Molecular Crystals and Liquid Crystals Science and Technology. Section A. Molecular Crystals and Liquid Crystals
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/gmcl19

# Characteristics of a Novel Liquid Crystal Cell with Mixture of FLC and U.V. Curable Resin

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Version of record first published: 23 Sep 2006.

To cite this article: Michio Shimizu , Takeshi Nishi , Toshimitsu Konuma & Shunpei Yamazaki (1995): Characteristics of a Novel Liquid Crystal Cell with Mixture of FLC and U.V. Curable Resin, Molecular Crystals and Liquid Crystals Science and Technology. Section A. Molecular Crystals and Liquid Crystals, 263:1, 585-587

To link to this article: http://dx.doi.org/10.1080/10587259508033619

*Mol. Cryst. Liq. Cryst.* 1995, Vol. 263, pp. 585–587
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# CHARACTERISTIC OF A NOVEL LIQUID CRYSTAL CELL WITH MIXTURE OF FLC AND U.V. CURABLE RESIN

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Abstract The DLFLC, which shows various characteristics as a domain-less switching and fast response time when low voltage is applied is produced by us.

## INTRODUCTION

Switching of the SSFLC comprises a lot of domains generating process and the domains growing process. When high voltage is applied, domain-generating process is dominant; when low voltage applied, domain-growing process is dominant. So the voltage dependency of response time shows different switching processes at the applied high voltage and low voltage.

We will report a novel FLC cell of a system comprising an FLC mixed with U. V. curable resin, which is called DLFLC (Domain-Less switching FLC).

## EXPERIMENT

We employed CS1014 produced by Chisso Co., of which phase sequence is I-N-A-C. And we employed U. V. curable resin including 90wt% acrylate monomer of which molecular weight is about 250. The CS1014 and U. V. curable resin was mixed with one another in the ratio 95wt% : 5wt% in isotropic phase. An antiparallel rubbing cell was used. The cell gap was 1.6μm. The mixture in isotropic phase was introduced to the blank cell and was gradually cooled to

Sm C* phase. As the U. V. curable resin was separated from the mixture, this resin was cured by irradiation of U. V. rays.

## RESULTS AND CONSIDERATION

We observed DLFLC's uniform orientation and appropriate extinction like that of SSFLC by polarizing microscope. Domain-less switching of DLFLC was observed in Fig.1. It is bright in Fig.1(a) at first. With changing applied voltage, domain-less continuously half tone switching is performed in Fig.1(b) and (c). Therefore it is dark in Fig.1(d).

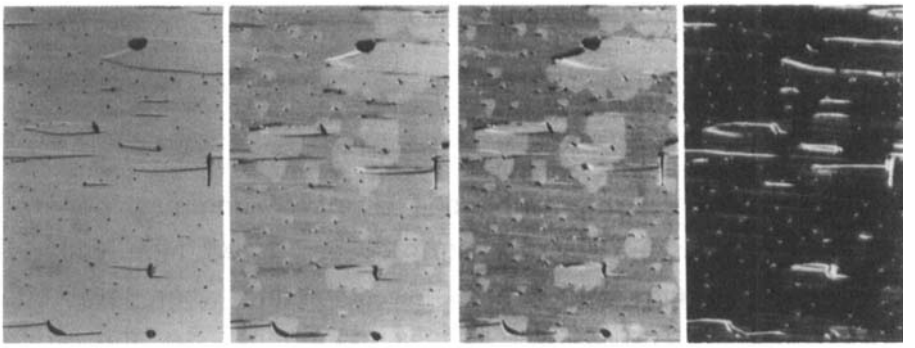


Fig.1 Micrographs of DLFLC cell, when changing voltage is applied (x200). : (a)9.8V (b)0.4V (c)-0.4V (d)-3.0V

And the voltage dependency of response time when changing voltage is applied is shown in Fig.2. DLFLC's response time was changing lineally when the applied voltage was changing. We consider the DLFLC's switching is consisted of one process.

We observed the shape of the resin formed in the DLFLC cell by SEM. It is confirmed there are a lot of cured resin grains with several tens nm on the substrate in Fig.3. When the monomer, which is included in U. V. curable resin is decreased, the resin grains decrease. It is confirmed domains are generated and grow in the switching process.

We consider a lot of cured resin grains are one of the cause of

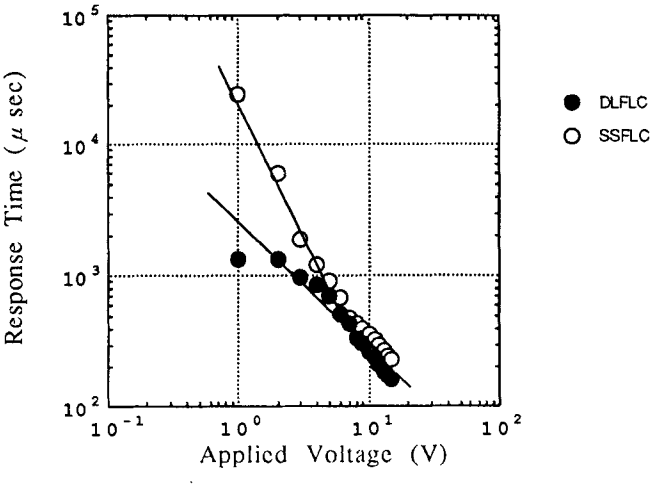


Fig.2 Voltage dependency of response time, compare DLFLC with SSFLC.

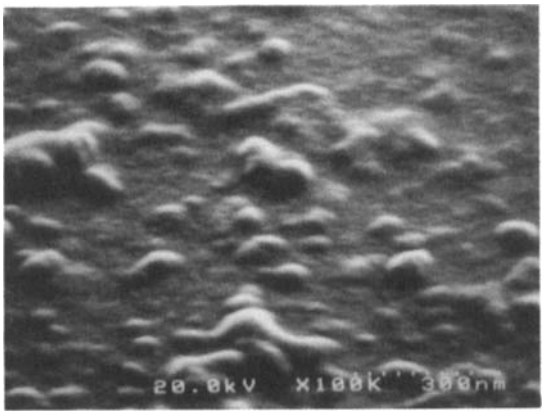


Fig.3 The shape of the resin formed on the substrate by SEM.

DLFLC's fast response time, switching look one process and continuous half tone [1].

## REFERENCE

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