

thinfilms and NEW IDEAS for SRF

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Cryogenic RF performances of Nb₃Sn films on Copper

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Superconducting radio frequency (SRF) cavities, made of niobium films on copper (Nb/Cu), are currently employed for a large variety of particle accelerators. At the same time, the Nb/Cu technology, being very cost effective, also represents one of the main options for upcoming machines like the future circular collider (FCC).

While research and development continue on the Nb/Cu technology, there is still a performance gap with respect to the best results that can be obtained with bulk Nb.

Alternative superconducting materials, with larger critical temperature T_c and superheating field H_{sh} , might pave the way towards higher performance. In this respect, materials in the A15 family, like Nb₃Sn, are among the most promising. At CERN, a reliable coating procedure for Nb₃Sn films on copper, using niobium or tantalum as intermediate layer, has been developed. The films are reproducible and show excellent DC transport properties (T_c up to 17 K), morphological and structural characteristics. A comprehensive RF characterization of these films was still missing though.

In this work, we report the results of a Nb₃Sn film coated on a copper sample, measured in the CERN quadrupole resonator (QPR). The QPR enables the characterization of small samples at different temperatures, RF frequencies and field values.

The main results are compared with those from Nb bulk and Nb/Cu samples, measured with the same technique.

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