Diagnostics of two configuration of plasma pencil

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Abstract. During several last years different plasma discharges with nozzle and powered by rf generator driven at frequency 13.56 MHz have been investigated. Plasma pencil is a special type of plasma nozzle working at atmospheric pressure. Through this nozzle flows working gas (argon with water vapour). Nozzle is from quartz tube with typical inner diameter 2 mm. The power electrode is connected through the matching unit to the rf generator driven at frequency 13.56 MHz. This type of discharge at atmospheric pressure is interesting for possible applications such as local treatment of surface, deposition of thin films, change surface energy etc. In this contribution we present diagnostics of plasma parameters of discharge channel generated by plasma pencil at atmospheric pressure. Plasma parameters of the discharge channel are investigated by means of optical emission spectroscopy in the range 200-900 nm, i.e. rotational temperature from OH rotational lines as well as vibrational temperature from nitrogen bands are estimated for different electrical parameters and for two different construction design of the plasma pencil, for unipolar version only with power electrode and for bipolar version with ground electrode.

1. INTRODUCTION

Many plasma jets systems working at reduced or atmospheric pressure, in subsonic or supersonic regime, were suggested, realized and studied [1, 2, 3]. Radio frequency (rf) plasma treatment represents a perspective and hopeful tool for many applications which is alternative tool to conventional methods.

Actually, the plasma pencil is dielectric barrier discharge (DBD)[3, 5], which makes possible to generate plasma at atmospheric pressure. The DBD discharges have been investigated for many technologies [6]. At present, the DBD discharge has been intensively studied for different plasma-chemical applications [4], too.

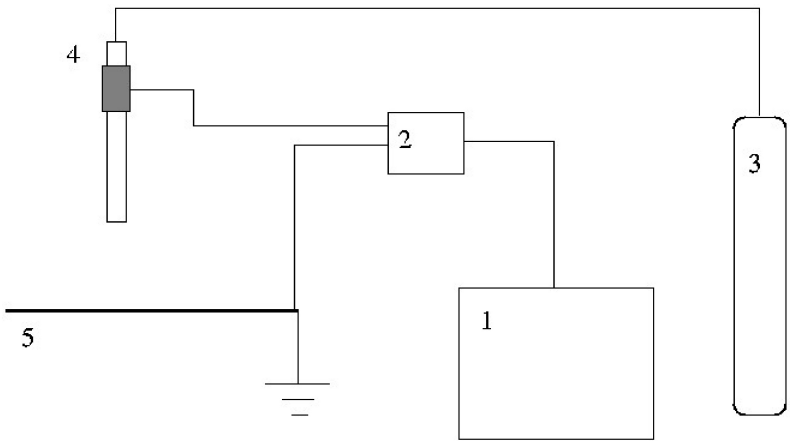

FIGURE 1. Experimental setup: 1 - rf generator 13.56MHz, 2 - matching unit, 3 - working gas reservoir (argon), 4 - dielectric plasma nozzle, 5 - ground electrode.

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