

課題番号 : F-19-KT-0006  
利用形態 : 機器利用  
利用課題名(日本語) : 光応答性液晶エラストマーのナノ構造解析  
Program Title(English) : Analysis for nanostructure of copolymer in liquid crystal elastomer  
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### 1. 概要(Summary)

The presence of cis-azobenzene causes the decrease of the order parameter in the aligned nematic liquid crystal (LC) is a well-known phenomenon. However, we observed a new photo-induced behavior of liquid crystalline order by shining the UV on the azobenzene copolymer stabilized in the liquid crystal. During the continuous UV illumination, the order parameter increased and reached an enhancement maximum, then finally decreased. The possible mechanism is still under study. According to the results we have in hand, this new phenomenon is related to the ratio of the 2 monomers in the copolymer. In order to explain the mechanism, the nanostructure of the copolymer formed in the liquid crystal should be identified.

### 2. 実験(Experimental)

#### **【利用した主な装置】**

超高分解能電界放出形走査電子顕微鏡

#### **【実験方法】**

The LC+monomers mixture were prepared in a quartz cell. After the polymerization and confirming the photo-induced behavior, the samples were split and immersed in hexane for 5 minutes. The liquid crystal was extracted and the polymer structure was left on the quartz plate. The sample were coated by Pt for SEM observation.

### 3. 結果と考察(Results and Discussion)

The copolymer structure formed by the different

ratio of the azobenzene to RM257 monomers was studied by SEM. Generally, the size of droplets was decreasing with the increase of the concentration of RM257 monomer. On the other hand, the morphology formed on the top of cell was very different from the bottom due to the polymerization process. The copolymer structure formed on the top was denser than on the bottom. The results of SEM suggested that the morphology greatly affects the photo-induced behavior of the azo-doped liquid crystal mixture.

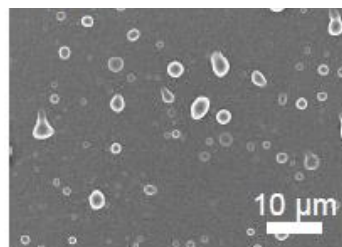


Figure 1. An example of the morphology formed by 2 monomers (bottom of cell).

### 4. その他・特記事項(Others)

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### 5. 論文・学会発表(Publication/Presentation)

(1) C. Y. Chien and J. Yamamoto, The 4th Asian Conference on Liquid Crystals (2019) P-39.

### 6. 関連特許(Patent) なし