PP-04

Firing voltage Reduction in PDP by Cs-doping of the MgO protecting layer

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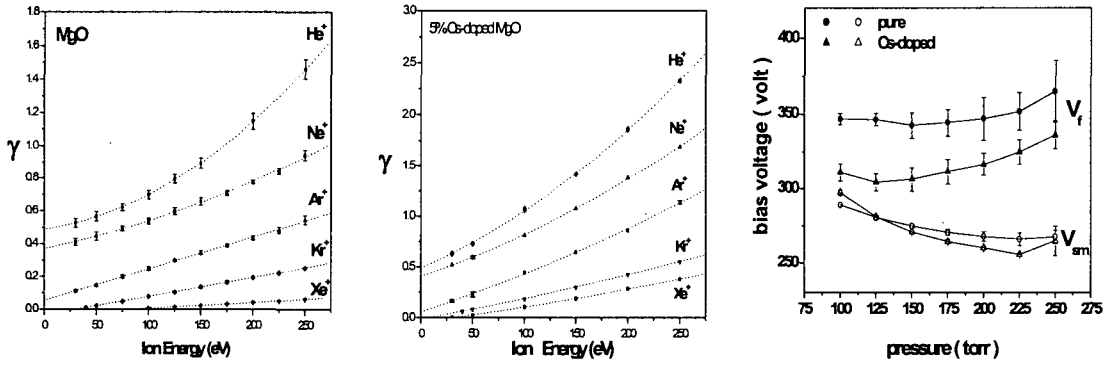
Plasma display panel(PDP) is regarded as the main large-area display device in recent years. MgO film has been used as the protective layer for the dielectric in PDP because of its good durability and high secondary electron emission coefficient(γ_i). To reduce the power consumption and production cost, low voltage operation of PDP is quite desirable, which can be achieved by enhancing the γ of the MgO protecting layer.

We have accurately measured the γ of pure and 5% Cs-doped MgO films under negligible surface-charging conditions as shown in Fig.1(a) and (b). To see the doping effects, discharge tests Fig.1(c) were also performed with a simple cell for Ne and 4% Xe-Ne gases.



(a) (b) (c)

Fig 1. (a) The γ_i of pure MgO film, (b) The γ_i of 5% Cs dopped MgO film , (c) The firing voltages and minimum sustain voltages measured in discharge test cell with 4% Xe-Ne gas.

The γ data can be qualitatively understood within potential emission and energy-dependent kinetic emission mechanisms. The γ of MgO increases upon doping with Cs mainly via enhanced kinetic emission, which suggests that the CsO_2-derived impurity band lie within less than ~2 eV above the top of the valence band of MgO. Thus, the potential emission by Xe^+ is still energetically forbidden. The firing voltage V_f of the discharge cell with a 5% Cs-doped MgO layer is reduced by 25~40V, which is attributed to the enhanced γ of MgO by Cs doping. These results suggest that if one can choose a proper doping material, a substantial improvement in the discharge characteristics of PDP can be achieved.