**Abstract**

KEK and Jlab have continued SO-study collaboration on ICHIRO 9-cell cavities since 2008. In 2010, we have started SO tight loop test on ICHIRO full 9-cell cavity. ICHIRO#7. 7 vertical tests included 3 EP process were done on ICHIRO#7 at Jlab so far.

**Brief History of LL/ICHIRO R&D at KEK**

2004 1st ILC workshop at KEK on Nov. 2004. We have started as WGS for ILC ACD HG cavity R&D (ICHIRO cavity, CC coupler, ball screw tuner).

2005 Proof of 50MV/m w/ single cell cavities, (LL, ICHIRO, RE)

2006 29.3MV/m w/ first ICHIRO 9-cell (bare cavity).

2007 Establishment of HG recipe for single, 47±2MV/m w/ 6/15 cavities.

2008 Jlab/KEK SO-study on ICHIRO#5 (bare cavity) 36.5MV/m @ JLAB, 33.4MV/m @KEK .

STF 0.5: High power test for one cavity package, BL, ICHIRO both succeeded operate at ~20MV/m.

Reorganized WGS, FTE was reduced (Saito and Furuta).

Concentration on ichiro HG cavity. R&D budget is ~1% of KEK ILC budget.


Nomura EP facility shut down in summer.

STF 1 started w/ BL cavity shape.

Re-start Nomura single EP/9-cell BCP facility in winter.

2010 Jlab/KEK SO-study on ICHIRO#7 (full cavity)

2011 Jlab/KEK SO-study on ICHIRO#8 (full cavity) will start

**Re-start ICHIRO#7 SO Study from 2010 Nov. ~**

*After VT4, features on an end-group and flatness degradation were found.

(1) Defects were found on an end group.

- #polish by Scotch Brite by Furuta.

(2) After 3rd EP + VT, Flatness was degraded to 86%.

Cavity was turned again up to 96% by Furuta

After 3rd EP+VT, 86%

Re-tuning, 96%.

*ICHIRO#7 was EP'ed (20um) again and tested.

Results of VT5, after EP 3rd, Nov. 24th 2010

*Achieved 36MV/m , but high radiation.

Re-HPR was applied to reduce radiation.

(1) Additional HPR for end groups & full cavity.

(2) put isolation valve.

(3) short bake for degassing.

**ICHIRO#7 Installation to JLab and Commissioning, 2010 June ~ Aug.**

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**ICHIRO#7 High Gradient Result at JLab**

Results of VT6, after re-HPR, Dec. 14th 2010

*ICHIRO#7 achieved ILC-ACD spec of Eacc=40MV/m w/ Qo=8.0e9 at 2K.

*pass-band analysis consistent with p-mode results.

OST analysis at VT7, Jan. 15th 2011

*OST predicted quench location at cell#8, a feature was found, but seems not critical.

*Data cross-checking were done and confirmed.

*>45MV/m seems to be possible by next EP

**Discussion**

1. What is the source of high radiation? MOF?

> R&D on going with MOF single at KEK.

> Cu gasket, air-flow assy, Cu/SUS flange, etc.

2. What we need for 45~50MV/m?

> Understand and eliminate high radiation source.

> Variable coupler, Effective post EP cleaning, etc.

**SUMMARY**

1. ICHIRO#7 has achieved Eacc=40MV/m, Qo=8.0e9 at Jlab, satisfied ILC-ACD.

2. Reduction of radiation and Post EP cleaning are key for 50MV/m w/ ICHIRO.

3. R&D on MOF single is on going at KEK, results will feedback to ICHIRO#7.

4. >45MV/m seems to be possible by additional EP process.

5. SO-study on ICHIRO#8(full cavity), already sent to Jlab, will start soon.

Thanks to Jlab and colleagues for ICHIRO SO collaboration!!