SRF2025 TOKYO

22ND INTERNATIONAL CONFERENCE ON RF SUPERCONDUCTIVITY

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Contribution ID: **98** Contribution code: **TUB01** Type: **Invited Oral Presentation**

Systematic study of annealing effects on RF properties of HiPIMS Nb film

Tuesday 23 September 2025 11:00 (20 minutes)

This talk will make a report on investigating performance of Nb thin films and in particular: effect of sequential heat treatments on mid field Q-slope and quench of Nb thin films effect of film vs bulk vs the Nb oxide in losses of the films in the quantum regime. This innovative study investigates a thin film of HiPIMS niobium deposited on a bulk niobium cavity. Measurements at FNAL investigated the performance of the film as compared to the bulk cavity it was coated on, and after subjecting the cavity to multiple and sequential heat treatment ranging from low temperature to mid temperature, to high temperature. Interestingly heat treatments in the range of 800 C demonstrate a significant improvement in mid-field Q slope and quench field. Studies have been performed with T-map to study the evolving character of the film losses for both slope and quench. Investigation into performance in the quantum regime demonstrate unequivocally that the leading role of low field Q-slope and TLS losses stems from the surface oxide and not from the Nb film or niobium bulk.

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Footnotes

Funding Agency

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