

Abstract Submitted
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Technique for in-situ measurements of electron density and film thickness using double curling probes. DAISUKE OGAWA, Chubu University — We have developed a technique to realize an in-situ measurement of both electron density and deposited-film thickness with the use of two curling probes. Curling probe is one of the microwave resonators, which mainly allows measuring electron density based on the microwave resonance of a curling slot antenna. A curling probe has a quartz cover separating a cavity in the probe from plasma region so that it is known that resonant frequency shifts when the film deposition occurs on the cover. We utilize the phenomenon to measure the film thickness during a deposition process. When the probe is inserted into a plasma, there are two factors to shift the resonant frequency. The first is the plasma permittivity, and the second is the dielectric constant of a deposited film. In order to separate the two frequency shifts, we use two different-sized curling probes because the attenuation of the radiation from the antenna depends on the antenna geometry and so on. Once we know the parameters specific to each probe, we can find the electron density and the film thickness simultaneously. In this presentation, we will show our theoretical background of the technique and the experiments to validate the equation.

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