



Contribution ID: 576 Contribution code: SUP075

Type: **Poster Presentation**

Co-sputter deposition of Nb₃Sn layer into SRF cavity using Nb-Sn composite target

Sunday 10 August 2025 15:00 (3 hours)

Nb₃Sn, with its superior superconducting critical temperature ($T_c \sim 18.3$ K) and superheating field ($H_{sh} \sim 400$ mT), is considered a promising material for superconducting radiofrequency (SRF) cavities, offering enhanced cryogenic performance compared to bulk niobium cavities. A Nb₃Sn coating technique has been developed for Nb SRF cavities using co-sputtering of Nb-Sn composite target in a DC cylindrical magnetron sputtering system. The composite target configuration and discharge conditions for co-sputtering were optimized to deposit Nb-Sn films on flat Nb substrates, followed by annealing to form Nb₃Sn. Multiple strategies have been explored to improve the surface homogeneity of the Nb₃Sn coating, including optimizing a two-step annealing process, annealing in Sn vapor, and a light Sn recoating process. A 1.5 μm Nb-Sn co-sputtered film was deposited on the interior of a 2.6 GHz Nb SRF cavity and annealed at 600 °C for 6 h, followed by 950 °C for 1 h. Cryogenic RF testing of the annealed cavity demonstrated a T_c of 17.8 K, confirming the formation of Nb₃Sn. Then, the annealed cavity underwent a light Sn recoating treatment and attained a quality factor (Q_0) of $8.5\text{E}+08$ at 2.0 K.

Please consider my poster for contributed oral presentation

Yes

Would you like to submit this poster in student poster session on Sunday (August 10th)

Yes

Footnotes

Funding Agency

Supported by DOE, Office of Accelerator R&D and Production DE-SC0022284, Office of Nuclear Physics DE-AC05-06OR23177, Early Career Award to G. Ereemeev, Office of High Energy Physics DE-AC02-07CH11359

I have read and accept the Privacy Policy Statement

Yes

Authors: SHAKEL, Md Sharifuzzaman (Old Dominion University); EREMEEV, Grigory (Fermi National Accelerator Laboratory); PUDASAINI, Uttar (Thomas Jefferson National Accelerator Facility); VALENTE-FELICIANO, Anne-Marie (Thomas Jefferson National Accelerator Facility); ELSAYED-ALI, Hani E. (Old Dominion University)

Presenter: SHAKEL, Md Sharifuzzaman (Old Dominion University)

Session Classification: SUP: Sunday Student Poster Session

Track Classification: MC7 –Accelerator Technology and Sustainability