

Abstract Submitted
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Electron density measurement in a dual frequency confined capacitive coupled plasma (DFC-CCP) processing tool using a floating hairpin resonance probe S.K. KARKARI, A.R. ELLINGBOE, Plasma Research Laboratory, NCPST, School of Physical Sciences, Dublin City University, Dublin-9, Ireland — The DFC-CCP's are widely used in industries for etching metals, insulators and semiconductor materials. In a symmetric DFC-CCP plasma tool [Exelan®], Lam Research Corporation] the discharge is electro-statically confined within a narrow gap (12 mm), which causes large plasma potential oscillation (1KV) of the two fundamental frequencies and their harmonics with the mean potential floating at several hundreds of volts above the ground. Therefore for plasma diagnostics, the RF compensated Langmuir probes are not suitable since appropriate resonant filters are practically difficult to design and also the bulky probe construction highly perturb the discharge. To overcome such limitations, we have designed a “floating hairpin probe” for measuring the electron density in Exelan®. This technique is based on Piejak's directly coupled hairpin probe operated in the reflection mode [presented in the 56th and 57th GEC conference], however with the hairpin probe electrically isolated from the loop antenna. Using this probe we have measured the time-averaged electron plasma density at the mid-plane of the discharge electrodes in Ar/O₂/C₄F₈ gas mixtures. The spatial and the phase-resolved measurements of the electron densities are presently being carried out and the results shall be presented in the conference.

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