Interfacial switching properties of ferroelectric liquid crystal molecules with polymerized reactive mesogen

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Ferroelectric liquid crystal (FLC), discovered by Meyer in 1975 [1], have attracted considerable attention from fundamental research and various applications as displays and data processing devices. FLCs have various structures and characteristics depending on the anisotropic alignment properties of polymer surface, surface anchoring energies, applied electric field, interfacial interactions between FLC molecules and polymer structures, and so on. Among them, information of the interfacial interactions at the FLC/polymer interface is of great importance for understanding the mechanism of the molecular reorientations. The molecular switching of LFCs has been studied by polarization reversal current [2], stroboscopic micrography [3], and electro-optic measurements [4].

In this paper, we describe the molecular reorientation process of FLC molecules influenced by the interfacial properties through measurement of polarization reversal current. For controlling the interfacial properties, we used the mixture of FLC and UV curable reactive mesogen (RM). The RM monomers are mixed within FLC layer and then they are polymerized by UV exposure. By varying the concentration of the RMs, we could change the interfacial conditions between FLC molecules and polymerized RM structures. The polarization reversal peaks could be separated by the switching origins of FLC molecules. Depending on the concentration of RMs in FLC and cell thickness, we discuss the interfacial switching properties of FLC molecules through separated polarization reversal current peaks associated with molecular reorientation processes.

Acknowledgement
This work was supported by a grant (2012-10040035) from the Fundamental R&D program for Core Technology of Materials funded by the Ministry of Knowledge Economy and Samsung Display Co..

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