

Abstract Submitted
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Modification of Bulk Nb Surfaces Using Ar/BF₃ and Ar/Cl₂ Plasmas¹ M. RASKOVIC, S. POPOVIC, L. VUSKOVIC, Department of Physics, Old Dominion University, Norfolk, VA 23529 — In-situ plasma treatment is one of the promising methods for preparation of Nb surface in superconducting radio-frequency cavities. The aim of our work is to remove Nb oxides and other poor superconductors from the bulk niobium surface and to eliminate surface roughness. Since Nb forms volatile fluorides and chlorides, reactive gas mixture can contain fluoride and/or chloride based gases. We exposed the Nb surface to Ar/Cl₂ reactive gases mixture in the microwave cavity discharge system [1] and to Ar/BF₃ in the repetitively pulsed d.c. diode system [2]. Optical and mass spectrometry methods were employed for process monitoring during the surface exposure to the discharges. Treated surfaces were characterized with optical microscope, scanning electron microscope, and scanning probe microscope. The preliminary studies on the planar samples show improvement of the surface smoothness comparing to buffered chemical polishing method, currently in use. Further, the gas-phase kinetics study of both discharges used in our work is being performed. These results will be compared with the process diagnostics data in order to develop better understanding of the surface modification processes. The results will be presented at the conference. [1] M. Raskovic, et al., Proc. EPAC 2006, Edinburgh, Scotland, MOPCH184. [2] S. Radovanov, et al., J. Appl. Phys. **98**, 113307 (2005).

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