

Investigation of the surface alignment of liquid crystal multilayers evaporated on photoalignment polyvinyl cinnamate film

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[Introduction] The investigation of the alignment properties of the mesoscopic surface attract the researchers interest. Up to today, studies by means of second harmonic generation method and/ or sum-frequency vibrational spectroscopy were described where the information of the surface molecular alignment can be demonstrated. However, the probed area should be uniform, i.e., the alignment of the liquid crystal molecules on a mesoscopic structured surface cannot be applicable to these methods. In this study, the surface alignment of the evaporated liquid crystal multilayers was investigated by the novel surface profiler instrument.

[Experiment and Result] Photoalignment layer used was polyvinyl cinnamate (PVCi) and spin coated on a glass substrate. The periodical striped patterns were produced with photomask by using He–Cd laser ($\lambda=325\text{nm}$, 25 mW/cm^2). The exposure time was set to be 20 min. For evaporation, 5CB was heated by using a hot plate at 90°C and was adsorbed on the substrate surface above the LC substance. The 5CB adsorption was controlled by the duration of evaporation. Figure 1 shows 3–D surface alignment pattern mapping for 3 hour 5CB evaporation. From the fig.1, a periodic profile can be clearly seen, where the period corresponds to the mask pattern ($100\mu\text{m}$ line and space). It is also recognized that the height of the UV exposed region is lower than that of the masked region. This result implies that the surface molecular alignment at the UV exposed region would not be voluminous because the surface liquid crystal molecules are well aligned parallel to the substrate.

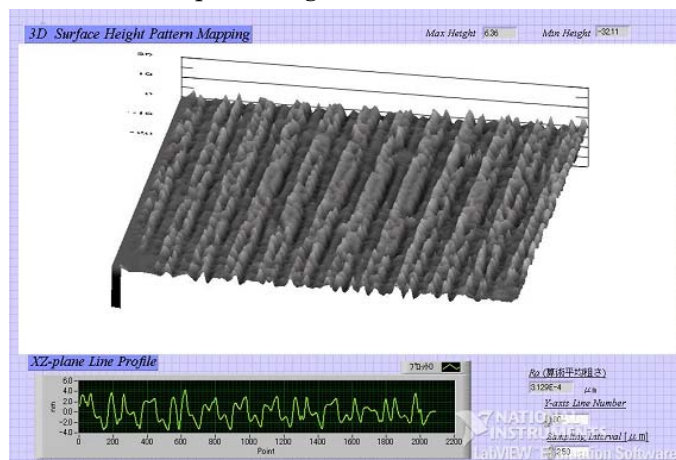


Figure 1. Pattern mapping of the surface alignment.