Thesis Tile A Study of Preparation of Photosensitive Elastomer from Liquid Natural Rubber.

Name Uthai Lairattanakul

Degree Master of Science (Polymer Science)

Thesis Supervisory Committee

Pranee Phinyocheep, Doctorat de l'Universite'du Maine.

Sauvarop Bualek, Dr.rer.nat.

Krisda Suchiva, Ph.D.

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ABSTRACT

Photo-induced polymerization reaction has been widely interested by macromolecular chemists and technologists because of the rapid chemical reaction and the ability to be carried in solution or solid state at room or high temperature. In this work photocrosslinkable elastomers were prepared by addition reaction of photosensitive acid onto epoxidised liquid natural rubber (ELNR). ELNR was prepared by two step reactions ; first natural rubber was depolymerized into liquid natural rubber (LNR) by using O_2/phenylhydrazine system at 60°C, then hydrogen peroxide and formic acid were added to LNR at 55°C to epoxidise the LNR. The addition reaction of photosensitive acid such as acrylic acid, methacrylic acid and cinnamic acid onto ELNR were carried out in $CHCl_3$ at 80°C. The kinetic of addition reaction was followed by titration of residual acid with 0.1M KOH. The acid grafted onto

ELNR was obtained by precipitation in methanol. The results showed that addition reaction of cinnamic acid was slower than acrylic acid and methacrylic acid. The increase of temperature led to slight improvement in the grafting efficiency. Furthermore, the molecular weight of ELNR has also influence on the rate of addition reaction of acid. It was found that the reaction times of low molecular weight ELNR were shorter than those of high molecular weight ELNR. Photocrosslinking study of cinnamated ELNR by ultra-violet radiation showed the rate of photocrosslinking, as followed by IR spectroscopy, to be dependent on molecular weight, thickness and % cinnamate grafted to the polymer chain.