Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Correlation of plasma impedance and plasma parameters in inductively coupled Ar and CF_4 plasma[1] NAYEON LEE, OHYUNG KWON[2], Korea Institute of Industrial Technology (KITECH), CHIN-WOOK CHUNG, Hanyang University — VI probe has been used to measure electrical impedances in plasma etcher. When an impedance was measured at the port after RF bias matcher, which was connected to an electrostatic chuck, the information of transmission lines and ceramic parts were included in the measured impedance. The impedances of chamber parts had to be excluded because these components interfered with obtaining genuine plasma impedance. We analyzed the correlation between the genuine plasma impedance such as a resistance, an inductance of plasma and total sheath capacitance and plasma parameters such as ion density and electron temperature in Ar plasma and CF_4 plasma, respectively. When the genuine plasma impedances were applied, the coefficient of determination between the resistance of plasma and the square root of electron temperature divided by ion density were improved from 0.606 to 0.955 in Ar plasma and from 0.368 to 0.554 in CF_4 plasma. In addition, the etching rates of SiO_2 and Si_3N_4 using CF_4 plasma were directly proportional to the total sheath capacitance. Monitoring genuine plasma impedance can be used to non-invasively inspect plasma parameters in real-time.

[1]This work was supported by the National Research Foundation of Korea(NRF) grant funded by the Korea government(MSIT) (No. 2019R1C1C1010062).
[2]corresponding author(kwonoh@kitech.re.kr)

Nayeon Lee
Korea Institute of Industrial Technology (KITECH)

Date submitted: 11 Jun 2020 Electronic form version 1.4