Contribution ID: **2277** Contribution code: **WEPA195** Type: **Poster Presentation**

XRR Analysis of Al2O3 coated and mid-T heat treated niobium for future implementation in SIS-based SRF cavities

Wednesday, 10 May 2023 16:30 (2 hours)

Superconducting radio-frequency cavities made out of niobium form the fundamental block of modern particle accelerators. A model proposed by Gurevich [1] suggests the use of a superconductor-insulator-superconductor (SIS) structure to achieve higher accelerating fields and a reduced surface resistance beyond the thermodynamic limits of Nb. As a first step to pursue this approach, a single-cell cavity was coated with a thin Al2O3 film via atomic layer deposition (ALD) to create an insulating layer [2] and baked for 3h at 300℃ (mid-T heat treatment) [3]. In parallel, a mechanically polished two-grain-Nb sample was treated and coated analogically to the cavity. To further understand the RF performance of the coated and annealed cavity, an XRR analysis of the sample was carried out at each processing step to follow the changes in the niobium native oxides at process conditions (120℃) and throughout the chemical deposition and show that the coating technique and the resulting structure form a viable way for a further tailoring of cavity properties.

Funding Agency

This work was supported by the BMBF under the research grants 05K19GUB and 05H2021.

Footnotes

[1] A. Gurevich, Appl. Phys. Lett. 88, 012511 (2006)
[2] M. Wenskat, Supercond. Sci. Technol. (2022)
[3] S. Posen, et al., Phys. Rev. Applied 13, 014024 (2020)

I have read and accept the Privacy Policy Statement

Yes

Primary author: ZAIDMAN, Artem (University of Hamburg)

Co-authors: STIERLE, Andreas (University of Hamburg); DEYU, Getnet (University of Hamburg); STEDER, Lea (Deutsches Elektronen-Synchrotron); WENSKAT, Marc (University of Hamburg); GHANBARI, Rezvan (University of Hamburg); BLICK, Robert (University of Hamburg); ZIEROLD, Robert (University of Hamburg); KELLER, Thomas (Deutsches Elektronen-Synchrotron); VONK, Vedran (DESY Nanolab); HILLERT, Wolfgang (University of Hamburg)

Presenter: ZAIDMAN, Artem (University of Hamburg)

Session Classification: Wednesday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T07: Superconducting RF