Seminar

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Institute for Plasma Research

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Title: Design and Characterization of RF power measurement device for multi electrode large area plasma source

Speaker: Dr. Dhyey Raval
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Date: 2nd May 2023 (Tuesday)

Time: 10:30 AM

Venue: Committee Room 4, IPR

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Abstract

Plasma processing of large area substrate is in a high demand due to several applications ranging from plasma enhanced chemical vapour deposition on metallic substrates to reactive ion etching of silicon for the manufacturing of solar cells and integrated circuits [1]. These processes are traditionally done using capacitive coupled RF discharge, wherein the processing substrate constitutes a part of the discharge circuit. Maintaining plasma uniformity over large area, as well as independently controlling the particle flux and ion energy distribution at the substrate is a key challenge [2]. To address the above limitations a novel multi-electrode RF plasma source has been developed in the Magnetized Plasma Development (MPD) laboratory at IPR. In this system hat-top radial plasma uniformity of approximately 40 cm has been achieved using an array of 16 capacitive coupled electrodes, driven in push-pull configuration. It is important to monitor the RF power distribution at the individual RF electrodes. The traditional contact measurement method is not practically feasible due to parasitic capacitances of passive probes [3]. In this work, a plurality of in-line noncontact method of current and voltage measurement using a miniature trace sensor probe is being developed for simultaneously monitoring RF powers at the individual electrodes. This talk will discuss the initial test result of measurements and simulation of the designed sensor conducted in the lab-bench. Simulation results quantify the capacitive and inductive signal obtained using the miniature sensor assembly.

References:

1. F Milde, M Dimer, Ch Hecht, D Schulze, P Gantenbein,Vacuum, 2000, 59, 2–3, 825-835.
2. Lieberman M A, Booth J P and Chabert P, Plasma Sources Sci. Technol., 2002, 11, 283T.
3. V. A. Godyak and R. B. Piejak, J., Vac. Sci. Technol., 1990, A 8, 3833.