

Orientation ordering analysis of Photo alignment panel in PLS mode.

Jehong Choi, Nakcho Choi, Yeogeon Yoon, Namseok Roh

Display R&D Center, Samsung Display Co., Ltd., Giheoung-gu, Yongin-City, Gyeonggi-Do, 446-711, Korea
 Tel.:82-31-8000-8312, E-mail: jhhong.choi@samsung.com

Recently, In-Plane Switching (IPS) mode and Plane-Line Switching (PLS) mode are adapted in Tablet PC and smart phone using the rubbing process or the photo alignment process.

These panels have to be developed for wide viewing angle and high contrast ratio (CR) properties. Among them, CR is most important because customers want to watch clear and high quality image. To make high CR image, we carried out photo alignment process to make the PLS panel because it has higher constant ratio than rubbing process. Fig.1 shows the black states in rubbing and photo alignment process panel. The photo alignment panel has higher CR than the rubbing panel because there is low light leakage in the panel compared with rubbing process. This result can be described from the degree of orientation of liquid crystals. If all liquid crystals were aligned in one direction paralleled to the polarizer transmittance axis, there will be no light leakage. So the degree of orientation of liquid crystals in photo alignment panel is higher than rubbing panel. But this nobody has measured it until now.

In this paper, we compared the degree of orientation in rubbing panel and photo alignment panel using Axostep measurement machine. We assumed the direction of liquid crystals was 0 degree and plot the histogram graph in Fig.2. The standard deviation in the photo alignment panel was smaller than the rubbing panel. It indicated that the photo alignment process could make the liquid crystals in one direction uniformly.

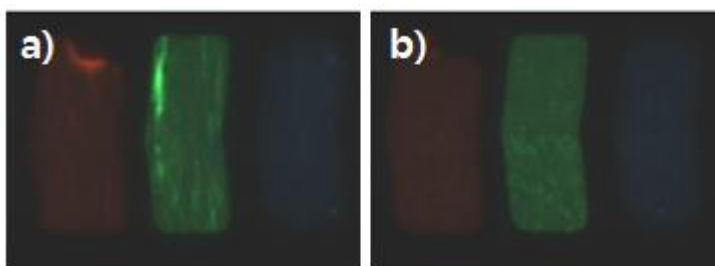


Fig. 1. Scope images of a) rubbing panel and b) Photo alignment panel

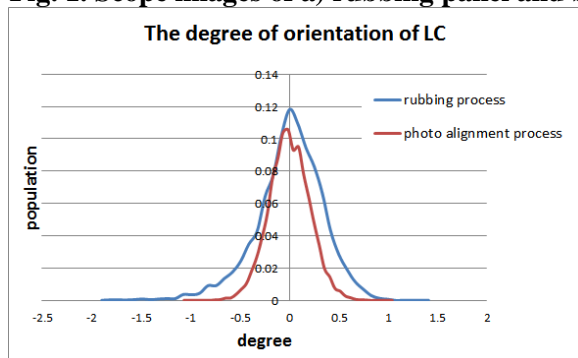


Fig. 2. Comparison orientation ordering

References

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