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Optical Characterization of Atmospheric Pressure Dielectric Barrier Discharge (DBD) in Air Using Transparent Electrode.

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Dielectric barrier discharge (DBD) operated in atmospheric pressure has been extensively studied in the past few years. However, very few literatures are available on DBD with transparent electrodes. The analysis of the homogeneity of the discharge is restricted due to a narrow inter-electrode spacing in such discharge. This paper deals with the study of DBD generated in a parallel plate electrode system with water serving as one of the electrode and glass as dielectric barrier. The discharge was produced using a high-voltage power supply (0-20 kV) operating in frequency in the range of 10-30 kHz. This system facilitates the direct observation of the 2-D view of the discharge which makes it possible to investigate the uniformity of the micro-discharges over the electrode surface. It also offers a convenient way to collect light of sufficient intensity from the discharge for optical spectroscopy. Optical emission spectroscopy was used to estimate the electron temperature (T_e) and density (n_e) in the plasma. The main objective of the present study was to investigate the distribution of micro-discharges in DBD and analyze the effect of discharge condition on the homogeneity of atmospheric pressure DBD. Analysis of 2-D images of the discharges showed that the density of micro-discharges is strongly affected by the inter-electrode distance.

1.

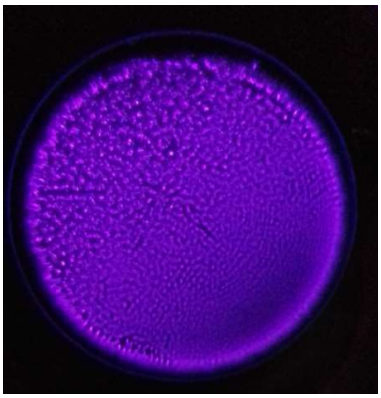

Fig. 1 Photograph of the discharge.

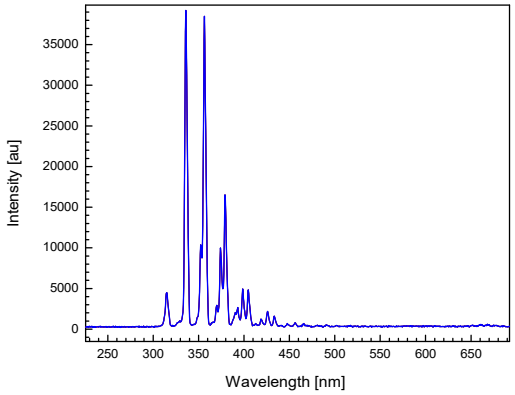

Fig. 2 Optical emission spectra of the discharge.

References

1. U. Kogelschatz, B. Eliasson, W. Egli. Journal de Physique IV, , 07 (C4), pp.C4-47-C4-66, (1997).

2. R. B. Tyata, D. P. Subedi, R. Shrestha and C. S. Wong, *PRAMANA, Journal of Physics, Indian Academy of Sciences,* Vol. 8, No. 3, pp 507-517, (2012).

3. D. P. Subedi, R. B. Tyata, R. Shrestha, C. S. Wong, Frontiers in Physics, AIP Conf. Proc. 1588, 103-108 (2014); doi: 10.1063/1.4867673

4. A. Falahat, A. Ganjovi, M. Taraz, M.N. Rostani Ravari, A. Shahedi, Pramana– *J. Phys*. 90:27 (2018)

5. X Ming Zhu,W Cong Chen and Y Kang Pu, *J. Phys. D: Appl. Phys.* ***41*** *105212 (2008)*