SRF2025 TOKYO

22ND INTERNATIONAL CONFERENCE ON RF SUPERCONDUCTIVITY

September 21-26, 2025

Contribution ID: **58** Contribution code: **TUP19** Type: **Student Poster Presentation**

Development of a 1.3 GHz RF research cavity for use in testing of superconducting thin films

Tuesday 23 September 2025 14:30 (3 hours)

RF testing is a key element in the development of superconducting thin film coated cavities. Initially RF tests are performed for thin film coatings on planar copper disks, before moving to cavities. To further progress in understanding the thin film deposition process, a new RF cavity has been designed, optimized specifically for use in thin film testing. This cavity serves as an intermediary research cavity, bridging the gap between flat samples and accelerating cavities. The cavity is split longitudinally, giving it an open-faced design, that enables a larger variety of deposition processes (including facilities designed for planar samples), as well as facilitating easy access for surface observation, measurement and quality control of the deposited films. Furthermore, it has been designed to minimize the surface electric field to below 13 MV/m at 80 mT. This allows for a multi-step approach to thin film testing, where the first step shows the surface resistance of the cavity from only the change in the magnetic field, while avoiding unwanted additional effects such as field emissions. Once deposition parameters are optimised these can then be applied to traditional cavities. This paper discusses the optimisation of this novel cavity geometry for use in thin film testing, as well as showing the results of testing a range of superconducting thin film materials deposited onto longitudinally split RF cavities.

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Yes

Footnotes

Funding Agency

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Session Classification: Tuesday Poster Session

Track Classification: MC2: Fundamental SRF research and development