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Effect electric potential across electrodes for trapping joss stick smoke particles using DBD at atmospheric pressure

One of the factors of respiratory disease is a smoke particle from air pollution, many researchers have tried to detect and catch it. This aim of experiment was to investigate the effect of electric potential difference of a Dielectric Barrier Discharge (DBD) system used for trapping joss stick smoke particle at atmospheric pressure. Dielectric Barrier Discharge (DBD) consists of inner electrode that is made from aluminum wire filaments that are placed randomly in a cylindrical tube. The outer electrode is made from metallic covered with the acrylic tube. The electrodes were connected to a 50 Hz high voltage AC source which was adjusted to 0 V, 5kV, 7kV, and 10kV. A ventilating fan is used for draining the smoke particle from the joss stick through the inner electrode with air flow velocity of 2.68 m/s. Result from the experiment was further compared with a study by simulation. It was found that the smoke particle density for electric potential difference of 0 V and 5 kV were similar; both measured conditions showed highest smoke density values. On the other hand, when the electric potential difference was adjusted to 7 kV and 10kV, it was found that the smoke particles density was decreased by 50%. The experiment also illustrated when the electric potential difference was increased high enough such as produces plasma which was at 7 kV and 10 kV, the smoke particle density released from the tube that it was similar. Nevertheless, when comparing the mass of the inner electrode with plasma condition, it was found that the mass increased more than the operating condition with electric potential difference of 0 kV and 5 kV.

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