

PT-P017

Research to Achieve Uniform Plasma in Multi-ground Capacitive Coupled Plasma

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The capacitive coupled plasma is used widely in the semiconductor industries. Especially, the uniformity of the industrial plasma is heavily related with defect ratio of devices. Therefore, the industries need the capacitive coupled plasma source which can generate the uniform plasma and control the plasma's uniformity. To achieving the uniformity of the large area plasma, we designed multi-powered electrodes. We controlled the uniformity by controlling the power of each electrode. After this work, we started to research another concept of the plasma device. We make the plasma chamber that has multi-ground electrodes imaginary (CST microwave studio) and simulate the electric field. The shape of the multi-ground electrodes is ring type, and it is same as the shape of the multi-power electrodes that we researched before. The diameter of the side electrode's edge is 300mm. We assumed that the plasma uniformity is related with the impedance of ground electrodes. Therefore we simulated the imaginary chamber in three cases. First, we connected L (inductor) and C (capacitor) at the center of multi-ground electrodes. Second, we changed electric conductivity of multi-ground electrode. Third, we changed the insulator's thickness between the center ground electrode and the side ground electrode. The driving frequency is 2, 13.56 and 100 MHz. We switched our multi-powered electrode system to multi-ground electrode system. After switching, we measured the plasma uniformity after installing a variable vacuum capacitor at the ground line. We investigate the effect of ground electrodes' impedance to plasma uniformity.

Keywords: CCP, uniformity, electrode

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Ar/N₂ 혼합가스 비율에 따른 대기압 저온 플라즈마제트의 플라즈마 전파 속도 및 전자 온도 조사

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플라즈마 전파 속도와 전자 온도를 조사하기 위해 ICCD카메라(Intensified Charge-Coupled Device Camera, 이하 ICCD)를 이용하여 대기압 저온 플라즈마제트의 방전 이미지를 촬영하였다. 사용된 플라즈마 제트 장치는 유리관 안에 주사기 바늘형 전극이 들어있는 형태이다. 전극의 내경은 1.3 mm, 외경은 1.8 mm, 총 길이는 39.0 mm이며 재질은 스테인레스강이다. 유리관의 내경은 2.0 mm, 외경은 2.4 mm, 총 길이는 80.0 mm이다. 입력 전압은 3.0 kV이며 구동 주파수는 40 kHz이다. 아르곤과 질소의 혼합가스 비율은 각각 100:1, 98:2, 95:5을 사용하였으며 총 가스유량은 400 sccm이다. 각각의 비율별로 균속도는 267 km/s, 305 km/s, 313 km/s이며 이온 음향 속도는 1.16 km/s, 1.24 km/s, 1.25 km/s이고, 전자 온도는 0.55 eV, 0.63 eV, 0.65 eV로 관찰되었다.

Keywords: 플라즈마, 플라즈마제트, 플라즈마 전파, 전자 온도, ICCD, 대기압 플라즈마