

Abstract Submitted
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Novel diagnostic tool, curling probe, for monitoring electron density during plasma processing¹ ANIL PANDEY, KIMITAKA KATO, SHUNJIRO IKEZAWA, KEIJI NAKAMURA, HIDEO SUGAI, Chubu University — A new type of microwave resonator probe, *curling probe*, has recently been proposed [1] which enables direct measurement of electron density even in plasma deposition process. The FDTD simulation of 10-mm-diam curling probe shows a sharp resonance at the frequency from 1 to 6 GHz uniquely determined by the electron density. The resonance frequencies measured by the curling probe in ICP and microwave plasma were explained well by the FDTD simulation result as well as the analytical formula. When a dielectric layer is deposited on the probe surface, the resonance frequency decreases with the increasing layer thickness. Using this probe characteristic, one can *in situ* monitor the thickness of dielectric layer deposited onto a wall of plasma vessel, where the curling probe is positioned to just the same surface as the inner wall. The FDTD simulation shows ~ 2 MHz shift in the resonance frequency for deposition of 3- μm -thick dielectric layer, in good agreement with the experimental observation. Thus, the wall deposition layer during chamber cleaning or CVD process can be *in situ* monitored by the curling probe.

[1] I. Liang, K. Nakamura, and H. Sugai, Appl. Phys. Express 4, 066101 (2011).

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