

# Seminar

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## Institute for Plasma Research

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**Title:** Design and characterization of RF power measurement device for multi-electrodes large area plasma source

**Speaker:** Dr. Dhyey Raval  
Institute for Plasma Research, Gandhinagar

**Date:** 06<sup>th</sup> May 2024 (Monday)

**Time:** 10:00 AM

**Venue:** Committee Room 4, IPR

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### Abstract

RF power monitoring system is required for any type of plasma processing reactor used for silicon substrate plasma etching, PECVD coatings, etc [1]. It is useful to have a sensor that can measure the precise quantity of injected RF power or current in order to efficiently regulate a certain plasma process [2]. For a better knowledge of power absorb in the system load is the inline V-I characterisation for RF power measurements. The commercial RF power sensors are required to be calibrated frequently and they are expensive [3]. To address the above issue, a device to measure the absolute radio frequency power of a RF plasma system has been conceived, constructed, and tested in-house at IPR's Magnetized Plasma Development laboratory. The device consists of a 50 Ohm coaxial enclosure with voltage and current sensors positioned and fastened suitably in the coaxial line's mid-plane. The output signals from the sensors are digitally recorded using an oscilloscope. The amplitude and phase between Voltage and Current for the fixed frequencies of 2 MHz, 13.56 MHz, and 27.12 MHz, respectively, are then found by analyzing the signals. Arbitrary waveforms provided by a signal producing source have been used to assess the sensors' performance. In this talk, the performance of the device has been evaluated using a 50-Ohm dummy load up to a maximum power of 100 Watts. The derived RF power from the obtained voltage has been benchmarked against a commercial I-V sensor. The talk will summarize the initial results

### 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.
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