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Progress with the Deposition of Niobium Nitride Thin Films on Copper

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As part of efforts to improve the performance of SRF cavities, to that prescribed by future operating requirements, alternative materials are currently being investigated. NbN provides interest both as a single layer coating and as part of a multi-layer coating for SRF cavities.

In this contribution, an update is provided regarding results from ongoing investigations into DC magnetron sputtered NbN thin films deposited onto copper substrates. The NbN films were prepared in a large scale commercial coating system following a plan created with a "Design of Experiments" program. A high and low value for the substrate temperature, process pressure, bias voltage, cathode power, nitrogen gas percentage, and the working gas type, using either Argon or Krypton, constitute the parameters of this study. The base pressure of the system prior to deposition was 5×10^{-7} hPa for all coatings.

The resulting films have been characterised using various characterisation methods to determine the effects of the deposition parameters during the film growth process. Adjustment and optimisation of the deposition parameters is ongoing in pursuit of an optimal RF coating. This study forms part of the EASITrain project, which has received funding from the European Union's Horizon 2020 research and innovation programme under grant No 764879.

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