ANALYSIS ON DISCHARGE CHARACTERISTICS OF MgCaO CRYSTAL POWDERS ON Li-DOPED MgO LAYER IN AC PLASMA DISPLAY PANELS*

Choon-Sang Park and Heung-Sik Tae
School of Electronics Engineering, College of IT Engineering, Kyungpook National University, Daegu 702-701, Korea

Eun Young Jung
Core Technology Lab., Corporate R&D Center, Samsung SDI Company Ltd., Cheonan, Chungcheongnam-Do 330-300, Korea

The MgO layers have been used as a protective layer in ac plasma display panels (ac-PDPs) due to their high stability against ion bombardment, low optical loss, high thermal stability, and good electrical insulating properties. Moreover, the MgO layers play a significant role in reducing the discharge voltage of ac-PDPs due to their high secondary electron emission capability and thus, various attempts to improve the characteristics of these layers have been reported1. However, for improving luminous efficiency of ac-PDPs, in case of increasing the Xe gas partial pressure, the discharge characteristics are much aggravated under the conventional MgO layer. Accordingly, the additional MgCaO crystal powders on the conventional MgO layer, that is called a functional layer, is used to overcome the demerits of the conventional MgO layer under higher Xe gas partial pressure. And also, Li-doped MgO layer is used to improve the MgO characteristics. In this study, the Li-doped MgO layer was deposited by an electron beam evaporation, and the MgCaO crystal powder was coated on the Li-doped MgO surface by a spray method in ac-PDPs. Accordingly, in this paper, the effects of the deposition of the MgCaO crystal powder and Li-doped MgO layer on the discharge characteristics were examined under the high Xe (30%) gas condition in 6 in test PDP panel with 50 in full HD cell size. The experimental results revealed that the discharge voltage of the MgCaO crystal powder on the Li-doped MgO layer was reduced by about 30 V compared with the conventional MgO layer. The firing voltage, luminance, discharge current, luminous efficiency, cathodoluminescence, SEM image (surface morphology on MgO layer), and more detailed mechanism relative to the MgCaO crystal powder and Li-doped MgO layer will be discussed in detail.


* Work supported in part by the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Korean Ministry of Education, Science and Technology (2011-0014341) and in part by Brain Korea 21 (BK21).