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**Plasma Treatment of Bulk Niobium Surfaces**<sup>1</sup> M. RASKOVIC, S. POPOVIC, L. VUSKOVIC, Dominion University, Norfolk, VA, S.B. RADOVANOV, L. GODET, Varian Semiconductor Equipment Associates, Gloucester, MA — In-situ plasma treatment is one of possible methods for preparation of Nb surface in superconducting radio-frequency (SRF) cavities used in linear particle accelerators. The aim is to remove Nb oxides and other poor superconductors from the bulk niobium surface and to eliminate surface roughness. The choice of the plasma technique is limited by the requirement for the discharge to fit into the relatively complex geometry of SRF cavities, which are to serve as vessels for pulsed or barrel-type reactors. For the surface treatment we used the microwave cavity discharge system with Ar/Cl<sub>2</sub> [1] and the repetitively pulsed d.c. diode system with Ar/BF<sub>3</sub> [2]. The preliminary studies on planar samples with both systems show results with positive influence on the surface smoothness comparing to buffered chemical polishing method, currently in use. In addition, images obtained with several surface characterization techniques show substantial reduction of feature size on the surface. The gas-phase kinetics of both discharges has been performed. Results are compared with the process diagnostics data in order to develop better understanding of the processes, the optimization strategy, and the in-situ reactor design. [1] M.Raskovic, et al., EPAC 06, Edingbourh, Scotland, June 26- 30, 2006. [2] S. Radovanov, et al., J. Appl. Phys. 98, 113307 (2005).

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