The Research of RGB Photo Resistant In the Ink-Jet System

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Abstract

The purpose of this research is to control proper processing condition of RGB photo resistant in the ink-jet process increasing processing ability by adding additives. The viscosities of modified RGB photo resistant were 10~ 14cps and the additives could decreased agglomeration and flowing trace of photo resistant effectively. Another way, the adhesion between photo resistant and glass substrate was improved by modifying photo resistant and substrate. The surface tensions of modified photo resistant were same as that of original RGB photo resistant. The additives appeared a better compatibility with photo resistant, and the micelle of photo resistant did not be broken during modified process.

1. Introduction

In the future of TFT-LCD display, the aim of development will move toward the direction of big size and big square. Therefore, color filter also faces with size problem as size of glass substrate increases. However, the mode of RGB photo resistant coating in the present process is spin coating; the disadvantages of spin coating are low application percentage and high cost. There is a new coating mode, ink-jet, appears in the technological process of color filter. It is similar with the use of printer; the advantages of ink-jet technology are low using amount of photo resistant and low cost. Conversely, the disadvantages of ink-jet technology are a bad processing ability and uniform thickness. Therefore, purpose of this research is to find proper processing condition of ink-jet method.

2. Experimental

The additives were added into original RGB photo resistant and the viscosities of photo resistant were controlled at 10~14cp [Fig. 1]. Then, the modified photo resistant was used to print in a glass matrix successfully. The additives were also increasing the processing ability. Two different type of optical microscope (model TE2000-U 、E400, Nikon) were applied to observe the trace of photo resistant, and a tensiometer (model k11, KÜSS, Germany) was used to get the surface tension of photo resistant.

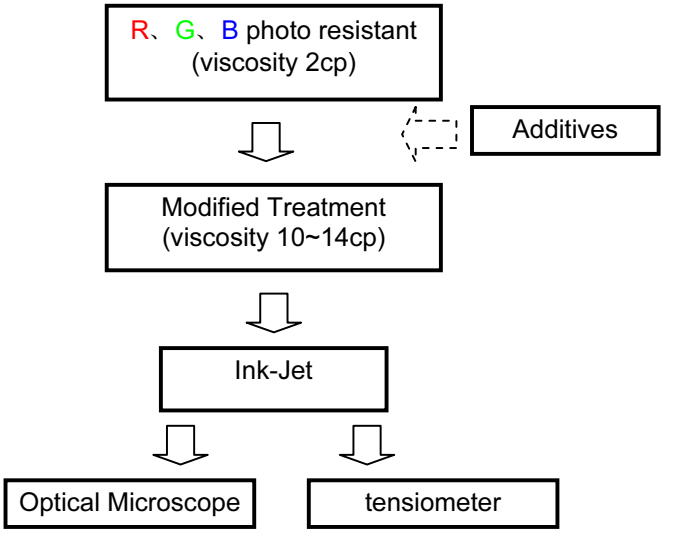


Fig. 1. The flowchart of RGB photo resistant modified in the ink-jet system.

3. Results and discussions

3.1 patterns observation of photo resistant with an additive

Viscosities of original RGB photo resistant are 2cp, the viscosities are too low to use in the ink-jet system. Therefore, additives adding method was employed to modified the viscosity of photo resistant. However, the photo resistant (1-B) was easy to agglomerate in the process and a lot of bubbles dispersed in the matrix were show in Fig. 2(c). But photo resistant (1-R、1-G)

appeared a smooth surface in the matrix were show in Fig. 2(a)、(b). Beside, an obvious flowing trace(1-G、1-B) appeared in the matrix after printing[Fig. 3], because the micelles were damaged. Therefore, additives were applied to improve above situation; a uniform surface could be observed by a higher magnification (200x) [Fig. 2(f) and Fig.4]. The additive demonstrated it could decrease the agglomerate and trace.

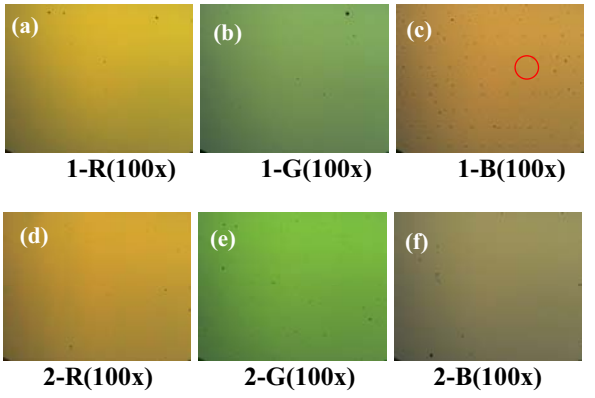


Figure 2. Photographs various kinds of modified RGB photo resistant smeared on the glass matrix.

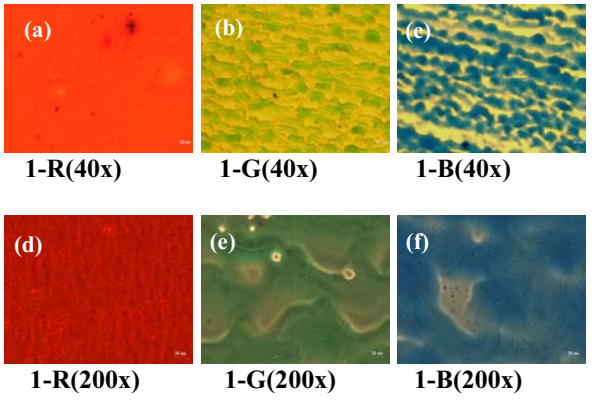
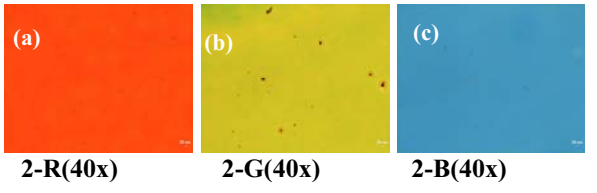


Figure 3. Photographs of RGB photo resistant with adding various additives (1wt %) in the ink-jet process.



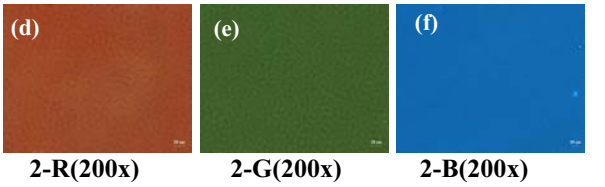


Figure 4. Photographs of RGB photo resistant adding various additives (2wt %) in the ink jet process

3.2 Surface tension measurement of photo resistant with an additive

Surface tensions of original photo resistant were 25~27mN/m was list in Tab. 1. The modified photo resistants were also 25~ 27mN/m by the same tensiometer. It confirmed that the modification method did not break the micelle of photo resistant and to form a stable photo resistant. And then, the photo resistant with the additives had the same rang of surface tension. Because the additives had better compatibility with photo resistant, it did not break the interface of photo resistant and form agglomeration.

Table 1. surface tension of modified RGB photo resistant.

Code	Additives (wt%)	Viscosity (cp)	Surface Tension (mN/m)
R	0	2	25.95
G	0	2	26.07
B	0	2	26.36
1-R	1	10~14	25.5
1-G	1	10~14	26.04
1-B	1	10~14	25.81
2-R	2	10~14	26.21
2-G	2	10~14	25.89
2-B	2	10~14	25.79

In this study, an additive was used to improve the agglomerate and the flowing trace of photo resistant successfully. The modified photo resistant could be applied in the ink-jet system and produce a high quality color filter.

4. Conclusions

In this research, viscosity of photo resistant in the ink-jet system was controlled at a proper situation by

the additives added. The photographs were observed that pattern of photo resistant with the additive present a uniform dispersion than without additives adding. The flowing ability of photo resistant also was improved by additives.

5. Acknowledgements

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6. References

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