

Ozone generator with mesh metal electrodes and porous dielectrics

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Abstract. During this experiment we used ozonizer with mesh electrodes and a few different porous dielectrics in order to improve efficiency of ozone production. An intensity of atmospheric pressure discharges generated in the dielectric barrier configuration in air can be considerably increased due to the application of the mesh electrodes and presence of porous or perforated dielectric in the discharge gap. In the investigated model the increase of more than 20% of the discharge power related to the unit electrode surface was achieved only due to introducing the glass wool dielectric into the discharge gap.

Keywords: ozone generation, DBD reactor, mesh electrodes, porous dielectrics

1. Introduction

The non-thermal plasma generated by electrical discharges at atmospheric pressure is still being the subject of intense interest of science and industry. The dielectric barrier discharges (DBD) are well recognized and widely used as a source of atmospheric pressure non-thermal plasma.

Many scientists have tried to increase the ozone generation efficiency and the ozone has been applied to improve the human environment such as keeping higher quality of water and air [1], [2]. The important parameters such as the dielectric constant, its thickness, gap distance and surface condition of electrode have an influence on the efficiency of ozone production. Another parameters such as the configuration of electrodes, the applied voltage waveform and the cooling system for the discharge region and so on have also been studied [3]. The different way for increasing ozone concentration is using the mesh metal electrodes and porous dielectrics [4]. Previously reported papers described only the changing of ozone concentration with the experimental parameters such as mesh number or different electrode materials. Using mesh electrode together with porous dielectric an increase of ozone generation efficiency and more homogenous discharge can be obtained.

2. Experimental part

Characteristics of the discharge are measured in the developed model of the reactor, that allows to vary the electrode distance and the thickness of dielectric layer. The sketch of the proposed reactor is presented in Figure 1.

In the presented configuration the air or oxygen is flowing through mesh metal electrode, 2. The second mesh electrode, 1, is covered by polyimide insulating foil, 3. Between electrodes, in the discharge gap, 4, the glass wool packing or other porous or granular dielectrics can be put. The electrodes diameter is 5 cm and the gap distance can be regulated from 1-10 mm. The transparent reactor housing made of Teflon, 5, together with magnifying glass, 8, permit to observe the discharges.