A study of characteristics for Image sticking in AC – Plasma Display Panel

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Abstract
In the alternative current plasma display panel(AC-PDP) technology, it is very important to remove the image sticking for improving an image quality. In this paper, we have investigated the driving method of alternative current plasma display panel(AC-PDP) for preventing image sticking. We have investigated the driving method of alternative current plasma display panel(AC-PDP) for preventing image sticking. The preventing method of image sticking was proposed by adopting the Sticking Remove Pulse(SRP). The variation of brightness is most affected by the MgO to be formed at the surface of the phosphor layer. As a result, the image sticking is reduced when the driving method adopted an SRP.

1. Introduction

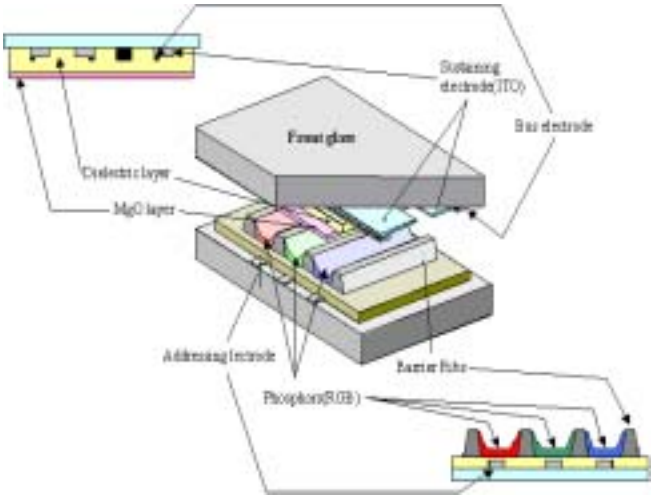


Figure 1. Structure of AC-PDP

2. General driving method of AC-PDP[1]

To drive AC-PDP we used Address Display-period Separation(ADS) driving method. The following figure is the outline of ADS driving method.

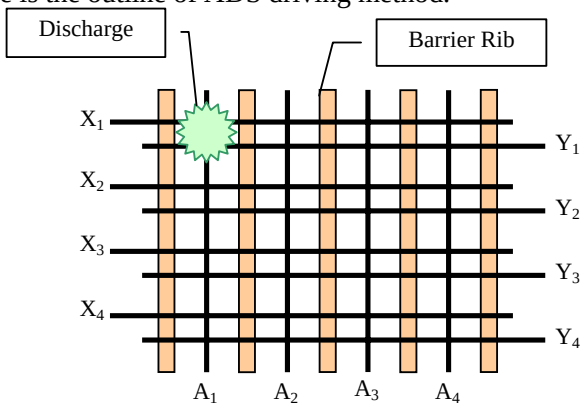
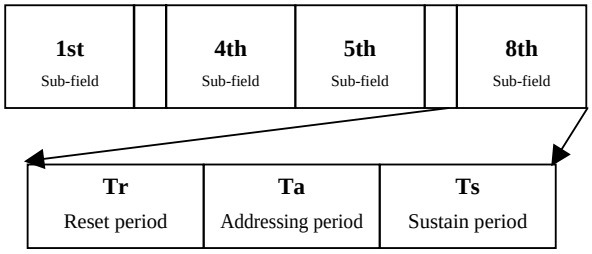


Figure 2. outline of ADS driving method

1 frame is formed with 8sub-field. And a single sub-field is formed with three periods.(reset, address and sustain.)



1 sub-field

Figure 3. ADS(Alternative driving separation) driving method

3. Background and objective

3.1 Cause of image sticking[2]

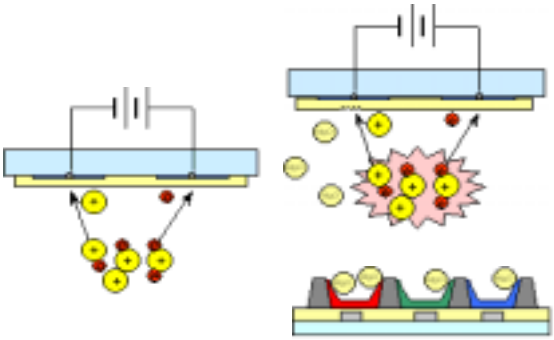


Figure 4. Sputtering of MgO protecting layer by accelerated ions.

During the discharge the ions in plasma accelerated to MgO protecting layer. Then the MgO protecting layer damaged by the ions. And the sputtered MgO molecules form a membrane on the phosphor.

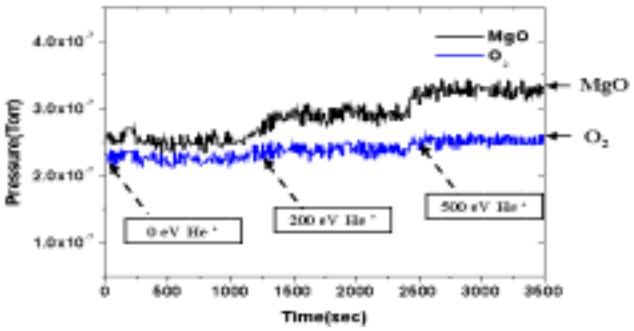


Figure 5. Measurement of MgO vapor pressure near the surface of MgO protecting layer at different accelerating voltage with RGA(residual gas analyzer)

The membrane of MgO on the phosphor is a cause of diminution of brightness.

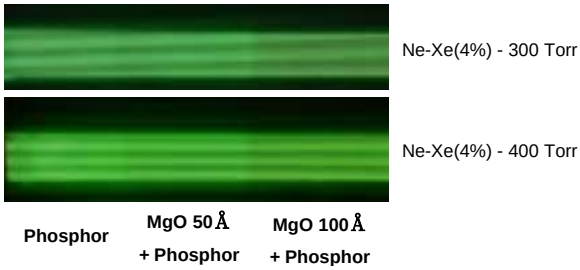


Figure 6. Brightness by thickness of MgO formed on phosphor

3.4 Method to prevent the image sticking using SRP(Sticking Remove Pulse)

We have to remove the image sticking to improve the image quality. We suggest that the driving method of AC-PDP using SRP. SRP added after the sustain period will discharge between the address electrode and sustain electrode. And then the ions accelerated to the direction of the address electrode. The ions will come into collision with the MgO formed on the surface of the phosphor. By the collision MgO formed on the surface of phosphor will be removed from the surface of the phosphor.

We used the same ADS driving pulse. But we added the SRP after sustain period of 8th sub-field.

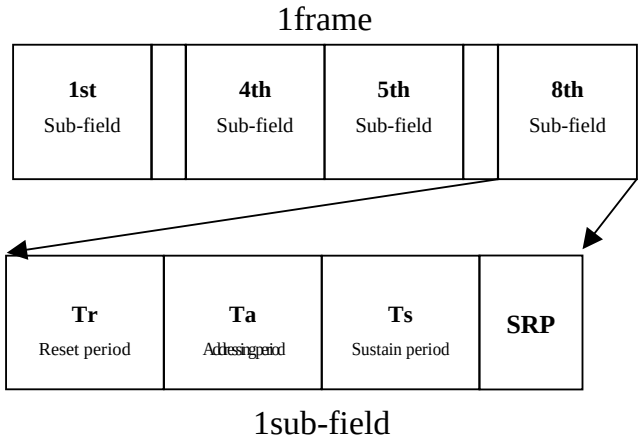


Figure 7. ADS(Alternative driving separation) with SRP

4. Experimental

4.1 General wave form of ADS driving

At erasing period the wall charge that remained after sustain is erased. And at reset period all of PDP cells are controlled to be same state.(In that state there is no wall charge) After reset period we can choose the cells which will discharge at sustain period using the memory properties of PDP is caused by wall charge. And these chosen cells emit light at sustain period. Following Fig shows the wave form of a single sub-frame. 8 sub-fields make a 1 frame.

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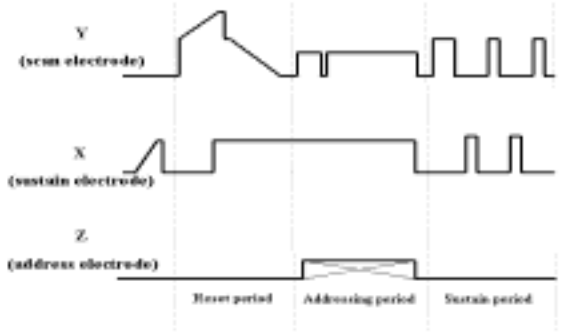

Figure 8. General wave form of ADS

4. 2 Wave form of ADS driving pulse with SRP

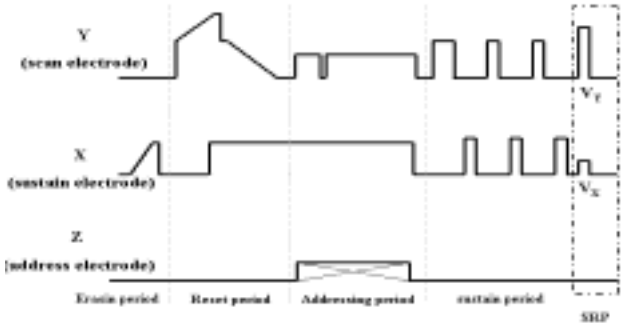

Figure 9. Wave form of ADS driving pulse with SRP

We added SRP to driving pulse that seen before. By SRP, there will discharge between address electrode and sustain electrode. And the accelerated ions take off the MgO formed on the surface of phosphor.

5. Results

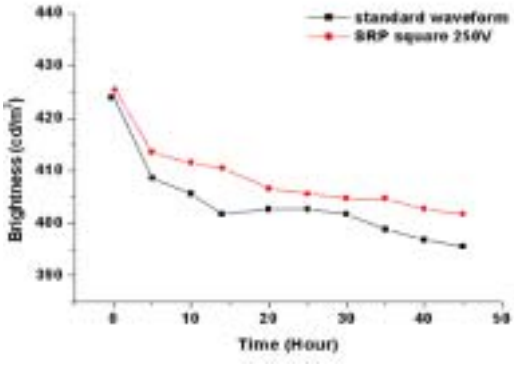

Table 1.Measurement of brightness without and with SRP.

We could find that the brightness of a cell which was driven by the driving pulse with SRP had less diminution than without SRP.

6. Discussion

We have investigated the driving method of alternative current plasma display panel(AC-PDP) for preventing image sticking. The change of brightness is most affected by the MgO layer to be formed at the surface of the phosphor layer. The image sticking is reduced when the driving method adopted a SRP(Sticking Remove Pulse).

7. Reference

[1] J. H. Choi, Development of new driving method and electro-optical characteristics for image sticking in alterating current plasma display panel.(2003)

[2] K. B. Jung, A study of electro-optical characteristic for image sticking and high luminance efficiency penning gas mixture ratio in AC-PDP.(2005)