IMPROVE THE LUMINOUS EFFICACY OF DIELECTRIC BARRIER DISCHARGE XENON LAMP

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Xenon excimer dielectric barrier discharge is a good candidate for free mercury lightning. The studied device[1] is consisting of two glass plates separated by a constant gas gap. The glass thickness is 4 mm and the gap 2 mm. A transparent conducting material (electrode) has been deposited on both external sides (plane to plane electrodes) and white phosphors[2] on both internal sides of the dielectric. The lamp is filled with Neon-xenon gas mixture and operates in a pressure range of 100-400 torr. In a previous work[1], for sinusoidal and pulsed excitations, we have shown the influence of the applied voltage (amplitude and frequency) on the consuming power, the light emission and mostly on the homogeneity of the discharge (modeling and experimental works).

In this work, a pulsed excitation voltage up to 3000V with a frequency range of 20-100 KHz has been used on a new electrode configuration lamp. We will present some investigation concerning the spatial emission of the discharge for this double coplanar electrode geometry[3], and we will discuss the influence of the applied voltage (waveforms, amplitude and frequency) on luminous efficacy and uniformity. The obtained results will be compared with the plane to plane electrode configuration. The new electrode configuration will appear to give a better efficiency (lm/W).

1. T. Beaudette et al., “Experimental characterization of dielectric barrier discharges for mercury free flat lamps”, 59th Annual Gaseous Electronics Conference, October 10-13, 2006, Columbus, USA
2. T. Beaudette et al “Influence of heating process on phosphor efficacy for mercury free flat lamp”,
LS11, Shangai, Chine, May 2007.
3. G. Auday et al Patent FR2890232 (a1) March/2007