ABSTRACT

Nitrogen (N_2) plasma is generated by using 100 Hz pulsed DC source and is investigated by using Optical Emission spectroscopy (OES). Several studies of N_2 plasma revealed that the properties of deposited thin film depend on the relative flux of active species to the growth of films on the surface of substrate. A major concern of this work is to optimize the production of reactive species of Nitrogen by selecting the discharge parameter using OES. The emission intensities of the band heads of the first negative system (λ=391.40 nm, 0-0) and the second positive system (λ=426.97 nm, 1-5) along with N (λ=469.00 nm) and N^+ (λ=463.05 nm) have been measured as a function of discharge parameters. It is observed that the concentration of active species of N_2 is strongly affected by the filling pressure, power and inter-electrode distance.

Plasma electron temperature is determined from relative intensities of two spectral lines of the same atomic species. The electron temperature decreases from 3.112 eV to 1.858 eV with increasing filling pressure (50-150 Pa) at input power of 80 watt and 3 cm inter-electrode distance. The electron temperature increases from 2.246 eV to 3.648 eV with increasing power (25-150 watt) at filling pressure of 100 Pa and 3cm inter-electrode distance. The constant electron temperature above 100 watt is observed which is due to the escape of the high-energy electrons to the walls. Thus, the input power for this system is kept below 100 watt for the filling pressure of 100 Pa and inter-electrode distance of 3 cm.