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Improvement of performance for Nb/Cu hydroformed full-seamless cavity

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In order to reduce the cost of superconducting cavities, research has been actively conducted in recent years to realize inexpensive cavities by making the cavity body out of copper and coating the inside with niobium to induce superconductivity. The inner surface of the accelerating cavity must be smooth, and a seamless cavity is ideal as a base for the coating. We came up with the idea of manufacturing a seamless cavity from a single copper pipe, and succeeded in prototyping it by hydroforming. At CERN, a niobium coating with a film thickness of about 5 μm was applied by magnetron sputtering. Electric field performance tests were conducted at KEK, and the accelerating gradient reached 12 MV/m at 4 K and 16 MV/m at 1.85 K. We are currently working on further improvements to improve performance. After hydroforming, the inner surface of the cell becomes rough. We report our efforts to improve the roughness by polishing and to design a new mold to improve the accuracy of the cell shape, and the results of hydroforming.

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Yes

Footnotes

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Author: YAMANAKA, Masashi (High Energy Accelerator Research Organization)

Co-authors: ROSAZ, Guillaume (European Organization for Nuclear Research); ARAKI, Hayato (High Energy Accelerator Research Organization)

Presenter: YAMANAKA, Masashi (High Energy Accelerator Research Organization)

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