

Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Plasma Parameters of SRF Cavities for Radio-Frequency Discharge Processing JANARDAN UPADHYAY, SVETOZAR POPOVIC, LEPSHA VUSKOVIC, Old Dominion University, ANNE-MARIE VALENTE-FELICIANO, LARRY PHILLIPS, Jefferson Lab — Superconducting radio frequency (SRF) cavities of bulk Niobium are accelerating field-generating components of particle accelerators. Cavities are designed to support TM modes at a resonant frequency, which usually serve as their identifier. RF plasma surface modification dry-etching technology as an alternative to the currently existing wet etching technology requires a different RF coupling regime. The choice of power generator frequency greatly affects the field and plasma parameters distribution over the cavity. These are adjusted by a coaxial centerline antenna to provide for optimum level of plasma sheath uniformity. In the search for best etching conditions, we are opting for radio frequency (13.56 MHz, 100 MHz) and microwave frequency plasma (2.45 GHz) in Ar/Cl₂ gas mixture. We have developed five optical probes for simultaneous spectroscopic measurements of the plasma properties at five points inside the cavity. The electron temperature and density measurement at the same set of points will be also measured with a Langmuir probe. The measurement of plasma parameters at different pressure and power for the chosen frequency set with varying chlorine content will be presented.

Janardan Upadhyay
Old Dominion University

Date submitted: 15 Jun 2012

Electronic form version 1.4