

International Workshop on Breakdown Science and High Gradient Technology (HG2021)

Contribution ID: 65

Type: **not specified**

Welded Cavities

Tuesday, 20 April 2021 08:00 (30 minutes)

High-gradient linacs are sought for various applications, from high-energy physics, industry and medicine, and require novel accelerating structures which are compact, robust and cost-effective. Due to the superior performance of accelerating cavities made of hard copper alloys, we have investigated two cost-effective welding processes, Electron Beam Welding and Tungsten Inert Gas welding, in order to preserve the hardness of the metal. We present the design, fabrication and high-power tests of two braze-free X-band cavities. This study is the result of a continuous, decade-long collaboration involving the SLAC, INFN-LNF and KEK. The high-power tests demonstrated accelerating gradients beyond 100 MV/m at a breakdown rate of 10-3/pulse/meter using a shaped pulse with a 150 ns flat part. This is an important step to validate our approach of structure construction and building practical multi-cell structures made of hard copper alloys. We will also present the design and fabrication of a welded X-Band accelerating structures made of two halves.

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Session Classification: Session 3