

ABSTRACT OF THE DISCLOSURE

A plasma processing apparatus and a method therefor which can achieve a preferred process rate, fine pattern
5 process capability, selectivity and uniformity of processing at the same time compatibly for a large size wafer, which are achieved by controlling the plasma state and the dissociation state of etching gas through control of the electron
10 resonance by applying the magnetic field. A high frequency power at 20-300 MHz is applied across a pair of electrodes in the vacuum process chamber, and the magnetic field forming means forms a magnetic field parallel to the plane of the electrodes between the gap thereof. By controlling the intensity of the magnetic field in a range of 100 gauss
15 or smaller, formation of electron cyclotron resonance and electron sheath resonance occurring from interaction between the electrical field and the magnetic field in the electrode sheath portion is controlled. Thereby, the plasma state, i.e., electron density, electron energy distribution and
20 dissociation state of process gas in plasma, can be controlled. The magnetic field forming means comprised of a plurality of coils, outer shield, and pendant yoke forms the magnetic field parallel to the plane of the electrodes in the space between the upper and the bottom electrodes.

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