in a phase that involved solid and liquid. The compound may have solid appearance but can flow like liquids. Besides that, liquid crystals are somehow can be polymerized using free radical polymerization method in which the compound name as LCPs comes to exist.

There are two types of LCPs that commonly known as main-chain LCPs and side-chain LCPs. The only difference between these two LCPs is the position of the mesogenic compounds. While mesogens incorporated at the backbone of polymer in main-chain LCPs, the side-chain LPCs is where mesogens are attached to the backbone through flexible spacer (Koide, 1991).

Thermal stability has become an important parameter which can help to ensure the polymers can be used at certain range of temperature. Thus, the degradation of the polymers can be avoided. Besides that, above the glass transition temperature, the LCPs will be in liquid crystal phase. Therefore, the LCPs structure can either be in nematic or smectic phase. By knowing this phase also, the known structure of polymers can be used in wide range of applications such as optical applications (Koide, 1991).

In order to have better quality of liquid crystal polymer, the polymers exposed to UV lights to study its behavior towards irradiation of UV lights. Understanding the isomerization kinetics of different is great importance in order to gain control over the response time and to design good photoresponsive materials for specific applications.

Other than that, ionic conductivity of polymers can be used for electrochemical devices, because it can be used for low temperature applications due to their relative low cost and high versatility. Through chemical and physical modification, new polymer