

Abstract Submitted
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Plasma Etching of Cu in an Ar/Cl₂ Microwave Discharge M. RASKOVIC, K. BRANNICK, S. POPOVIC, L. VUSKOVIC, Physics Department, Old Dominion University — Copper substrates can be used for depositing superconducting material thin films, such as Nb or Nb₃Sn, lowering the cost of cavity production for linear particle accelerators based on the superconducting radiofrequency technology. To avoid contamination and mechanical damage by environmental agents, the best would be to prepare Cu surface in the same apparatus thin film deposition is performed. Low volatility of Cu halides is main difficulty for using plasma processing techniques. Standard parallel plasma etching reactor does not achieve temperature necessary for evaporation of CuCl, the most volatile Cu halide. Therefore our approach was to use a microwave glow discharge [1], characterized with higher electron and radical density as well as higher substrate temperature comparing to standard RF system. Etching rates of 300 nm/min were reached using only 3 %Vol Cl₂ reactive gas in Ar/Cl₂ mixture. Formation of CuCl during plasma etching process was monitored using emission spectroscopy techniques. Attempt to use observed CuCl rotational spectra for determining discharge gas temperature was made. Composition and morphology of Cu surface before and after exposure was investigated using scanning electron microscope.

[1] M. Raškovic, *et al.*, J. Vac. Sci. Technol. A 27, 301 (2009).

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