Influence of Temporal Dark Image Sticking Characteristics on Bright Screen with Various He contents in 50-in. AC-PDPs

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Abstract

The effects of the temporal dark image sticking phenomena on bright screen were investigated with various He, Ne contents and a high Xe content fixed at 11% in the 50-in. ac-PDPs. In this work, the disappearance time and the display luminance between the before and after discharge in the discharge and non-discharge regions were measured with 0%, 35%, and 50% He contents. Consequently, the temporal dark image sticking on bright screen was reduced with the increase of He contents compared with the non-He (0%) content.

1. Introduction

Alternating current plasma display panels (AC-PDPs) regarded as good application for large flat-panel displays have been developed during past several years. However, several requests for achieving a high image quality in ac-PDPs still remain. In particular, the temporal image sticking, meaning the ghost image, which can be observed after strong sustain discharge such as a square-type image, is a serious problem that restricts the realization of high image quality in ac-PDPs. In order to reduce this drawback, several approaches such as driving waveforms, face-to-face structure and vacuum sealing method were reported in previous works [1]-[4]. Furthermore, the influences of the ternary gas composition with He-Ne-Xe were examined in relevance to the luminous efficiency [5]. In this paper, the effects of the temporal dark image sticking on bright screen were investigated under various He contents in 50-in. ac-PDPs. In addition, the image sticking characteristics of high helium contents were compared with those of the conventional gas composition with Ne-Xe.

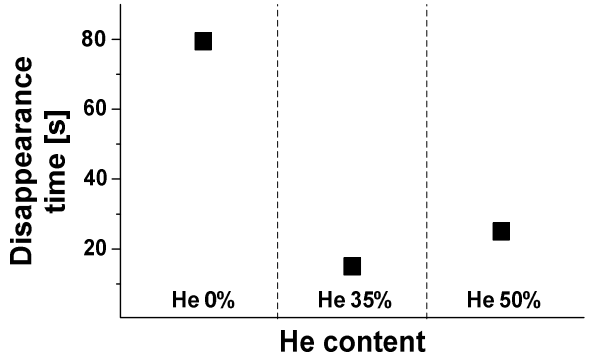

Fig. 1. Disappearance time of the temporal dark image sticking on bright screen measured by human eyes with various He contents.

2. Experimental

To measure the temporal image sticking, the entire region of the 50-in. panel was changed to a full-white background immediately after displaying a square-type image (discharge region) at a peak luminance for about 60 s [3], [4]. The same voltage levels of the driving waveforms were applied to each panel. The frequency for the sustain period was 200 kHz. The driving method with ADS was adopted and the gas chemistry of panels in the experiment were Ne (89%)-Xe (11%), Ne (54%)-Xe (11%)-He (35%), and Ne (39%)-Xe (11%)-He (50%).

3. Results and discussion

After the square-type images with peak luminance (0% : 953 cd/m^2, 35% : 908 cd/m^2, 50% : 918 cd/m^2) were displayed for 60 seconds, the temporal dark image sticking on bright screen was observed while displaying the full-white background. Fig. 1 shows the disappearance time of the temporal dark image

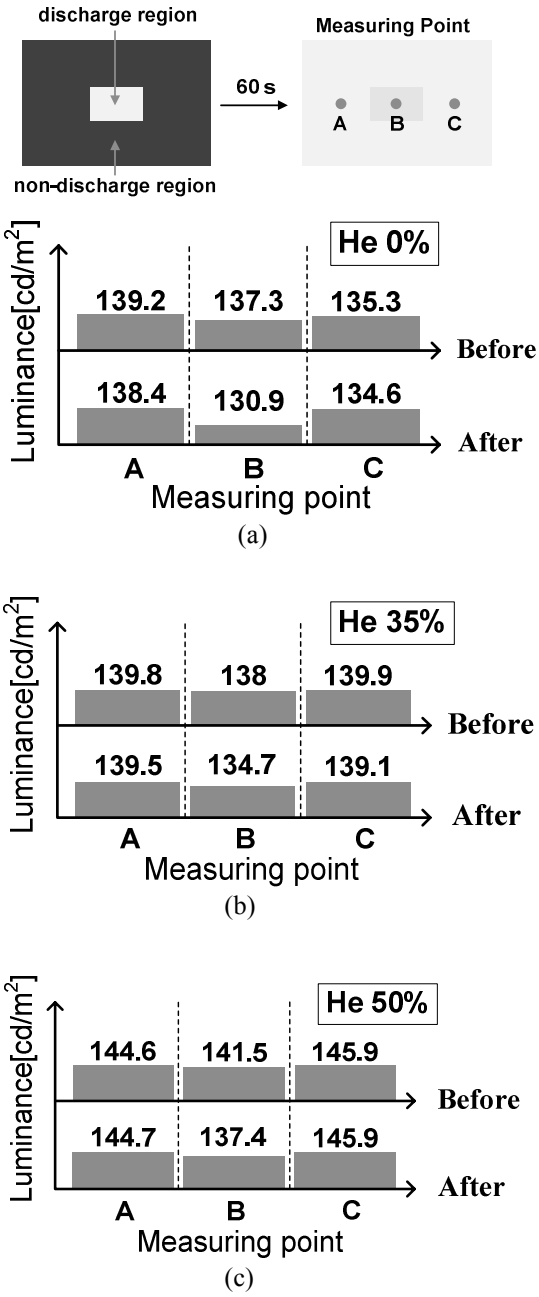

Fig. 2. Changes in luminance between before and after discharge at discharge region B and non-discharge region A and C under various He contents; (a) 0%, (b) 35%, and (c) 50%

sticking on bright screen measured by human eyes with various He contents. As shown in Fig. 1, the disappearance time of the temporal dark image sticking on bright screen was reduced with an increase in the He content. In particular, at 35% He content, the disappearance time of the temporal dark image sticking on bright screen was more reduced than 50% He content.

TABLE 1. Changes in luminance difference between before and after discharge in discharge region B under full-white background after iterant 60-second sustain discharge measured from 50-inch HD panel under various He contents.
(*$\Delta L = | L_{before} - L_{after} |$)

	L_{before} (cd/m^2)	L_{after} (cd/m^2)	*ΔL (cd/m^2)
He 0%	137.3	130.9	6.4
He 35%	138	134.7	3.3
He 50%	141.5	137.4	4.1

Fig. 2 shows the changes of the luminance between the before and after 60 second sustain discharge at the discharge (B) and non-discharge region (A and C) under various He contents; (a) 0%, (b) 35%, and (c) 50%. Table 1 shows the luminance difference between the before and after discharge in region (B) under full-white background after iterant 60 second sustain discharge measured from 50-inch HD panels with various He contents. As shown in Fig. 2 and Table 1, conventional gas composition with Ne-Xe (11%) has the largest luminance difference (ΔL : 6.4 cd/m^2), whereas the luminance differences of 35% and 50% helium contents have 3.3 cd/m^2 and 4.1 cd/m^2, respectively. The luminance differences between the before and after discharge in the discharge region were more reduced at the 35% and 50% He contents compared with the non-He (0%) gas content. Accordingly, as the helium content was increased, the temporal dark image sticking on bright screen was decreased due to the reduction of the degradation on the MgO protective or phosphor layers [6].

4. Summary

To realize the high quality of ac-PDPs, the image sticking phenomenon is urgently needed to shorten the recovery time of the discharge region. The effects of temporal dark image sticking on bright screen were examined under various He contents with a high Xe content fixed at 11%. In this work, the disappearance time and the display luminance between the before and after discharge in the discharge and non-discharge regions were measured with 0%, 35%, and 50% He contents. The temporal dark image sticking on bright screen was reduced as the He contents in the panels were increased. In this sense, the proposed high He gas condition can contribute to achieving the high quality of digital ac-PDPs due to the reduction of temporal dark image sticking on bright screen.

5. References

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