

The dependence of the electrical characteristics of MgO on temperature in an AC PDP

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Abstract

We studied the dependence of the electrical characteristics of MgO protecting layer on temperature in an AC PDP cell. Careful measurements of the surface resistance of MgO were performed for the temperature range from room temperature to 100 °C with and without the VUV illumination. Experimental results show that the resistivity is affected by not only the temperature but also VUV irradiation. The measurement of wall charge distribution and the address discharge delay time as to the temperature show that the resistivity change of MgO may affect the wall voltage and consequently the discharge delay time.

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Key words: PDP, temperature, MgO, wall charge.

1. Objective and Background

To be a prominent display device in a world wide market, there are many requests for the improvement of display characteristics of an ac PDP such as the luminance, luminous efficacy, high image quality, and etc. Among these factors, the establishment of a robust driving condition is required for a broad ambient temperature range.

In this research, we studied the correlations between the electrical characteristics of MgO and the ambient temperature with and without the VUV illumination. The difference in the wall charge distribution and address discharge delay characteristics with the change of temperature were measured and their significance are discussed.

2. Results

A. Temperature-dependent MgO surface resistance.

Even though MgO is a good insulator, it shows electrical characteristic change as to its surface conditions and environments.[1] MgO layer is directly exposed to heat and VUV from plasma discharges in an AC PDP, which can result in the change of electrical characteristics. We measured the surface resistivity of MgO layer by forming a doughnut type electrode with 300 μ m gap on MgO surface. The surface was shown by the VUV from a D2 lamp which has a VUV emission with the wavelength around 170nm as shown in fig. 1. It also shows the change of MgO surface resistivity with the temperature. The surface resistivity decreased by about 25% as the temperature decreased from room temperature to 60 .

B. Wall charge distribution and address delay time as to temperature.

We carried out the measurement of wall charge distribution by the longitudinal electro-optic amplitude modulation technique with controlling the temperature of test panel.[2] Figure 2. shows that the peak values of wall charge on the MgO layer gets smaller and broadened as temperature goes high.

Figure 3. shows the difference of formative delay time of address discharge between 15th and 240th scan line as to temperature, The difference increases as the temperature increases with the green cell the biggest difference among R, G, B cells.

3. Impact

In this research, we examined the temperature-dependent MgO surface resistivity which affects the wall charge formation on the MgO layer. The resistivity decreased with the increase of temperature which explains the difference in the measured wall charge profile and the address discharge formative delay time among different scan lines.

Reference.

[1] W. D. Kingery, H. K. Bowen, D. R. Uhlmann, "*INTRODUCTION TO CERAMICS*", WILEY, pp. 904-911.

[2] D. C. Jeong, W. J. Chung, And K. W. Whang, IDW'02 Digest, PP. 721-724.

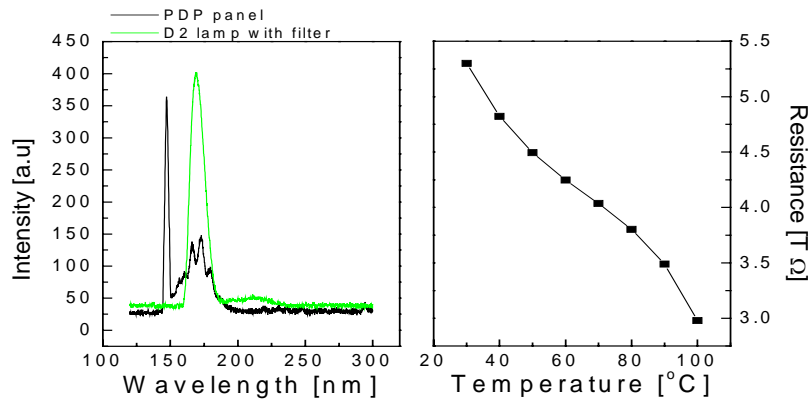


Fig. 1 VUV spectrum and MgO surface resistance as to temperature.

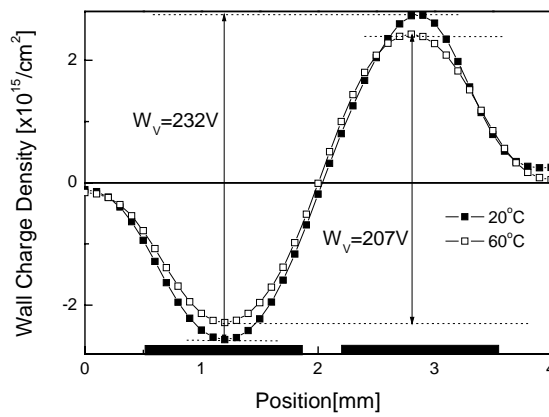


Fig. 2 Wall charge distribution as to temperature during sustain period.

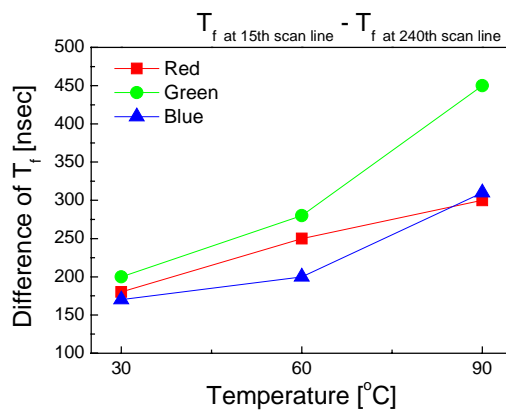


Fig. 3 Difference of formative delay time as to temperature