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Experimental Investigation of pulsed inductively coupled Ar and Ar/N2 plasmas by a time-resolved Langmuir probe[1] FEI GAO, YU-RU ZHANG, YONG-XIN LIU, YOU-NIAN WANG, Dalian University of Technology — Pulsed inductively coupled plasmas have been widely used in the etching process of the semiconductor manufacturing due to its many advantages, such as more flexible control of the ion energy distribution. The time evolutions of the radial distribution of electron density and electron energy probability function (EEPF) are measured in pulsed inductively coupled Ar and Ar/N_2 plasmas by using a Langmuir probe. In Ar discharge, the electron density generally exhibits a parabolic distributions during the whole active-glow period at a low pressure. However, at a high pressure, the electron density first increases and then decreases with the increase of the radial distance during the initial active-glow. As the time evolves, the peak of the electron density gradually moves towards the chamber center, and finally the radial distribution of electron density tend to be parabolic during the late active-glow period. In Ar/N_2 discharge, the maxima of the electron density is off-centered during the whole active-glow. In addition, the peak of electron density in Ar/N_2 discharge occurs earlier than that in pure Ar discharge. To better understand the underlying physics, the radial distribution of the EEPF are analyzed.

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