International Journal of Applied
and Natural Sciences (IJANS)
ISSN(P): 2319-4014; ISSN(E): 2319-4022
Vol. 8, Issue 4, Jun - Jul 2019; 71-80

International Academy of Science,
Engineering and Technology
Connecting Researchers; Nurturing Innovations

ELECTRON TEMPERATURE AND ELECTRON DENSITY OF ATMOSPHERIC PRESSURE NEEDLE TO PLANE DIELECTRIC BARRIER DISCHARGE AIR PLASMA

M K Alam[1], M W Rahman[2] & A T M Kaosar Jamil[3]

[1]Research Scholar, Department of Physics, Pabna University of Science & Technology, Pabna, Bangladesh

[2]Research Scholar, Department of Applied Physics & Electronic Engineering, University of Rajshahi, Rajshahi, Bangladesh

[3]Research Scholar, Department of Physics, Dhaka University of Engineering & Technology, Gazipur, Bangladesh

ABSTRACT

Electron temperature and electron density of atmospheric pressure single dielectric barrier discharges in the 'needle-air gap-glass barrier-plane' configuration are investigated by means of optical emission spectroscopy (OES). The atmospheric pressure open-air diffuse type sustainable plasma is generated by a high voltage (5 kV) AC source operating at a frequency of 20 kHz. The electron temperature is estimated using the spectral line intensity ratio method and the electron density is determined using Stark broadening parameters. It was found that the electron temperature and electron density both decrease with the increase of gap distance and dielectric thickness. It is also found that the electron temperature is less than 1 eV (0.61–0.33 eV) and electron density is 1.80×10^{13} – 7.21×10^{11} cm^{-3} depending upon air gap and dielectric thickness.

KEYWORDS: *Atmospheric Pressure Plasma; Dielectric Barrier; Needle to Plane; Diffuse Discharge; Optical Emission Spectroscopy, Spectral Line*

Article History

Received: *05 May 2019* | ***Revised:*** *21Jun 2019* | ***Accepted:*** *28 Jun 2019*