

# **Low-loss/ICHIRO cavity progress**

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**KEK**

**ALCPG09 Albuquerque**

# Activities of ICHIRO cavity at KEK

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**ICHIRO shape**

← **high gradient**

+

**Fine grain + EP  
or  
Large grain +CP**

← **Standard recipe**

← **Cost reduction**

+

**single cell  
&  
9-cell**

← **Pilot study**

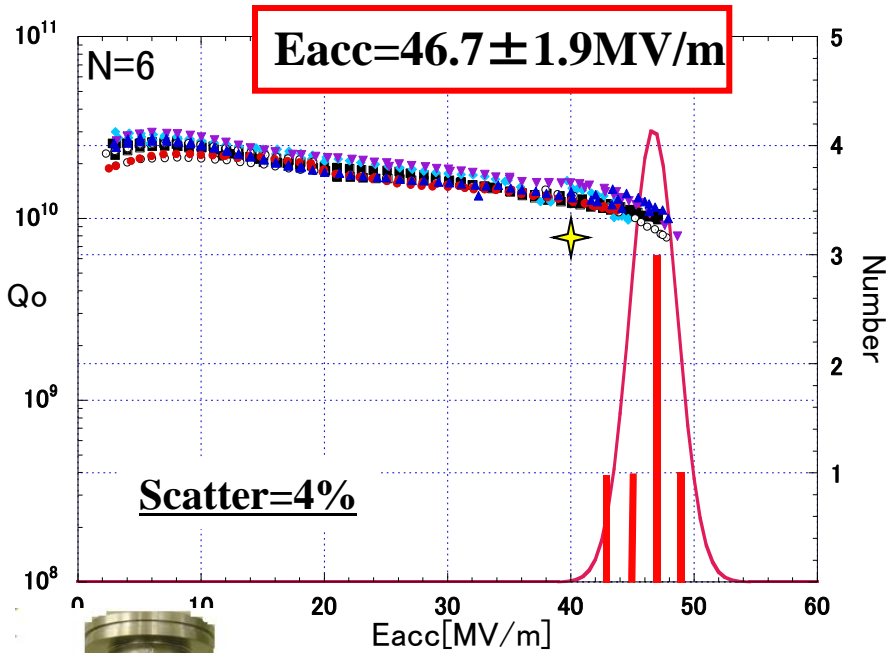
← **Real ILC**



**Final target is High gradient, high yield and low cost.**

# Fine grain + EP, Single cell (1)

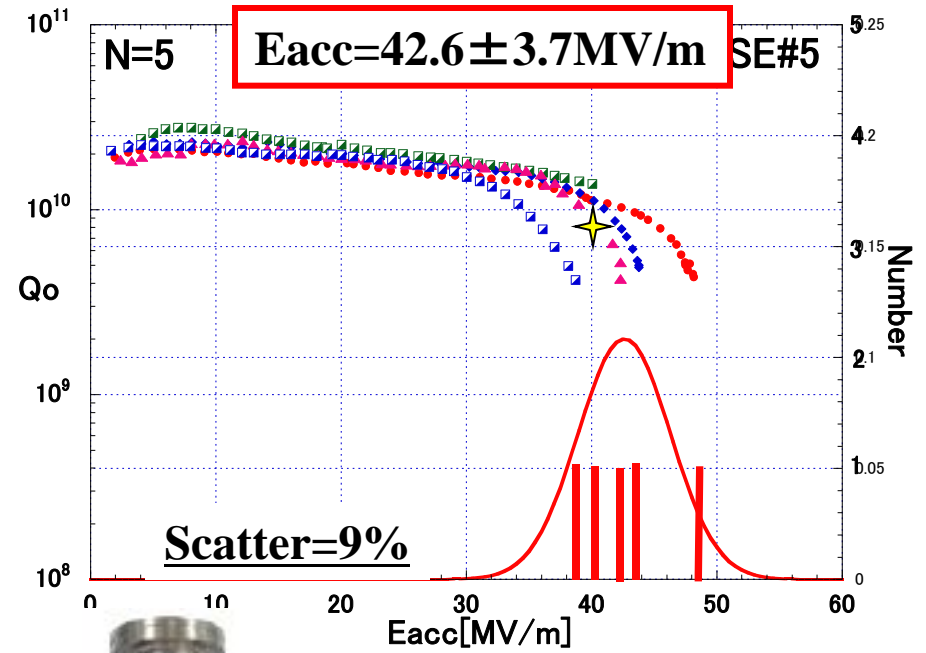
## Centre cell single



**+EP(20 $\mu\text{m}$ )+flash EP(3 $\mu\text{m}$ )  
+HPR  
+Bake**

*Applied to 6-cavities*

## End cell single



**+EP(20 $\mu\text{m}$ )+flash EP(3 $\mu\text{m}$ )  
+Ethanol rinsing  
+Wiping  
+HPR  
+Bake**

*Repeated 5times with 1-cavity*

# Fine grain + EP, Single cell (2)

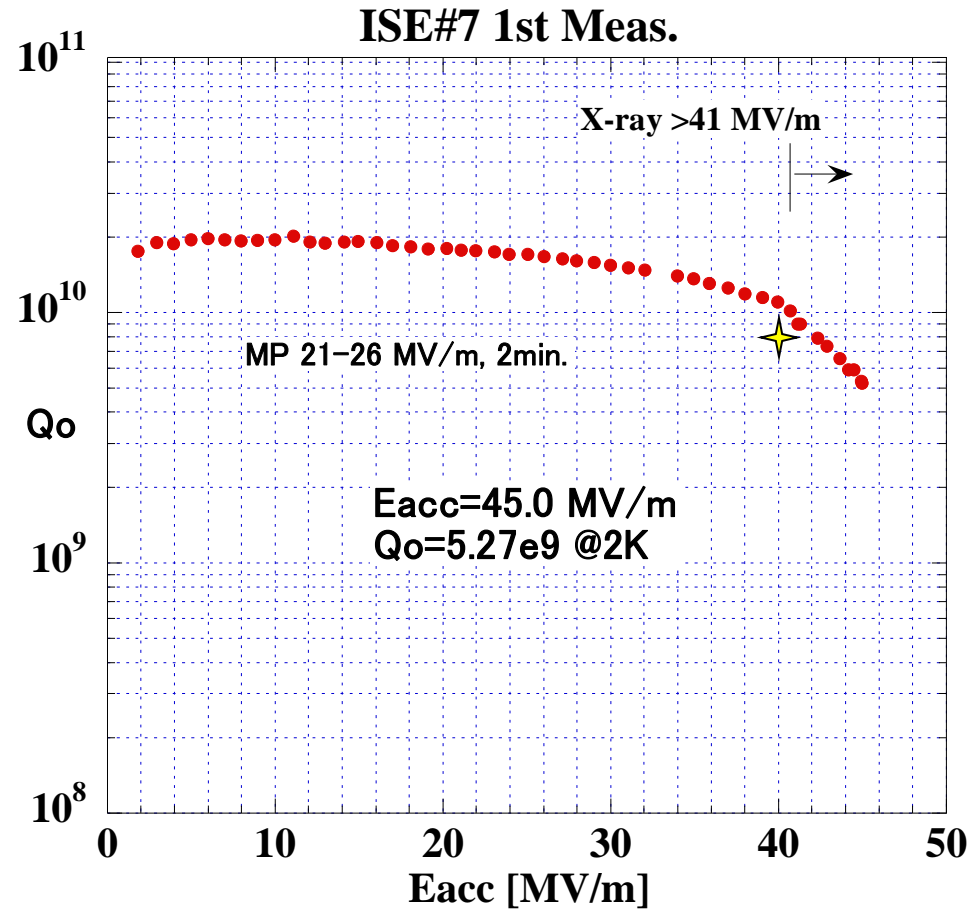
## Current best recipe + bland new cavity



**bland new ISE#7**

### Current best recipe

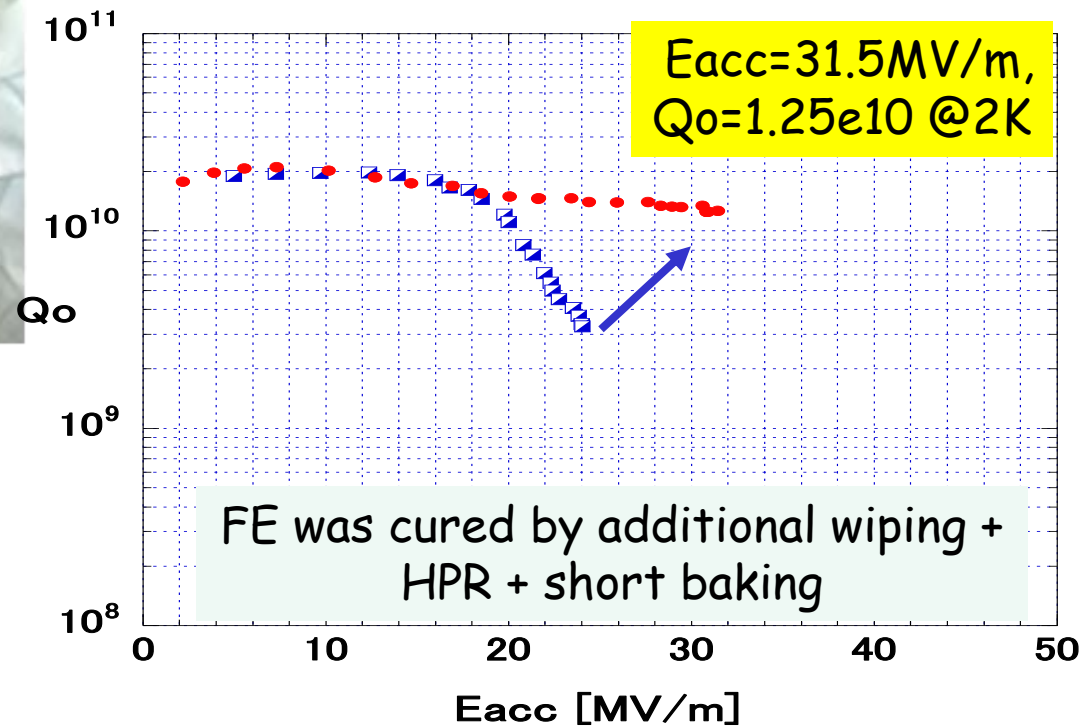
CBP(100 $\mu$ m)+CP(10 $\mu$ m)+AN(750C\*3hrs)+EP(80 $\mu$ m)+EP(20 $\mu$ m)+flash EP(3 $\mu$ m)  
+Ethanol rinsing +Wiping +HPR (15min.\*2times)+Baking(120C\*48hrs)



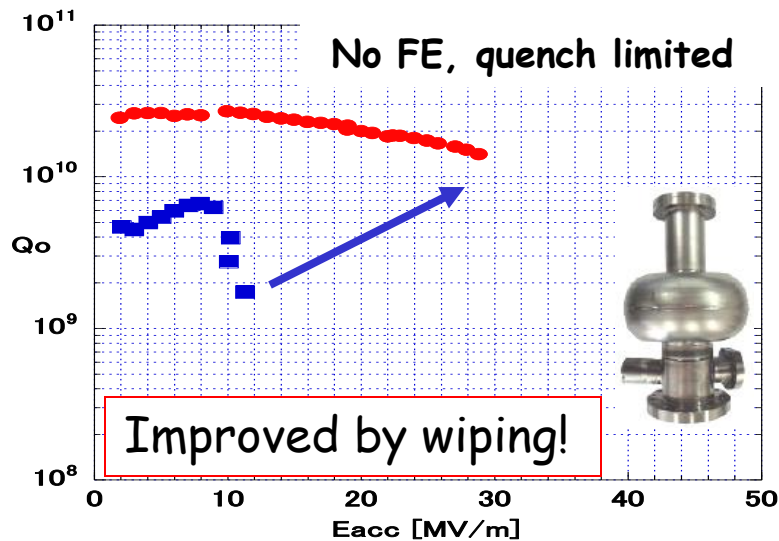
# Pilot study of Wiping with degreaser



## Wiping effect on 9-cell (I9#5)



## Wiping effect on single

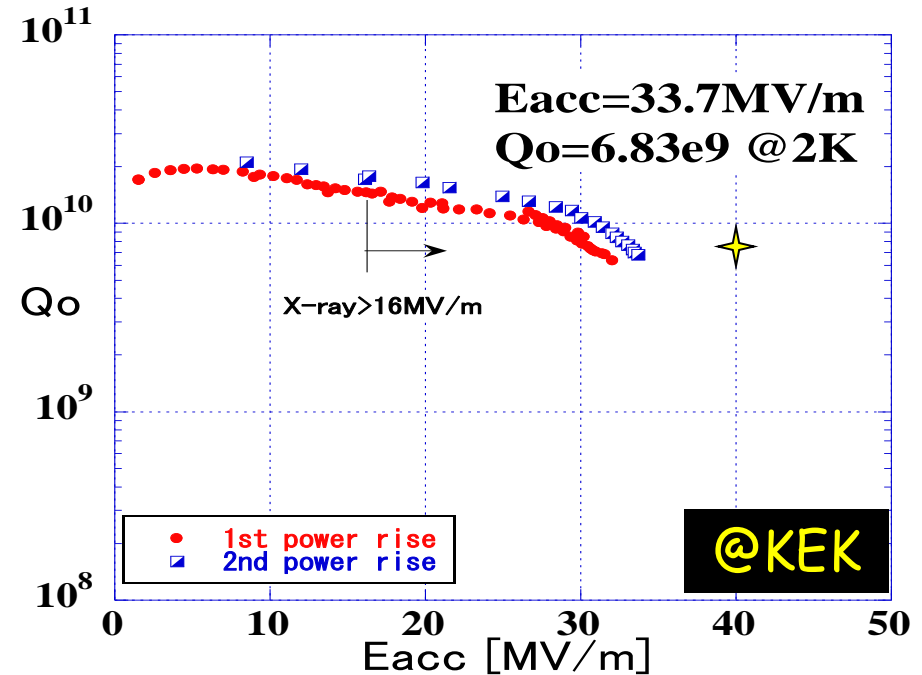
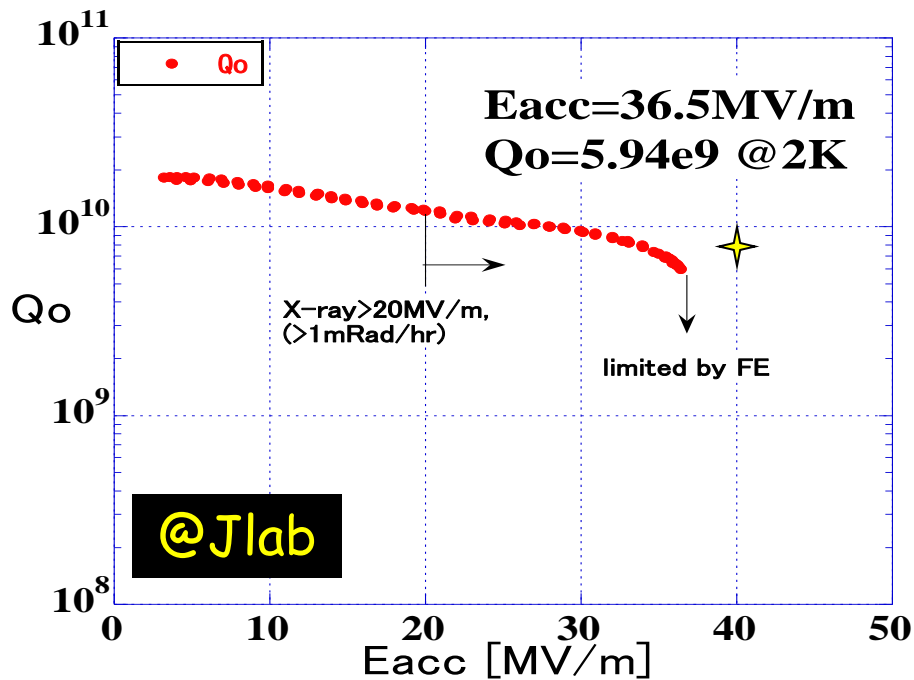


# Fine grain + EP, 9-cell



No end groups

**ICHIRO 9cell-#5**



Current best results of ICHIRO 9-cell (bare cavity)

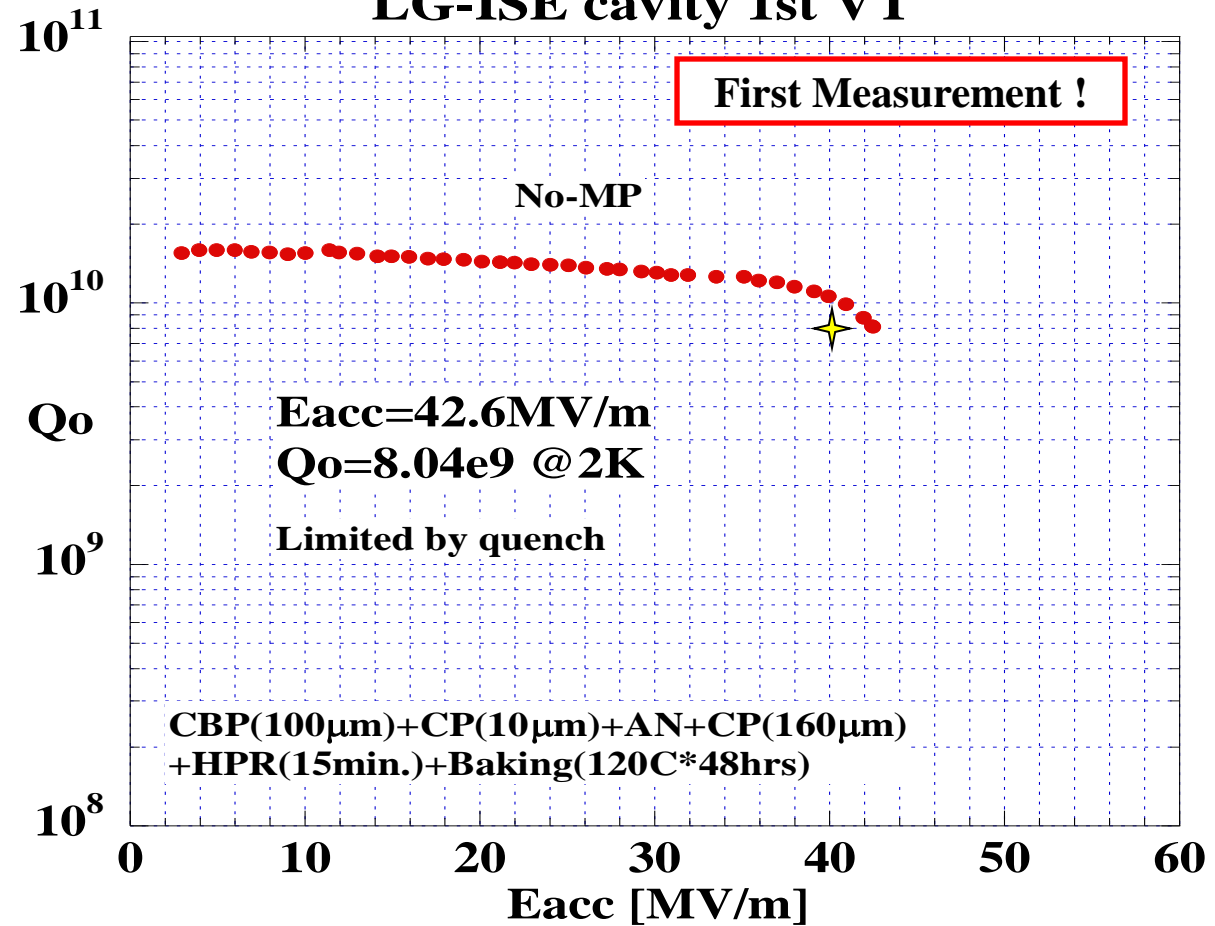
# Large grain + CP, Single cell made of sliced LG Nb

## CP+ bland new cavity

### LG-ISE cavity 1st VT



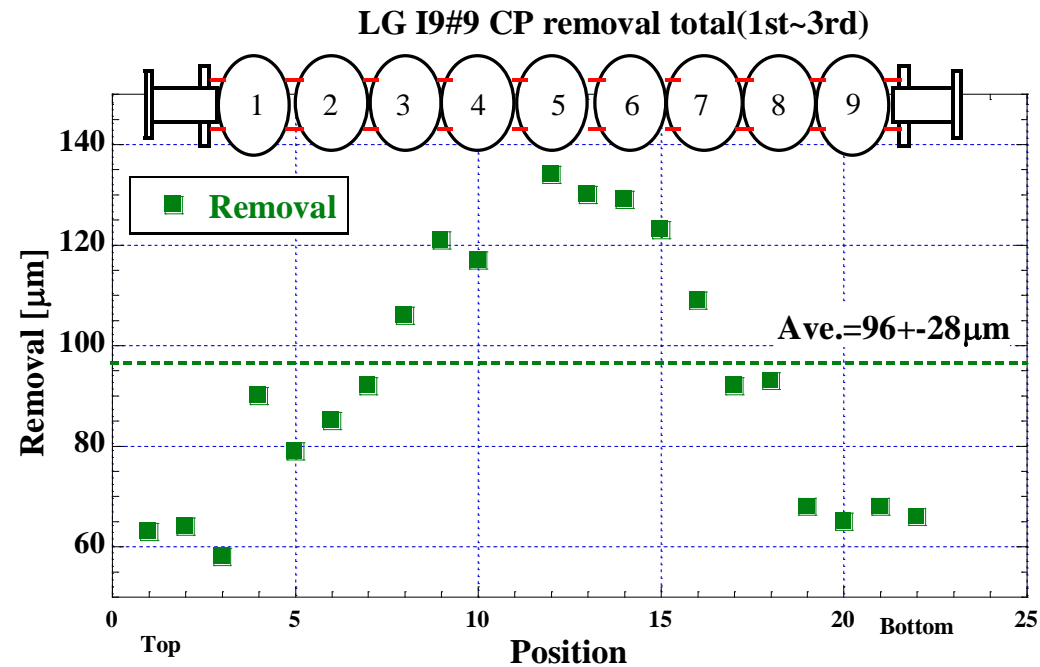
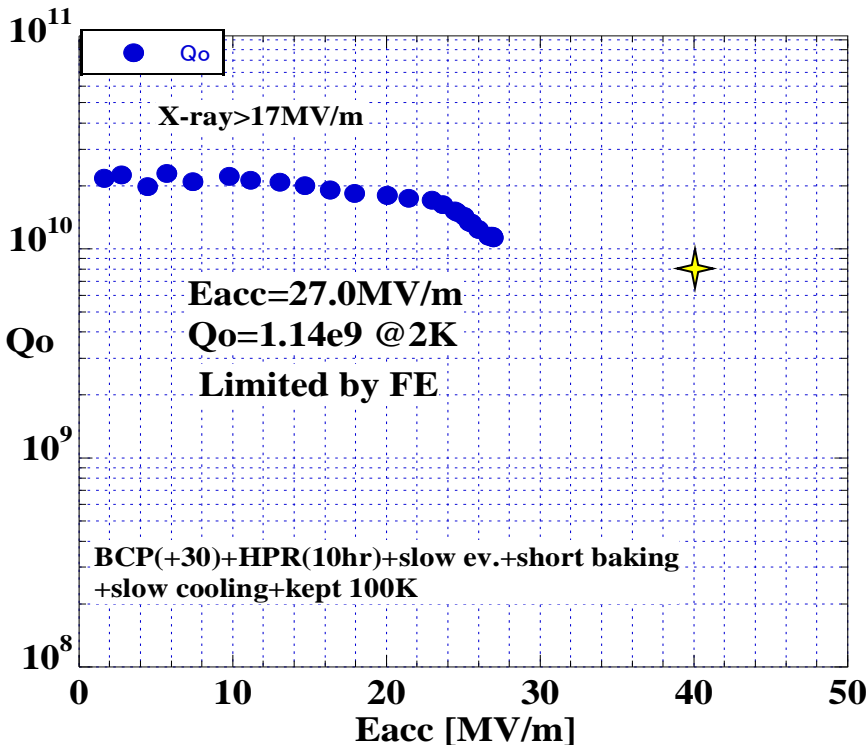
**bland new  
LG-ISE**



## Recipe

CBP(80 $\mu\text{m}$ )+CP(10 $\mu\text{m}$ )+AN(750C\*3hrs)+CP(160 $\mu\text{m}$ )  
+HPR(15min.)+Baking(120C\*48hrs)

# Large grain + CP, 9-cell made of sliced LG Nb



Totally 96 μm (in average) removed by BCP

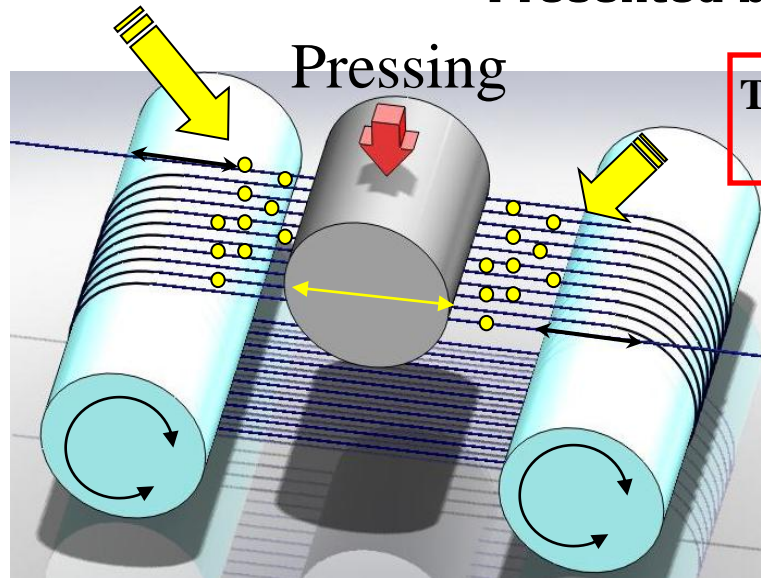
Material removal distribution by the current BCP

**KEK is developing a horizontal BCP system.**



# Pilot study of Multi-Wire Slicing @KEK/Tokyo Denkai

Presented by K. Saito at SRF2009



This is established technology on silicon wafer slicing.

Slicing used very thin piano wire ( $0.16\Phi$ ) and liquid abrasive

102 sheets(2.8t)



Tokyo Denkai will install this machine by the end of this year and start slicing soon.

# Summary

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The following recipe is best on single cell cavities includes end groups.

CBP +CP +AN +EP +Flash EP +Ethanol rinsing +Wiping +HPR +Baking

Q-slope problem  $>40\text{MV/m}$  has become clear for end groups.

Bare ICHIRO 9cell cavity has achieved  $36\text{MV/m}$  by EP so far.

Tight loop test of rinsing for I9#5 is on going,  
just repeat rinsing + VT, no EP.

We have succeeded to slice 102 Nb sheets within 50hrs.

From these sliced Nb sheets, we will fabricate three 9-cell cavities.

Both of bare and full 9-cell are planed.

We have demonstrated  $42\text{MV/m}$  with sliced LG-Nb + ICHIRO single +CP  
at first trial.

The combination of ICHIRO shape + sliced LG Nb +CP has capability to  
reduce the cost of cavity production .