Contribution ID: **14** Type: **Oral presentation using Zoom**

Development of hydrofluoric acid-free EP treatment of Nb cavities at KEK

Thursday 28 October 2021 14:00 (30 minutes)

The ILC project will require ˜8000 9-cell Nb cavities. In the fabrication process of Nb cavities, electrolytic polishing (EP) treatment is essential for the high SRF performance of the cavities. However, the electrolyte is a mixture of hydrofluoric acid and concentrated sulfuric acid, and its toxicity to the human body and environment is extremely high. HF-EP facilities become more complex to ensure chemical safety and prevent environmental leaks, and the workers are required to have advanced chemical knowledge and work experience. For that reason, EP-related expenses in the ILC project account for a very large proportion.
The HF-EP treatment of the Nb cavity in KEK was started in 2008, and a large amount of EP effluent containing fluoride has been treated. Meanwhile, we have been developing the bipolar EP (BP-EP) method in collaboration with Nomura Plating and Marui Plating. However, the BP-EP method is not energy efficient and requires a very high power programmed power supply to process a 9-cell Nb cavity. Also, since a relatively high concentration of sulfuric acid solution is used as the electrolyte, the cost reduction is limited.
Recently, the application of the plasma-EP (PEP) method, in which metal surfaces are polished by high-voltage plasma discharge, to Nb surfaces has been promising. The PEP method is chemically safe because it uses an inorganic salt aqueous solution as the electrolyte, and the polishing rate is tens of times faster than that of HF-EP. Also, the PEP method is suitable for local polishing of Nb cavities, which enables the polishing process of Ti-jacketed Nb cavities. That is expected to greatly reduce the cost of the ILC project. Now, KEK starts to establish the PEP method for Nb cavities, and some experimental concepts will be introduced in this presentation.

1st preferred time slot for your oral presentation

13:00-15:00 JST (6:00-8:00 CEST, 0:00-2:00 EDT, 21:00-23:00 PDT)

2nd preferred time slot for your oral presentation

15:30-17:30 JST (8:30-10:30 CEST, 2:30-4:30 EDT, 23:30-1:30 PDT)

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Session Classification: W-1: Green ILC

Track Classification: Parallel sessions: Sustainability: Session W: Green ILC