



Contribution ID: 1369 Contribution code: WEPS46

Type: **Poster Presentation**

Buffered chemical polishing process of 3.9 GHz cavities for SHINE

Wednesday, 22 May 2024 16:00 (2 hours)

The linear acceleration part of the SHINE project consists of two 3rd harmonic cryogenic modules which are operating at 3.9 GHz. Each of the cryomodules consists of eight 3.9 GHz 9-cell superconducting cavities. The SHINE specifications of the 3.9 GHz cavities are $Q_0 > 2.0 \times 10^9 @ 13.1$ MV/m and maximum accelerating gradient > 15 MV/m. The 3.9 GHz cavities were treated with buffered chemical polishing (BCP) baseline combined with 2-step low-temperature baking surface treatment process to meet the specifications. In order to achieve the required performance, the BCP process had been optimized at the SHINE Wuxi surface treatment platform, especially the acid ratio. Vertical tests of all 3.9 GHz bare cavities treated with the optimized BCP process showed Q_0 up to $3.0 \times 10^9 @ 13.1$ MV/m and maximum accelerating gradient over 20 MV/m. The optimized BCP process applied to the 3.9 GHz cavities and related vertical test results were presented in this paper.

Footnotes

Funding Agency

Paper preparation format

Region represented

Asia

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Session Classification: Wednesday Poster Session

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

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