

## **Analysis of the tuning characteristics of low-power microwave device for generation of plasma sheet**

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A novel, recently patented by us plasma source with unique shape of plasma (i.e. *plasma sheet*) is presented in this paper. The presented source generates non-thermal plasma using the 2.45 GHz microwaves in any gases under reduced, atmospheric and greater than atmospheric pressure. This plasma source is simple and the unique shape of generated plasma sheet is very convenient for surface treatment, thus it is attractive for industry

The plasma source was tested for surfaces treatment. The following materials were subjected to the plasma treatment process: caoutchoucs, PC (polycarbonate) and PMMA (poly(methyl methacrylate)). The water contact angle (WCA) directly after plasma treatment dropped 1.6-4.8 times. The WCA 200 hours after plasma treatment is lower 1.7-1.5 times relative to WCA before plasma treatment. The experimental investigations proved high potential of the presented method for the surfaces activation in industrial applications. The ageing of adhesion enhancement effect indicates that water contact angle is related to the surface energy changes.

Due to industrial requirements regarding low costs of generated discharge in this work we focus on analysis of the tuning characteristics of the device. The tuning characteristics is a dependence of reflected microwaves power  $P_R$  to the incident microwaves power  $P_I$  as a function of position of a movable plunger  $l_s$ . In general the plasma source is efficient when the ratio  $P_R/P_I$  is close to zero and it is stable when this ratio does not depend on the position of the movable plunger  $l_s$ . Our preliminary experimental tests showed that the presented device requires improvement in order to increase its power coupling efficiency from the supply line to the generated plasma. Therefore, the presented in this work research is the first stage in the process of improving this device for increasing its energy efficiency and stability performance.

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