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The effects of new Penning gas mixture in an AC-PDP

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The effects of addition of D_2 (Deuterium) to conventional [He(70 %)-Ne(27 %)-Xe(3 %)]gas mixture on the discharge characteristics were investigated in this work. When the concentration of D_2 in He-Ne-Xe-D_2 gas mixture was varied from 0.01 to 0.5 %, we measured firing voltage, sustain voltage, luminance, luminous efficiency and wall charge according to amount of D_2, respectively. In case of a small addition of D_2, we have experimentally investigated that an increase of electron due to penning effect improves an increase of Xe^* and Xe_2^* that emits 147 nm and 173 nm photons. As a result, when the small addition of D_2 in conventional gas mixture, firing voltage decreased by 9.8 %, sustain voltage decreased by 4.9 %, luminance increased by 19 % - 44 % , luminous efficiency increased by 20 % - 44 % and wall charge increased by 34 % - 45 % at the pressure of 200 Torr.