

Effects of Gas Chemistry (Pressure, He, and Xe Contents) in Ternary Gas Mixture on Temporal and Permanent Image Sticking in 42-in. and 50-in. AC-PDPs

Choon-Sang Park, Jae Hyun Kim, and Heung-Sik Tae
 School of Electrical Engineering and Computer Science, Kyungpook National University,
 Daegu 702-701, Korea
 TEL:82-53-950-6563, e-mail: hstae@ee.knu.ac.kr

Keywords : Image Sticking, AC-PDP, Pressure, Helium, Xenon

Abstract

The influences of the temporal and permanent image stickings on a bright screen were examined under various pressures, He, and Xe contents in the 42-in. and 50-in. AC-PDPs with a ternary gas mixture (Xe-He-Ne). With a decrease in the working gas pressure and Xe contents, and an increase in the He contents, the temporal image stickings were observed to be reduced. Whereas, with an increase in the working gas pressure, and a decrease in the He and Xe contents, the permanent image stickings were observed to be reduced.

1. Introduction

Since the invention of AC-PDPs in the 1960s by the Coordinated Science Laboratory at the University of Illinois, extensive research has produced high quality PDPs, allowing current PDPs to represent a large market share in the flat-panel-display area. Recently, the image sticking or image retention is a critical issue that needs an urgent solution for the realization of a high image quality in IPTV (Internet Protocol Television), PID (Public Information Display), and Electronic Copy-Board [1], [2]. Nonetheless, the image sticking problems of PDPs remain a significant defect compared with other display devices (e.g. CRTs, LCDs, and OLEDs). As such, this paper focuses on the effects of the temporal and permanent image sticking under various pressures, Xe, and He contents in the 42-in. and 50-in. AC-PDPs with a ternary gas mixture. Our experimental observation illustrates that the various pressures, He, and Xe contents are closely related to the temporal and permanent image sticking phenomenon. Accordingly, this paper investigates the relation between the temporal and permanent image sticking and the pressure (Xe and He contents fixed at 11% and 35%), He (Xe contents and gas pressure fixed at 11% and 420torr), and Xe (He contents and gas pressure fixed at 51% and 390torr) contents.

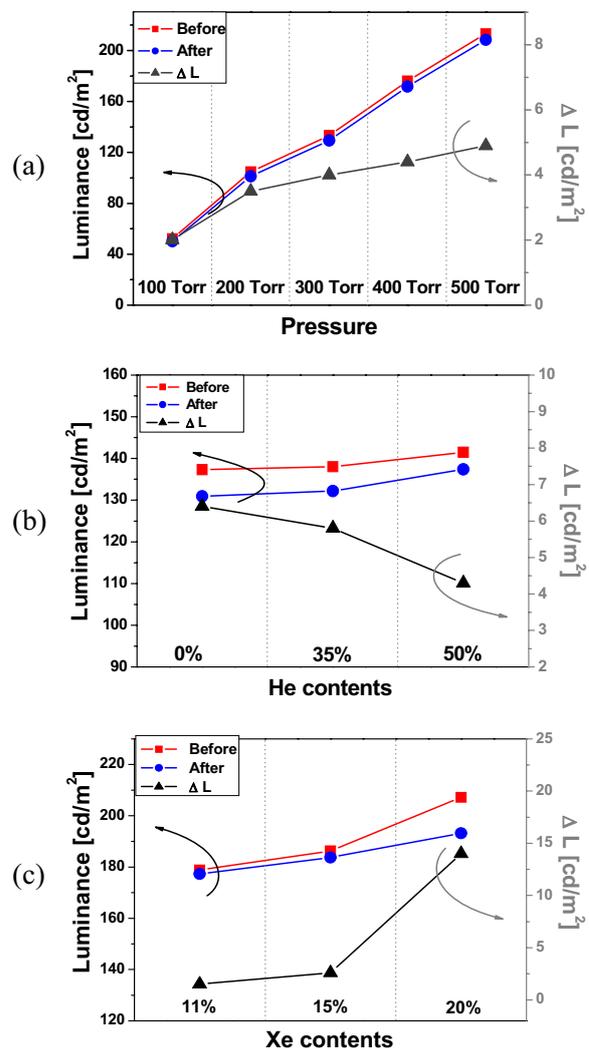


Fig. 1. Changes in the luminance difference between the before and after discharge regions observed with full-white background after an iterant 60 s sustain discharge of temporal image sticking under various (a) panel working gas pressure, (b) He, and (c) Xe contents.

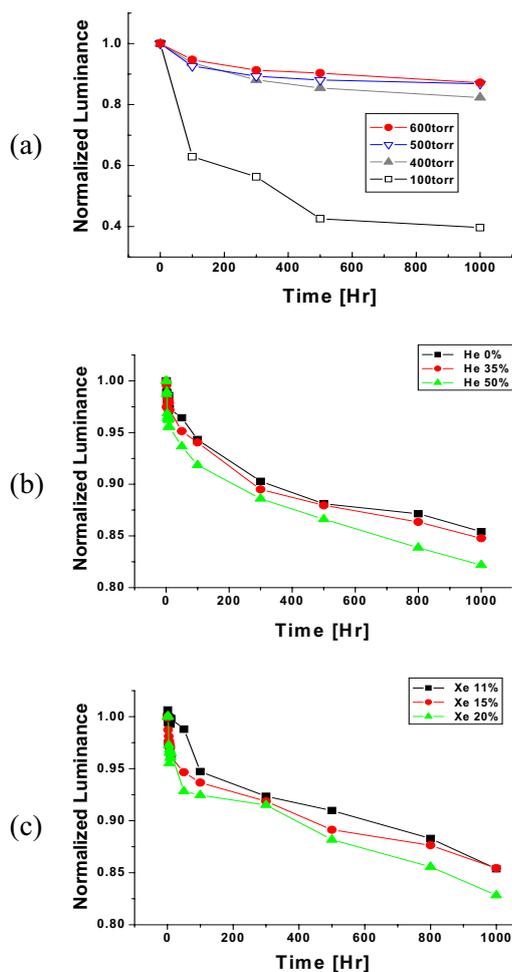


Fig. 2. Changes in the normalized luminance between the before and after discharge regions observed with full-white background during an iterant 1000 h sustain discharge of permanent image sticking under various (a) panel working gas pressure, (b) He, and (c) Xe contents.

2. Experimental setup

To produce the temporal and permanent image sticking, the entire region of the 42-in. and 50-in. test 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 and 1000 h, respectively. The frequency for the sustain period was 200 kHz. A driving method with a selective reset waveform was also adopted. In cases of the various working gas pressure and Xe contents, the different voltage levels of the driving waveforms were applied to each test panel due to the different firing condition. Whereas, in case of the various He contents, the same voltage levels of the driving waveforms were applied to each panel due to the same firing condition.

3. Results and Discussion

Figs. 1 (a), (b), and (c) show the changes in the luminance and luminance difference between the before and after discharge regions observed with full-white background after an iterant 60 s sustain discharge of the temporal image sticking with a square-type image at peak luminance of the 42-in. and 50-in. test panel under various panel working gas pressure, He, and Xe contents. As shown in Figs. 1 (a) and (c), as the working gas pressure and the Xe contents were decreased, the temporal image sticking was reduced. On the other hand, as shown in Fig. 1 (b), as the He contents were increased, the temporal image sticking was reduced. Figs. 2 (a), (b), and (c) show changes in the normalized luminance between the before and after discharge regions observed with full-white background during an iterant 1000 h sustain discharge of the permanent image sticking with a square-type image at peak luminance of the 42-in. and 50-in. test panel under various panel working gas pressure, He, and Xe contents. As shown in Fig. 2 (a), as the working gas pressure was increased, the permanent image sticking or life time was reduced. On the other hand, as shown in Figs. 2 (b) and (c), as the He and Xe contents were decreased, the permanent image sticking or life time was reduced.

4. Summary

Image sticking phenomenon in ac-PDP is a critical issue, so that the detailed research is needed to eliminate such a side effect completely. The effects of the temporal and permanent image stickings were examined under various panel working gas pressure, He, and Xe contents in the 42-in. and 50-in. ac-PDP. With a decrease in the working gas pressure and Xe contents, and an increase in the He contents, the temporal image stickings were observed to be reduced. Whereas, with an increase in the working gas pressure, and a decrease in the He and Xe contents, the permanent image stickings were observed to be reduced. In this sense, this paper can contribute to giving a clue for reducing the temporal and permanent image stickings in ac-PDP.

5. References

1. C.-S. Park, S. H. Kim, J.-H. Kim, and H.-S. Tae, *J. Inf. Disp.*, **10**[4], p.195 (2009).
2. C.-S. Park, S.-K. Jang, H.-S. Tae, E.-Y. Jung, and J.-C. Ahn, *J. Soc. Inf. Disp.*, **17**[11], p.977 (2009).