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Abstract

Abstract

During the HWR vertical tests, the 2K performance of some cavities did not satisfy the requirement although the 4K performance looked promising. We increased temperature for the low temperature baking to cure cavities. Quality factor vs. Eacc with field emission are presented by analysis of the baking effect on the HWR cavity.

Low Temperature Heat Treatment Setup

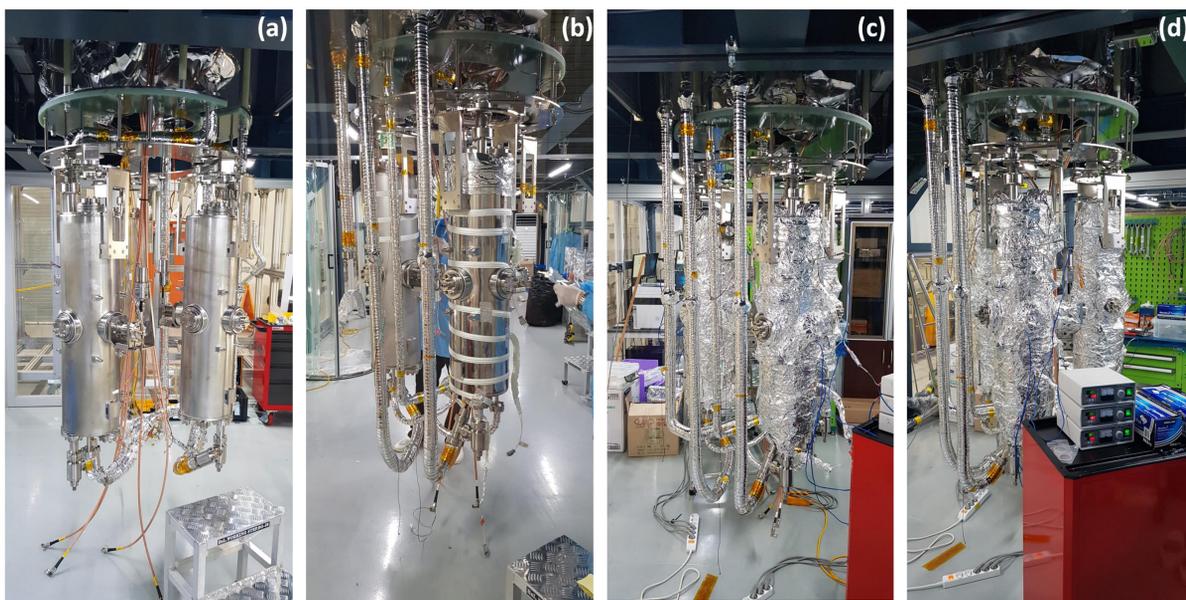


Table 1. Typical Surface Treatment for HWR Cavity

Surface Treatment	Values
BCP	HF: HNO ₃ : H ₃ PO ₄ =1:1:2
High Pressure Rinsing	Water Pressure: 100 ~ 150 bar
High T. Heat Treatment	650°C, 10 hrs
Low T. Heat Treatment	Target Temperature, 120°C

Fig.1 Low temperature heat treatment setup.

- (a) Three HWR cavities are assembled to a top lid before being inserted to vertical pit,
 (b) cavities are covered with heating wires,
 (c) cavities are covered with insulation films
 (d) heater is set as target temperature: 150°C/180°C

Q Vs. Eacc, / 1st, 2nd, 3rd test / Setting baking temperature 150°C vs 180°C

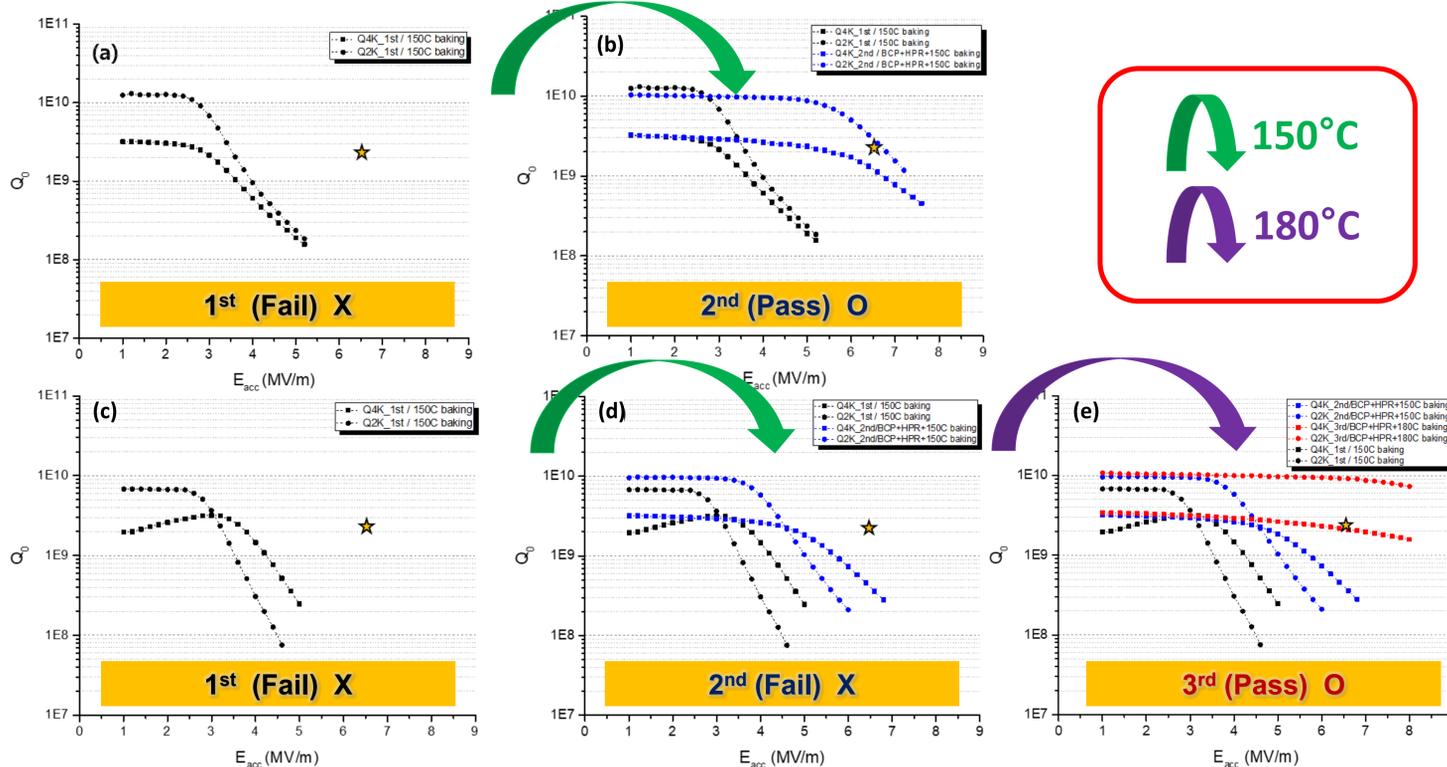


Fig. 2 Vertical test results from 150°C setting and 180°C setting of the heat controller.

(a), (b), (f) from the No. 22 HWR cavity

(c), (d), (e), (g) from the No. 38 HWR cavity

The circle and the square represent Q from 2K and 4K, respectively.

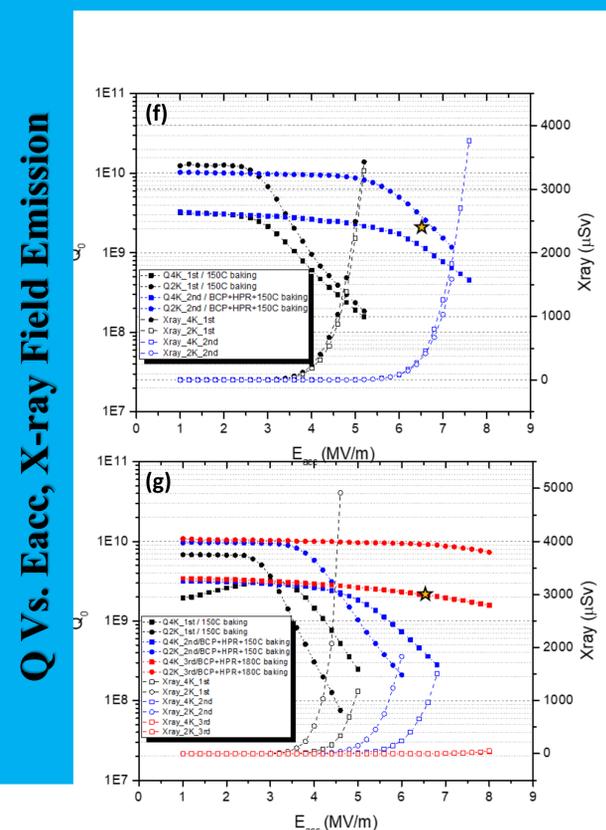
The open circle and the open square represent the field emission from 2K and 4K, respectively.

Black lines, blue lines and red lines represent the 1st, 2nd and 3rd results.

The yellow star is the requirement of the cavity as 2.3×10^9 at 6.6 MV/m of Eacc.

All cavities have been experienced same additional surface treatment, for example, light BCP, HPR and 150°C of temperature setting except the cavity of (e) was baked with the setting temperature 180°C of the heat controller.

Q Vs. Eacc, X-ray Field Emission



Summary

- More than 50% of HWR cavities have been tested since last August, 2020.
- In some cavities, 2K performance of the cavities did not pass the test in spite of promising 4K results.
- Setting temperature of a heat controller was increased from 150°C to 180°C to cure the 2K performance.
- With increased setting temperature, 2K performance including 4K performance improved dramatically.
- The intensity of X-ray field emission and the X-ray turn improved with the increased setting temperature.

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