

6 - 6 Nb/Cu SRF Cavity R&D Activity at IMP

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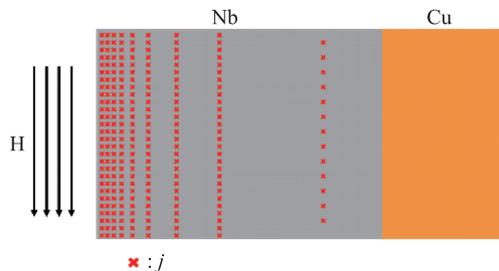


Fig. 1 (color online) Schematics diagram shows the screen effect of a single layer of Nb on the Cu cavity.

SRF cavities are operated at Meissner state, which allows the electro-magnetic wave only interacts with the very surface of the cavity. The penetration depth of Nb at 4.2 is ~ 100 nm, which means more than 99% of the expensive SRF grade Nb used on the SRF cavity is not involved in the interaction with the E-M wave. Fig. 1 shows the schematics diagram of the interaction between magnetic field and a Nb coated Cu cavity. With a Nb film thicker than 3λ , the copper hide behind wouldn't be able to see the E-M wave nor generate RF dissipation.

Two dummy QWR cavities and three elliptical cavities are prepared for cavities coating. The design model and real QWR cavity are shown in Fig. 2(a) and 2(b). A 7-step successive mechanical polishing was applied on the copper cavity. After the final mechanical polishing, the whole inner surface of the cavity is mirror shiny (Fig. 2(d)). The electro-polishing setup for the whole cavity is being prepared.

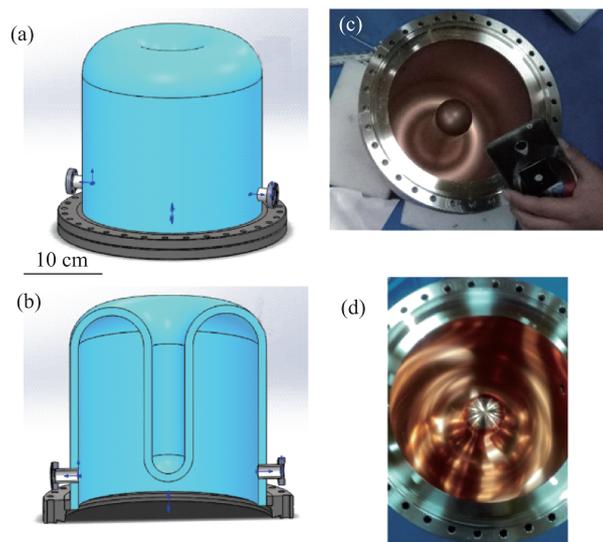


Fig. 2 (color online) Dummy cavity preparation and polishing. (a) 3D model of the dummy QWR cavity. (b) The cut-out view which shows the inner structure of the cavity. (c) A rough surface after the 2nd mechanical polishing step. (d) A mirror shining surface after the final mechanical polishing step.

The whole cavity coating will be done at the Northwestern Institute of Non-ferrous Metal Research. The whole cavity test will be done by the end of this year.