Ozone production using nanosecond-pulse and AC-driven DBD in mixtures of oxygen and argon

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Ozone in a strong oxidizing agent with many industrial applications, such as bleaching and water treatment. It can be produced by means of electrical discharges and, particularly, dielectric barrier discharge is commonly used in large installations [1]. Reducing the energy cost of ozone production is of prime importance in industrial applications and, among other factors, the voltage waveform is known to play an important role [2]. In this work, the energy efficiency of ozone production using DBD fed with pure oxygen and mixtures oxygen with argon has been investigated. Two different forms of stimulation have been used: AC (22 kVpp, 200–2000 Hz), and pulses of nanosecond duration (−22 kV, pulse repetition rate: 100–1000 Hz). The DBD reactor consisted of two stainless steel plane circular electrodes, 20 mm in diameter, covered with fused silica glasses of 1 mm of thickness. The gap between dielectrics was 2 mm. Experiments were carried with a total gas flow rate of 100 cm^3/min. The concentration of ozone in the effluent gas was measured using UV spectrophotometry. According to the observations, the pulse stimulation gives a higher ozone production than AC, but with a lower energy efficiency, as can be appreciated in Fig. 1.

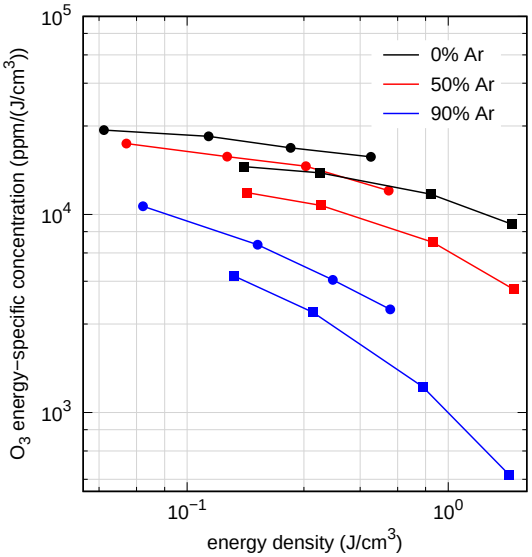

Figure 1: *Ozone concentration per energy density as a function of the energy density in mixtures of O_2 and Ar. Circles: AC driven DBD. Squares: nanopulses driven DBD.*

References

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