

thinfilms and NEW IDEAS for SRF

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Initial results from investigations into the use of NbN thin films sputter coated onto copper for SRF applications.

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Considerable research is currently underway to utilise alternative materials to bulk Nb in SRF cavities. This is with the aim to increase their performance to that required by future accelerators. In this contribution, the results of two investigations into dc magnetron sputtered Nb thin films on Cu substrates are summarized, as well as initial results from research which has been conducted into the use of NbN thin films as an alternative to Nb thin films. This is part of the EASITrain and ARIES programs. The Nb samples were prepared using a high and low value for the deposition temperature, bias voltage and cathode power to observe the effects on the film adhesion. To test the adhesion the films were subjected to scratch tests. In the second part, the deposition parameters remain unchanged to investigate the effects of the substrate preparation method on the properties of Nb thin films. Five different pre-treatments have been investigated: electrochemical polishing (EP), tumbling, EP plus SUBU, and SUBU. The latter have been done at two different institutes, CERN and INFN, the rest at INFN only. Samples were prepared in a Cemecon CC800 commercial coating system. The Initial NbN samples focused on the effects of varying N₂ partial pressure, in an Ar-N₂ gas mixture, on the film thickness, surface roughness and Nitrogen content. Samples have been characterised using, AFM, SEM, EDX, SIMS and XRD measurements.

Summary

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