

Abstract Submitted
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Real-time plasma impedance matching using an impedance mapping strategy. MIKE HOPKINS, DAVID GAHAN, PAUL SCULLIN, THOMAS GILMORE, Impedans Ltd — In plasma impedance matching, power transfer is not always the only desired outcome, for instance an accurate VI sensor at the output of the matching unit increases the accuracy of power delivery, accounts for matching network efficiency, increases impedance range, allows real time load impedance measurement and diagnostics, accurate load tracking, fast ignition, and in-pulse matching. In the current paper we use a VI sensor located at the output of the match, combined with the power forward and reflected, measured at the power supply to map the complex impedance of the matching unit and relate it to the system performance. To test the performance of different matching strategies, such as frequency tuning, we develop an electrical model of an ICP plasma etcher with a 13.56 MHz bias. We gather a wide range of experimental measurements to calibrate the model and show that it is accurate and predicts the behavior of the system. As an example, we observe a 20% shift in ion energy with +/- 5% range frequency tuning. We show in-pulse matching of power in the microsecond range. We confirm that impedance mapping is a powerful tool in delivering more stable and reliable plasma processes in the etcher studied and that it is the first step in a plasma chamber matching program.

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