OPTICAL EMISSION SPECTROSCOPY DIAGNOSIS OF ACETONE SPECIES IN ATMOSPHERIC PRESSURE ARGON PLASMA*

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Atmospheric pressure dielectric barrier discharge (DBD) plasma has become higher and higher with its ever-increasing applications to surface modification of materials recently. DBD is characterized by the presence of at least one insulating layer in contact with the discharge between two planar or cylindrical electrodes connected to an ac power supply. The main advantage of this type of electrical discharge is that non-equilibrium plasma conditions in atmospheric-pressure gases can be maintained in an economic and reliable way. This has led to a number of important applications including industrial ozone generation, plasma-chemical vapor deposition, pollution control, excitation of CO_2 lasers, excimer lamps, and most recently, large-area flat plasma-display panels[1, 2]. Recently, there are few studies have investigated optical emission spectroscopy (OES) diagnosis of acetone species in intermediate frequency argon/acetone plasma at atmospheric pressure. Argon/acetone plasma jet was generated from a nozzle using an AC discharge in intermediate frequency at atmospheric pressure. The spectral lines of argon and acetone plasma emission were obtained and analyzed by using HR2000 spectral diagnosis equipment. The experimental results indicate that spectral diagnosis has been proved a workable method. It is significant for the application of OES diagnosis of volatile organic reagent in argon plasma, and is important to the concept of plasma polymerization of volatile organic reagent. There exist large differences in the activity species of acetone plasma between at atmospheric pressure and under vacuum condition, and oxygen is the most important influencing factor. In addition, the paper shows the topography of the deposition acetone film indicates that through experiment achieved a continuous deposition film in intermediate frequency plasma at atmospheric pressure.

1. B. Eliasson, U. Kogelschatz, “Modeling and Applications of Silent Discharge Plasmas”, IEEE Transaction on Plasma Science, 19 (1991), pp. 309-323.
2. L. X. Tang, P. X. Feng, et al, “Investigation of atmosphere pressure plasma discharge and its application to surface modification of blood-filtering material”, 30th International Conference on Plasma Sciences, June 2 - 5, 2003, pp. 274.

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