THE GENERATION AND CHARACTERISTIC STUDY OF LARGE-VOLUME MICROWAVE PLASMA PRODUCED WITH PARELLEL RECTANGULAR WAVEGUIDES*

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A uniformity, high efficiency and large volume microwave plasma source has been developed, which consists of a 1-10kW 2.45GHz magnetron power supply, microwave transmission and monitoring system, microwave power splitter, adjustable short-circiut plunger and two parallel rectangular waveguides with axial slots regularly positioned on its inner side. The design parameters and electric field existing modes of the microwave plasma source were optimized to produce high-amplitude and uniform electromagnetic field distribution[1]. Various of gases including argon, helium, nitrogen, and air have been successfully used to generate a plasma for pressure range from 1000 to 2000 Pa and microwave power range from 800W to 3000W, which fills the entire discharge space. The simulation results are perfectly consistent with the experimental observation. The electron density was measured with a Mach-Zehnder interferometry and the electron temperature was obtained by use of atomic emission spectrometry. It can be seen from the interferograms at different microwave power that the distribution of the plasma electron density is stable and uniform.

This microwave plasma source has a good scalability, which facilitates the three-dimensional scale-up of the source by series-parallel connection. The potential industrial applications of this microwave plasma source are for material synthesis and sterilization.

1. Liu Liang, Zhang Guixin, Li Yinan, Zhu Zhijie, Wang Xinxin and Luo Chengmu, “A New Atmospheric Pressure Microwave Plasma Source”, *Plasma Sci.Technol*. 2008, 10(1), pp. 83-87.

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