PM-P007

## 유도 결합 플라즈마에서 웨이퍼 표면의 부유 전위 공간분포 측정

장애선[1], 박지환[2], 김진용[1], 김유신[1], 정진욱[1]*

[1]한양대학교 전기공학과, [2]한양대학교 나노반도체공학과

웨이퍼 표면에서 부유 전위 분포를 측정하기 위해서 웨이퍼형 탐침 배열을 제작하고 측정회로를 만들었다. 아르곤 플라즈마의 경우 낮은 압력에서 부유 전위의 분포는 중심에서 최대값을 갖는 포물선 형태로 나타났다. 하지만 음이온 가스의 압력이 증가함에 따라 부유 전위의 분포가 현저하게 변화했다. 가스 압력이 높아짐에 따라 비국부적이었던 플라즈마의 방전 특성이 국부적으로 변화했기 때문이다. 이외에도 음이온도 부유 전위의 분포를 변화시킬 수 있음을 확인하였다. 이 연구는 반도체 제조 공정에서 웨이퍼 표면에서 전하 축적에 의한 손상을 이해하는데 도움이 될 것으로 기대된다.

**Keywords:** 유도 결합 플라즈마, 웨이퍼, 부유 전위, 전하 축적

PM-P008

## Sensitivity Enhancement of RF Plasma Etch Endpoint Detection With K-means Cluster Analysis

Honyoung Lee[1], Haegyu Jang[2], Hak-Seung Lee[3], Heeyeop Chae[23]

[1]School of Semiconductor and Display Engineering, Sungkyunkwan University (SKKU),
[2]SKKU Advanced Institute of Nanotechnology, Sungkyunkwan University (SKKU),
[3]School of Chemical Engineering, Sungkyunkwan University (SKKU)

Plasma etch endpoint detection (EPD) of SiO2 and PR layer is demonstrated by plasma impedance monitoring in this work. Plasma etching process is the core process for making fine pattern devices in semiconductor fabrication, and the etching endpoint detection is one of the essential FDC (Fault Detection and Classification) for yield management and mass production. In general, Optical emission spectrocopy (OES) has been used to detect endpoint because OES can be a simple, non-invasive and real-time plasma monitoring tool. In OES, the trend of a few sensitive wavelengths is traced. However, in case of small-open area etch endpoint detection (ex. contact etch), it is at the boundary of the detection limit because of weak signal intensities of reaction reactants and products. Furthemore, the various materials covering the wafer such as photoresist (PR), dielectric materials, and metals make the analysis of OES signals complicated.In this study, full spectra of optical emission signals were collected and the data were analyzed by a data-mining approach, modified K-means cluster analysis. The K-means cluster analysis is modified suitably to analyze a thousand of wavelength variables from OES. This technique can improve the sensitivity of EPD for small area oxide layer etching processes: about 1.0 % oxide area. This technique is expected to be applied to various plasma monitoring applications including fault detections as well as EPD

**Keywords:** Plasma, Etch. EPD, PR OES, K-means Cluster Analysis, Data-mining