

Method to reduce iridescent reflection from LCD panel with fine electrodes

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As the display manufacturing technology advances, the patterns used in liquid crystal display panel have become narrower and more sophisticated. The fine patterns are likely to produce iridescent color reflection, in particular, under bright illumination. The iridescent color reflection can cause deterioration of display image quality. Such a problem is commonly observed in SVA LCD with a pixel electrode of fine ITO slit and in FFS (or PLS) LCD with a common electrode of fine slit pattern, as shown in the photo in Fig. 1 (a).



Fig. 1. (a) Iridescent reflection in LCD panel (b) Constructive interference in fine slit pattern

In this paper, to reduce the iridescent reflection so as to improve the display image quality, the thickness and type of the transparent electrodes, surface treatment method and slit pattern design were precisely adjusted, and the corresponding iridescent color reflection was theoretically predicted and experimentally confirmed. As shown in Fig. 2, the lower the thickness in the same type of transparent electrode, the reflected light decreases. The type of transparent electrodes, which have different refractive indices, influenced the strength of reflection because of the refractive index difference between layers. Also, it was able to reduce the reflected light by increasing irregularities in the pattern structure, which was achieved by redesigning the shape of the electrode or by increasing optical scattering on the electrode surface via a surface treatment. The degree of iridescent color reflection was evaluated by measuring reflection pattern and by using subjective test. This study will be helpful in not only LCD with fine patterns but also all high resolution displays that suffer from iridescent color reflection.

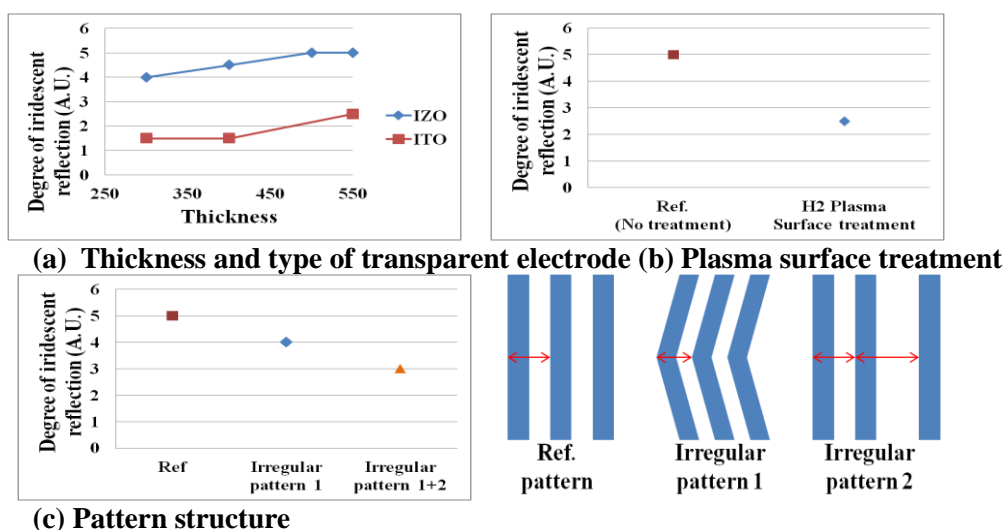


Fig. 2. Degree of iridescent reflection (the lower the degree of reflection, image quality is good)

References

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