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Spatial Distribution of Plasma Parameters in an Asymmetric Coaxial Discharge JEREMY PESHL, JANARDAN UPADHYAY, Old Dominion University, MILKA NIKOLIC, James Madison University, ALEXANDER GODUNOV, SVETOZAR POPOVIC, LEPOSAVA VUSKOVIC, Old Dominion University — Plasma processing of superconductive radio-frequency (SRF) cavities provides the unique opportunity of tailoring the inner surfaces for better SRF properties in addition to being a less expensive and more environmentally friendly method of processing the cavities. An asymmetric coaxial capacitively coupled RF discharge is a natural approach to plasma processing of an SRF cavity. Although the experimental setup and process parameters necessary to generate the reversal of the asymmetry and achieve the 3D surface processing have been established [1], information about the plasma properties such as electron temperature, ion energy, and plasma density remain elusive for asymmetric coaxial capacitively coupled plasmas (CCP). For diagnostic purposes, an RF (15.36 MHz) coaxial CCP is made using a 12" long and 2" diameter powered inner electrode and a 12" long 3.85" inner diameter outer grounded electrode. Plasma parameters are measured using external and internal optical emission spectrometers and a Langmuir probe. Spatial distributions of plasma parameters are collected by changing the radial positions of the measurement devices. Comparative analysis of the data from each diagnostic tool is conducted to ensure consistency of the quantitative results.

[1] J. Upadhyay, J. Appl. Phys. **117**, 113301 (2015).

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