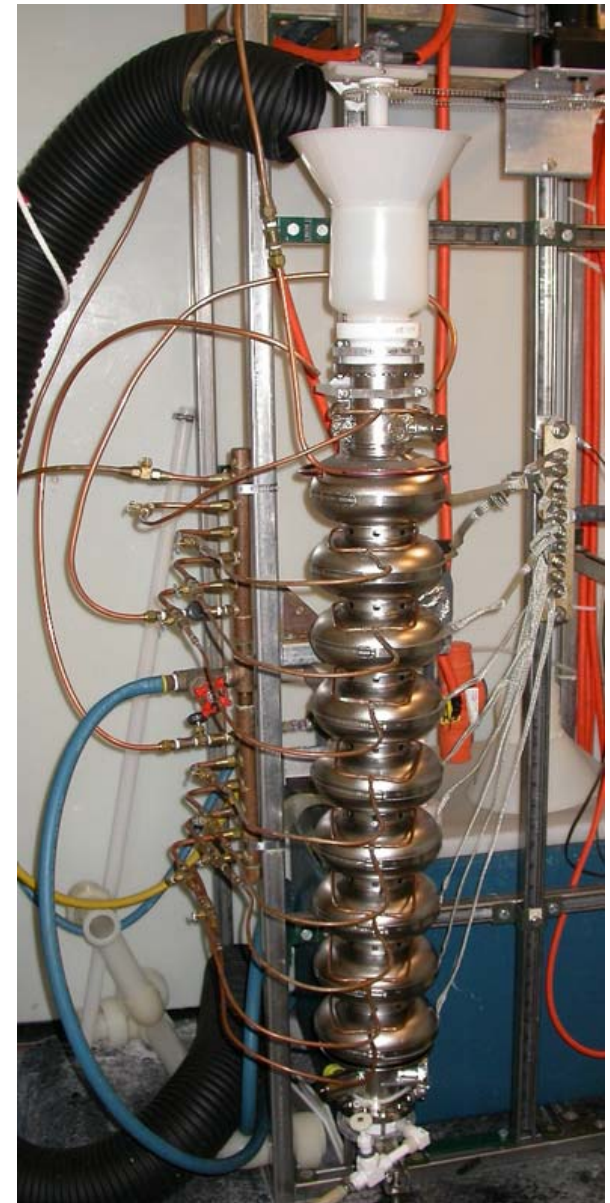


# Vertical Electropolishing Set-up

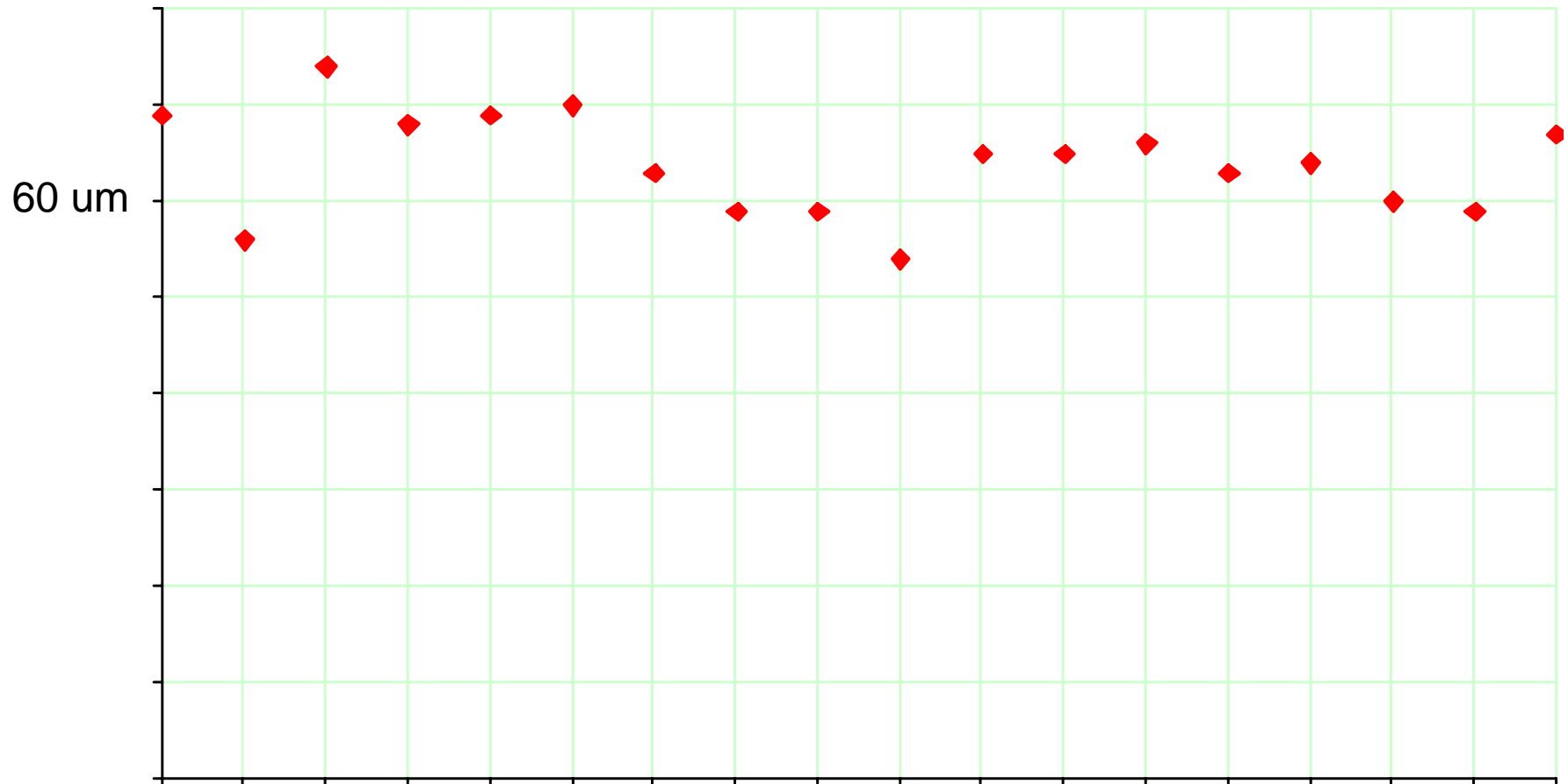
- Mission: show it gives flat Q vs E to E > 35 MV/m
- Possible benefits
- Simpler
  - No large acid barrel, no plumbing, valves, no acid heat exchanger...
- Less expensive to reproduce many systems
- Possible disadvantage
  - more exposure to H
  - 600 - 800 C, H degassing required



# VEP (2)

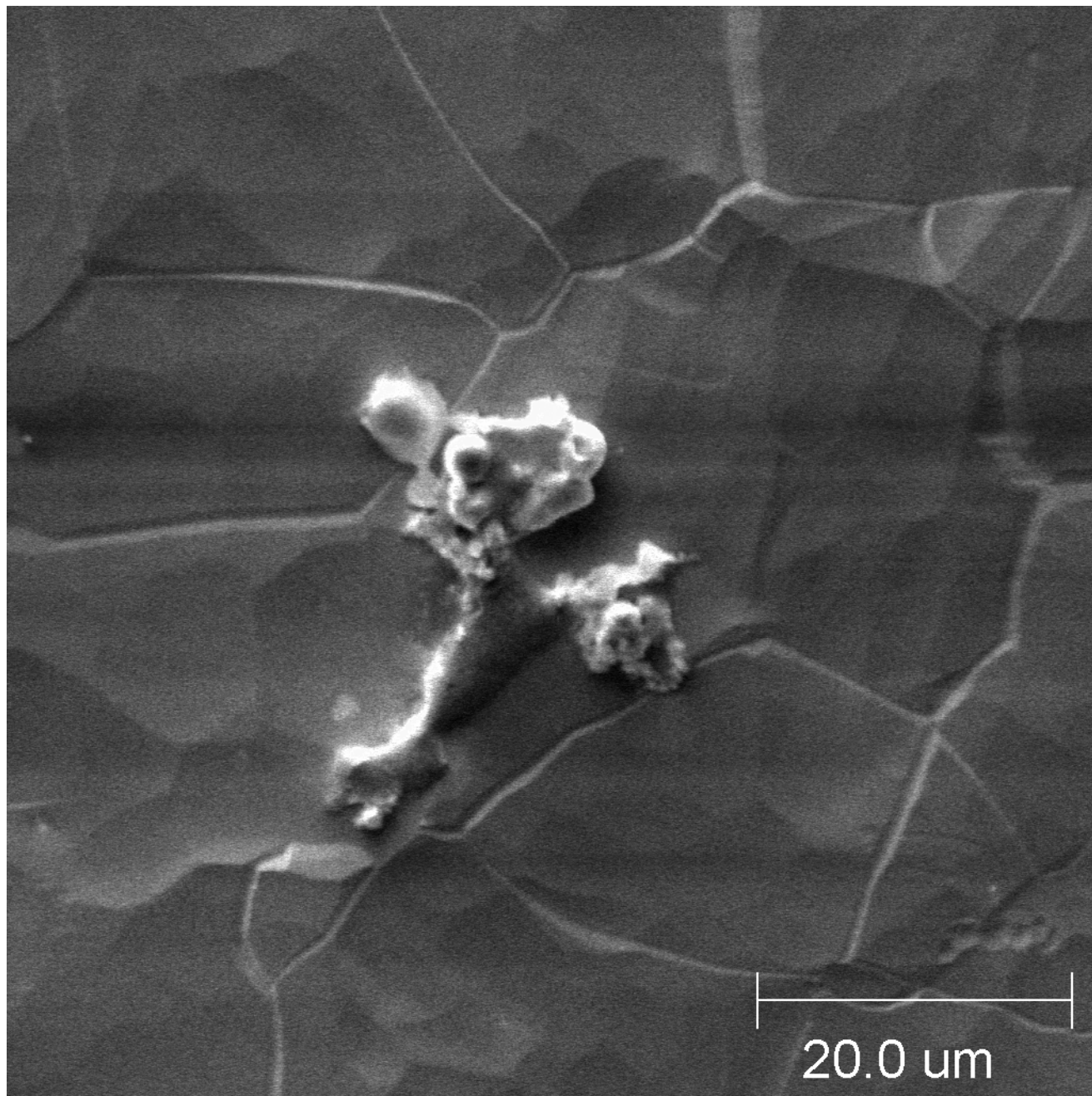
- The ACCEL-5 (loaner) is electropolished 60 um in one orientation, and 60 um in the flipped orientation
- Material removal is roughly uniform per cell
- Latest experience: adjust temperature of top vs bottom to get more uniform removal

# Material Removal

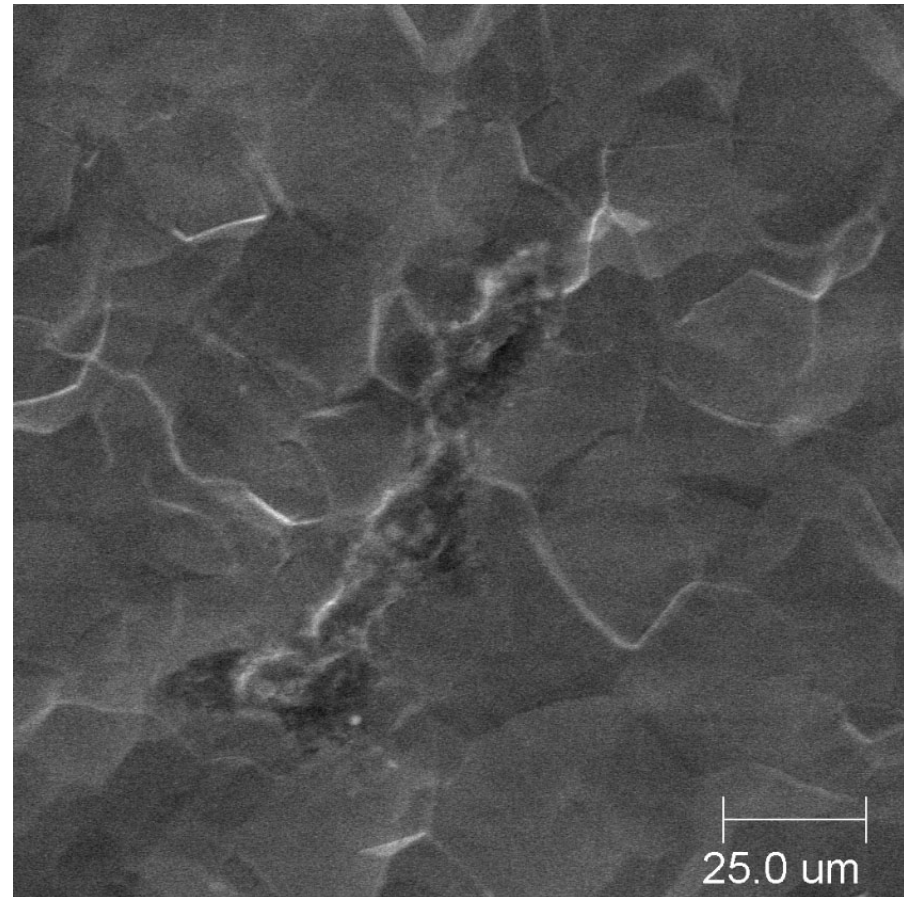
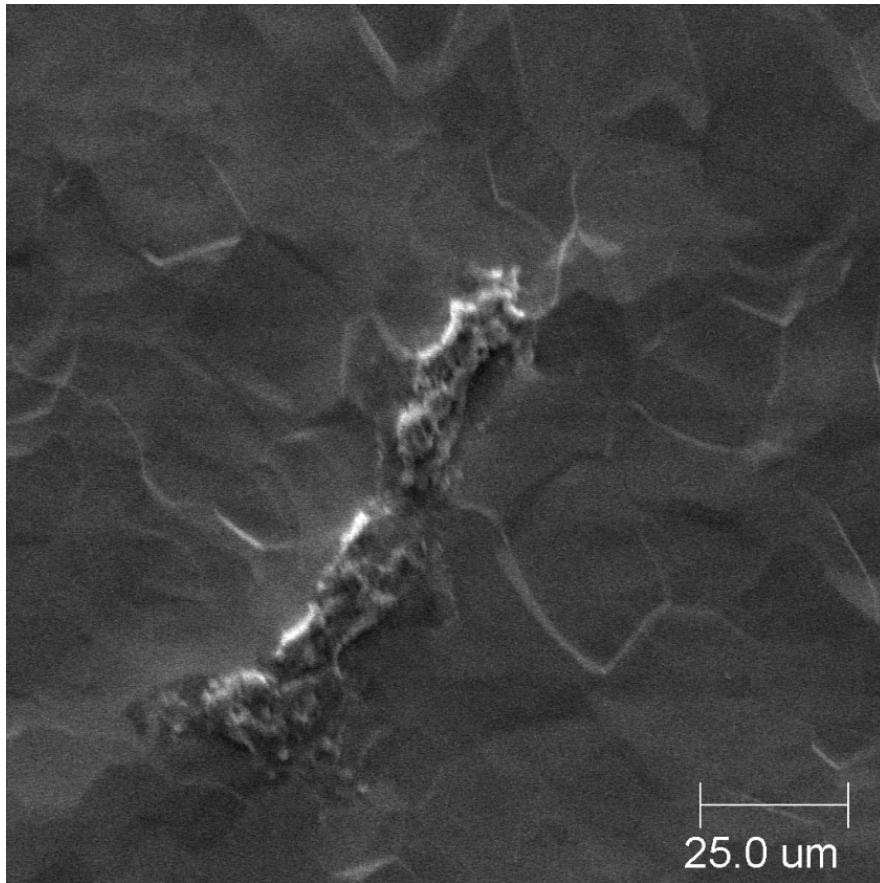


# VEP(3)

- In the first orientation, the acid was not changed. So we exceeded the g/L allowed for Nb.
- We collected a lot of pure S particles on a Nb sample placed in the foam catcher at the top as well as on the top cavity cell. See following picture.
- We could gather several mg of S in a vial !
- In the second orientation we only did 30 um and changed acid, and found no visible quantity of S.



# S-Particle Before and After Ethanol Rinse



Particle dissolves but residue remains

# Parameters for EP

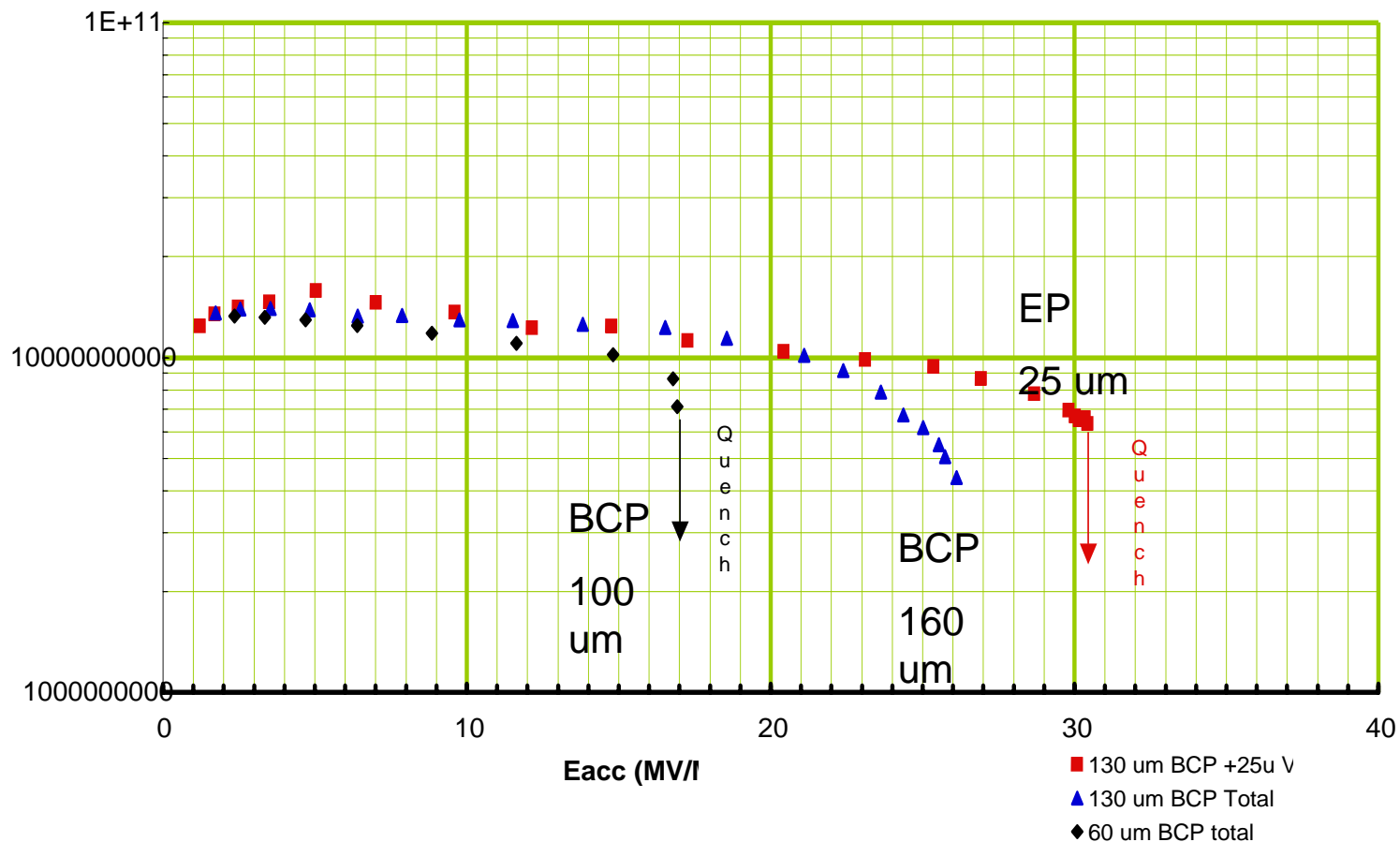
- $V = 14.5$  Volts
- $I = 400$  to  $450$  Amps
- $T = 32$  to  $40$  degrees.
- Temp is increased to maintain
- $j = 50$  milliamperes/cm<sup>2</sup> as electrolyte grows tired.

# Vertical EP Moves Forward ACCEL- 8 Test Results

CornellSRF

ACCEL\_8 15feb

MaxRadiation=1 mRad/Hr  
Onset of Radiation = 30 MV/r  
Cavity Temperature = 2 Degr





# ACCEL 8 Treatment Details

- BCP 110  $\mu\text{m}$  (+ 50  $\mu\text{m}$  on parts at ACCEL) + HPR
- No Heat treatment at 800 Deg C
- **$E_{\text{acc}} = 26 \text{ MV/m}$**  (Limit : high field Q-slope)
- Vertical EP, 25 microns, ultrasound degreasing, HPR, bake 110 C, 48 hours
- **$E_{\text{acc}} = 30 \text{ MV/m}$** 
  - No field emission
  - Limit: quench
- Vertical EP: 70 microns
  - Sent to Jlab for H outgassing

# ACCEL- 5 Treatments

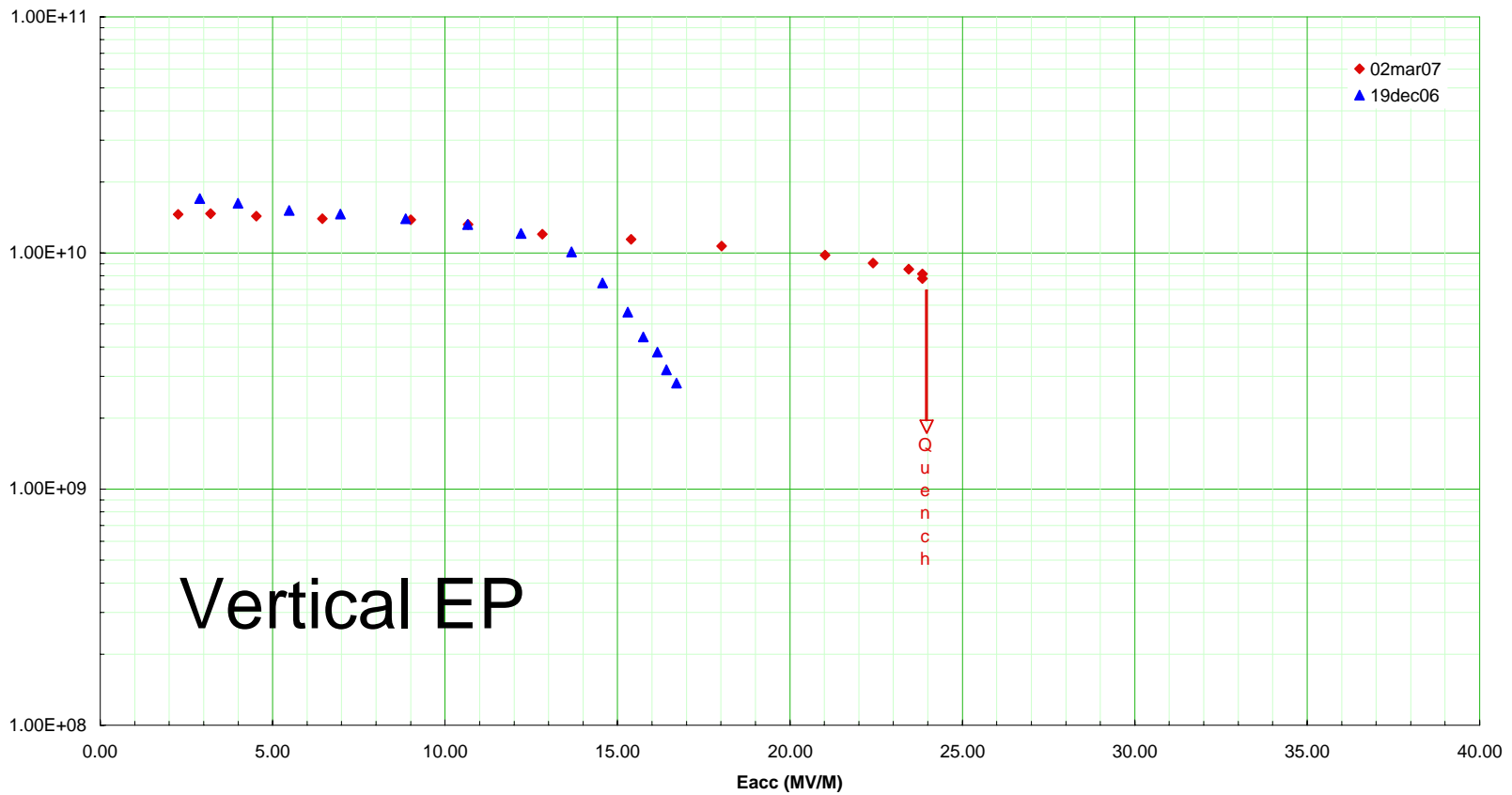
- Vertical EP : 120 micron
- 600 C, 12 hour bake at Jlab to remove H
- Flash BCP (< 10 microns) + HPR & test
- $E_{acc} = 17 \text{ MV/m (max)}$ 
  - No field emission
- Need more material removal after furnace bake
- Vertical EP, 25 microns, ultrasound degreasing, HPR
- $E_{acc} = 24 \text{ MV/m}$ , Flat Q vs E, Quench
- Remove another 105 microns, sent to Fermilab for H outgassing

# Vertical EP - ACCEL-5

Cornell **SRF**

ACCEL5\_02mar07

All Data Taken at 2.0 Degrees



# Conclusions

- Ultrasound degreasing works against FE
- Vertical EP reaches 25, 30 MV/m
- More ep on the way