



## Recent result of ERL injector 2-cell cavities.

K. Watanabe (KEK) and STF cavity group.  
21<sup>st</sup> ILC cavity group meeting, 16/March/2010



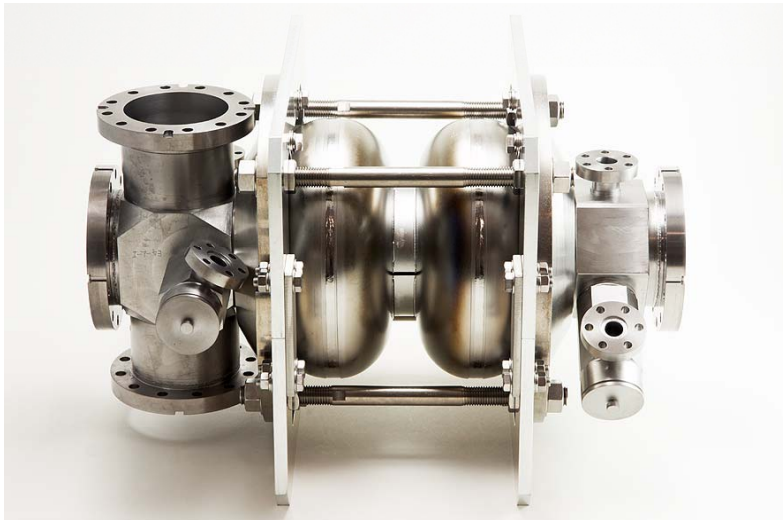
Proto-type model (fabrication at 2008)

ERL injector 2-cell cavity **#1** (KEK, made by MHI)

**Four HOM coupler** equipped beam pipe for strong damping.  
(Two antenna type and two loop type HOM couplers)

1<sup>st</sup> V.T. with HOM pickup probe was done at April 2009.  
(See TTC meeting in Orsay, June 2009)

2<sup>nd</sup> V.T. without HOM pickup probe was done at February 2010.



Proto-type model (fabrication at 2009)

ERL injector 2-cell cavity **#2** (KEK, made by MHI)

**Five loop-type HOM coupler** equipped beam pipe to obtain more strong damping.

1<sup>st</sup> V.T. without HOM pickup probe was done March 2010.

2<sup>nd</sup> V.T. with HOM pickup probe will be done April 2010.



Two step test for both cavities: (1) Without HOM pickup probe, (2) With HOM pickup probe.

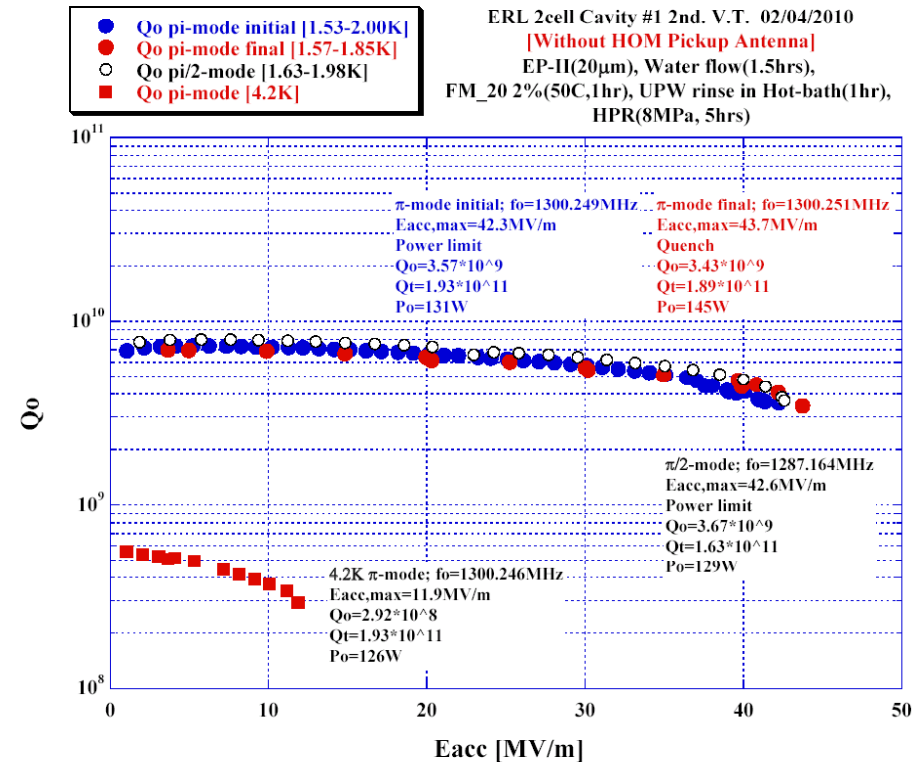
To estimate the cavity performance (EBW) and the HOM coupler performance (RF design).



Surface treatment: 28 Jan 2010  
 EP-2 : 20um, low current density (40 mA/cm<sup>2</sup>)  
 with Air condition  
 1<sup>st</sup> water rinsing with Air condition. 90 min  
 FM-20 rinsing (2%), 50 degC 1 hour  
 Hot bath with UPW, 50 degC, 1 hour  
 HPR : Total time 9 hour  
 Baking : 100 degC, 48 hour

Rres =38 nΩ. (Measured)

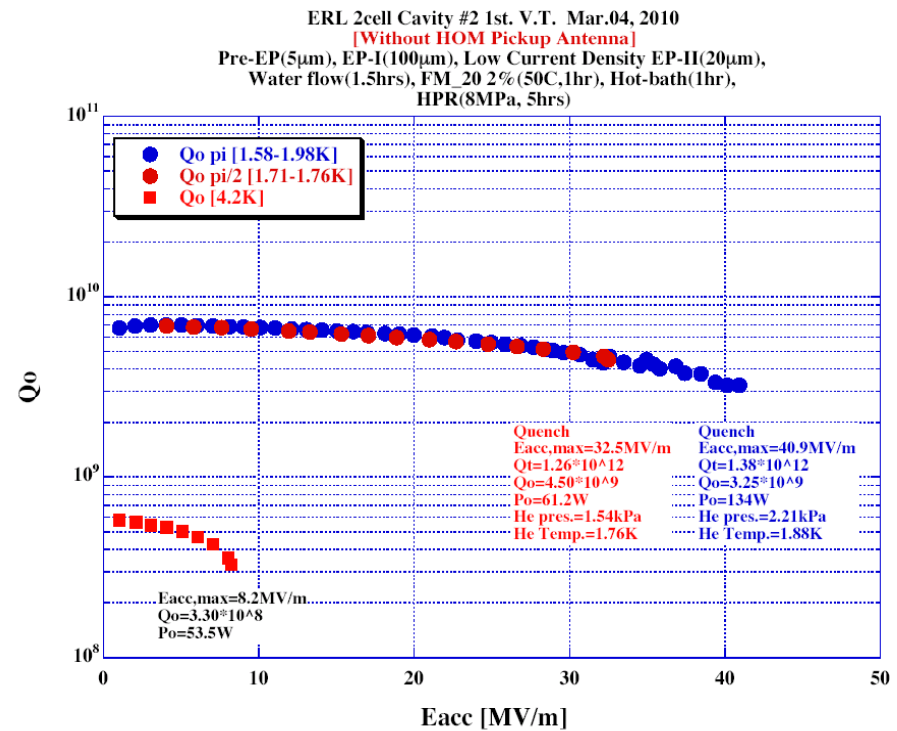
SUS flange loss = 23 nΩ.  
(Calculated by HFSS)



- The reason of limitation was a heating of one loop-type HOM coupler at maximum field.
- No quench at cells.



Surface treatment: 22 Feb 2010  
 EP-2 : 20um, low current density (30 mA/cm<sup>2</sup>)  
 with N2 gas flow  
 1<sup>st</sup> water rinsing with N2 gas flow. 90 min  
  
 FM-20 rinsing (2%), 50 degC 1 hour  
 Hot bath with UPW, 50 degC, 1 hour  
 HPR : Total time 9 hour  
 Baking : 100 degC, 48 hour



R<sub>res</sub> =40 nΩ. (Measured)

SUS flange loss = 23 nΩ.  
 (Calculated by HFSS)

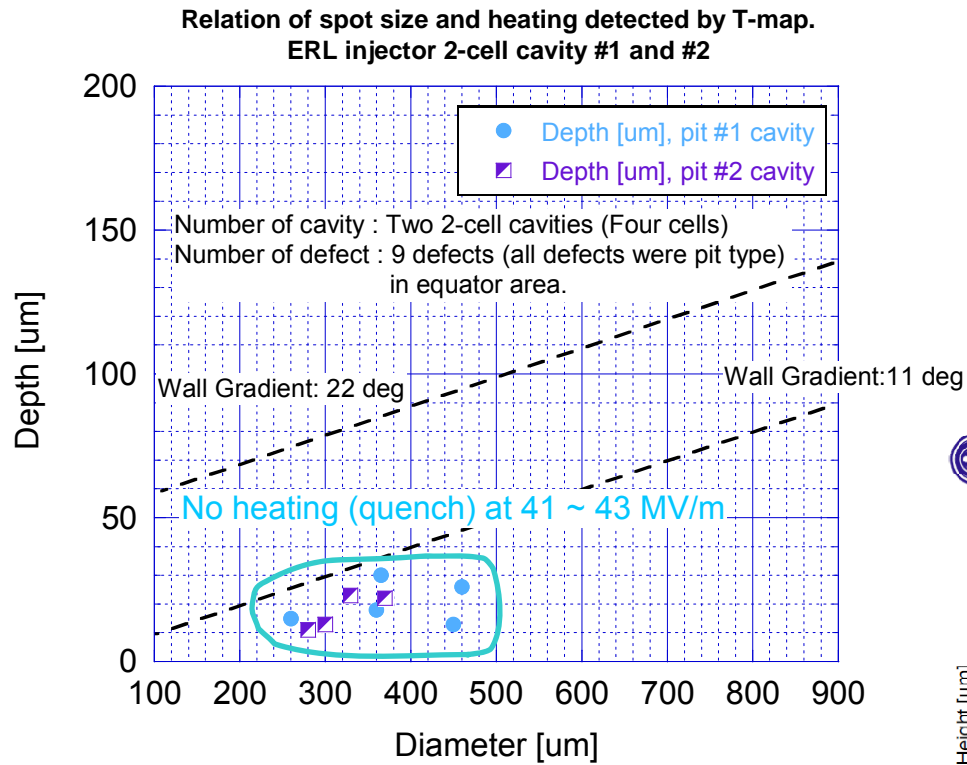
- The reason of limitation was a heating of one loop-type HOM coupler at maximum field.
- No quench at cells.



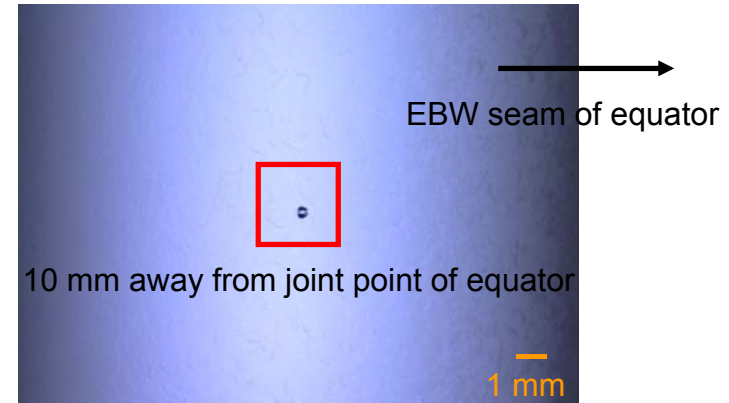
# Correlation of Geometrical spot size and hating (Rough estimation)



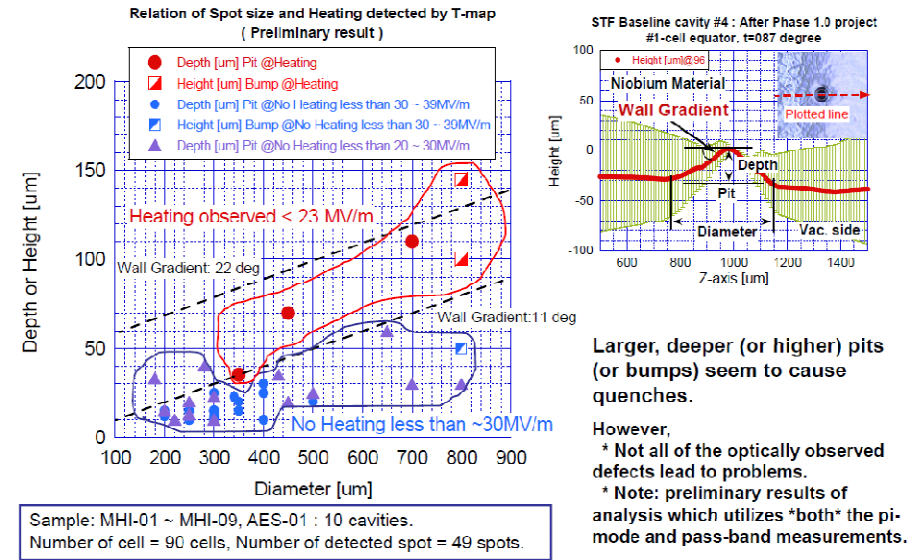
Example : #2 cavity, 1-cell equator, outside weld area, t=076deg.



The information of geometrical spot size and field was updated.



## Correlation of spot size and heating (Rough estimation)





- Two ERL injector 2-cell cavities were achieved  $E_{acc} = 43.7$  MV/m (#1) and  $E_{acc} = 40.9$  MV/m (#2) without HOM pickup probe.
- \* The reason of limitation of both cavities was a heating of one loop-type HOM coupler at maximum field.
- The information of geometrical spot size and amount of field was updated.
- We tried to make the low current density EP for two 2-cell cavities. The results were very successful.



# Inspection of #1 cavity after vertical test.

