

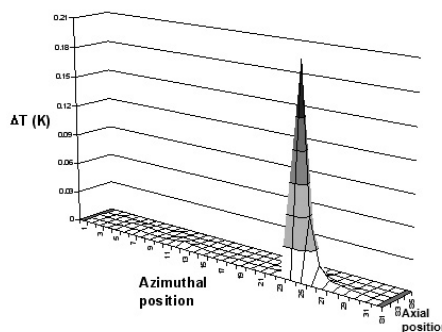
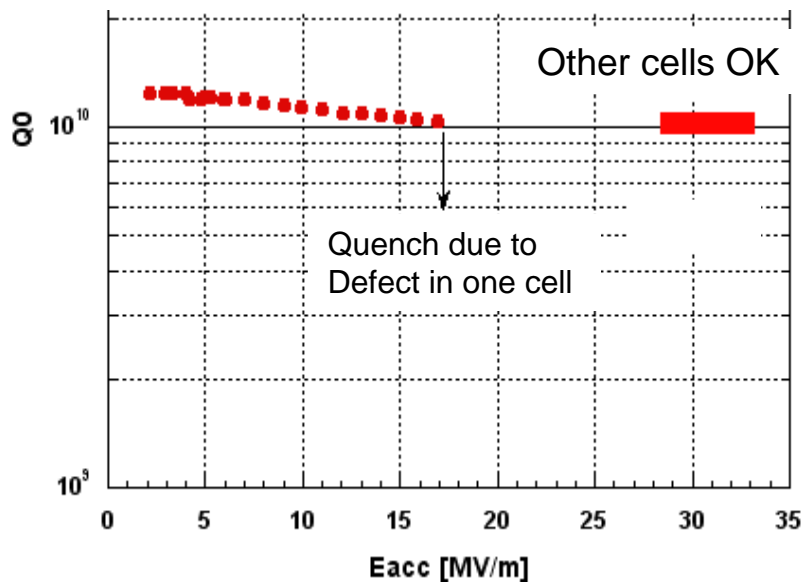
**Artificial Pit  
Its Reaction to BCP and EP  
and  
Its Removal by E-beam Re-melting**

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KEK

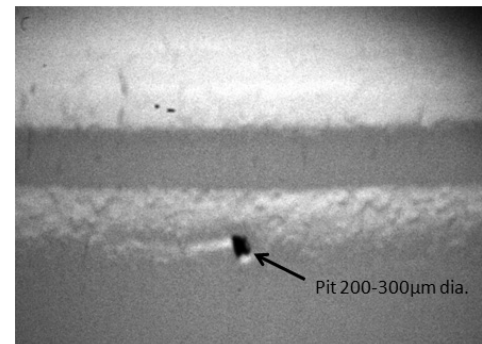
TTC Meeting, New Delhi, India, October 20-23, 2008

# Pit and Its Relevance to Quench



(a)

T-mapping



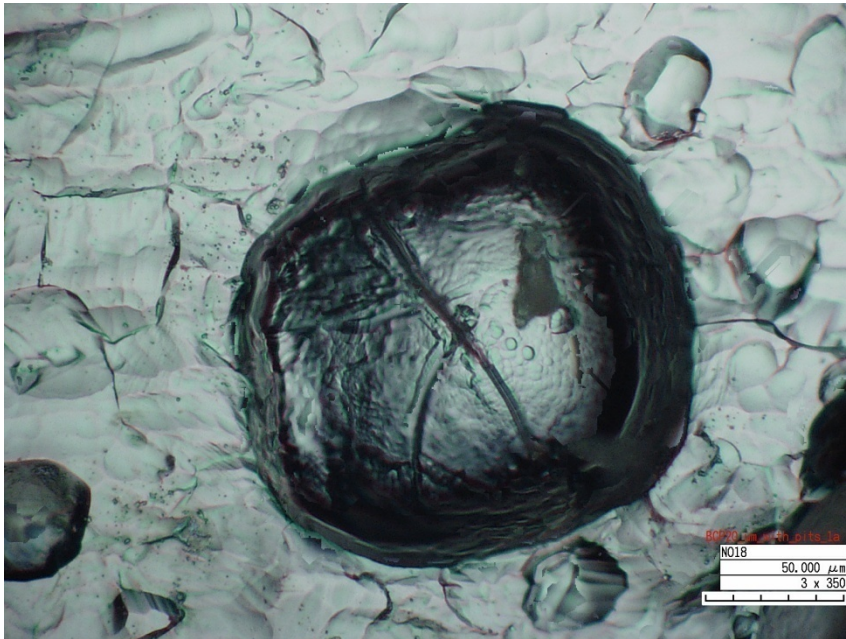
(b)

LDM inspection

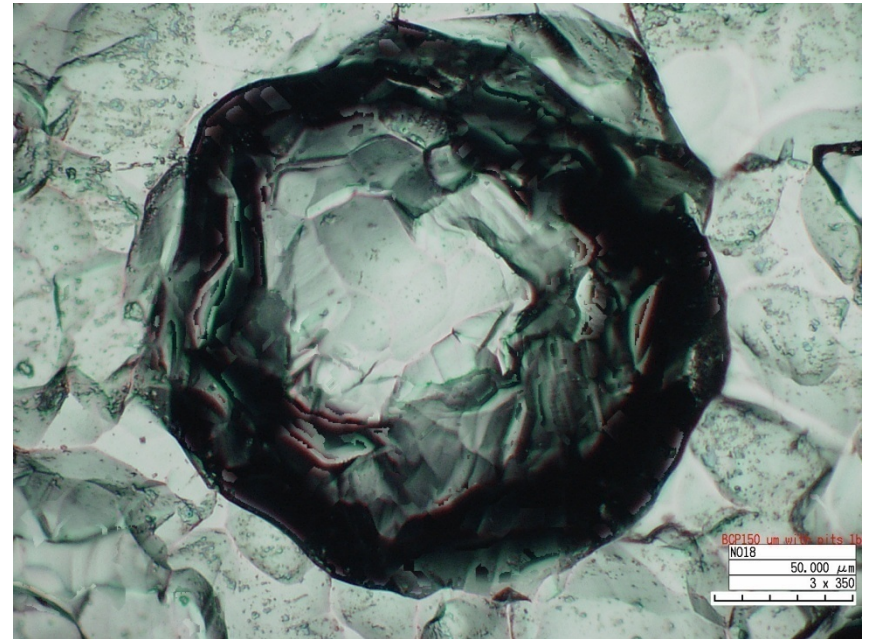
- A pit (200-300  $\mu\text{m}$  in dia.  $\sim$  50  $\mu\text{m}$  in depth) correlated to quench at 17 MV/m in A15.
- **One pit limits whole cavity** – as other cells 28-33 MV/m.
- Pit/bump (sub-mm sized) correlated to quench  $<20$  MV/m in AES1 by FNAL/KEK/Kyoto collaboration [Champion et al., ASC08]
- Another fact: AES1 quench limit insensitive to repeated EP, same responsible cell pair.

# BCP Effect on Pit

A pit becomes a bigger pit after more BCP



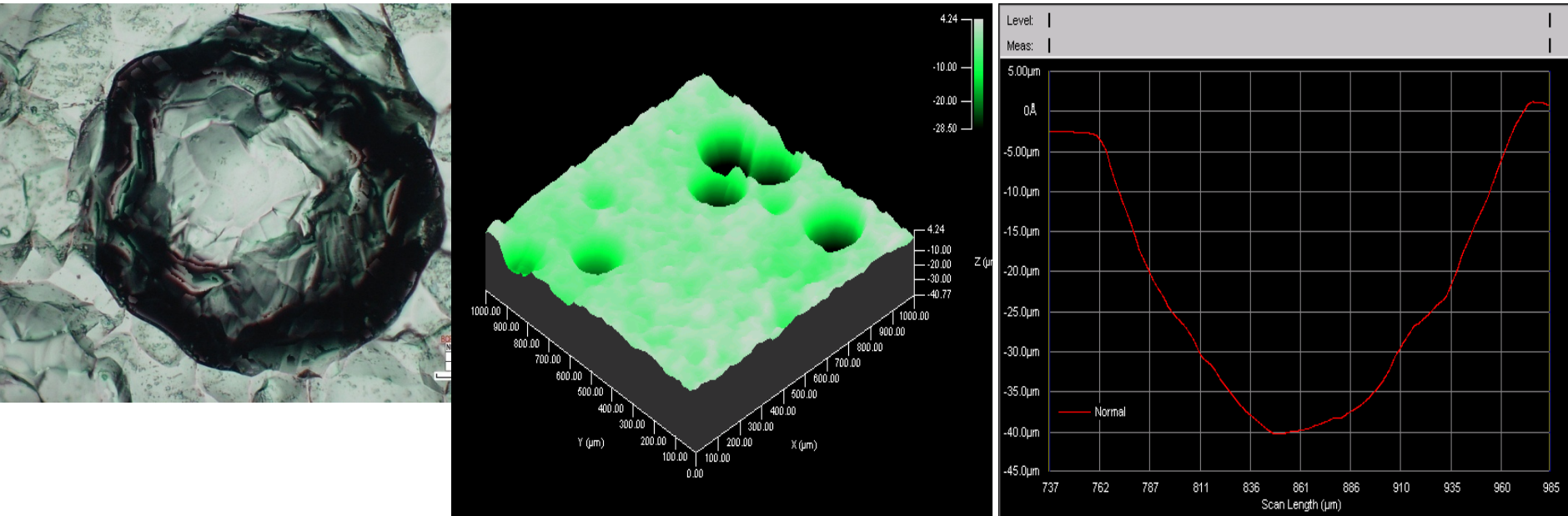
BCP 20 μm



BCP 150 μm

# BCP Effect on Pit

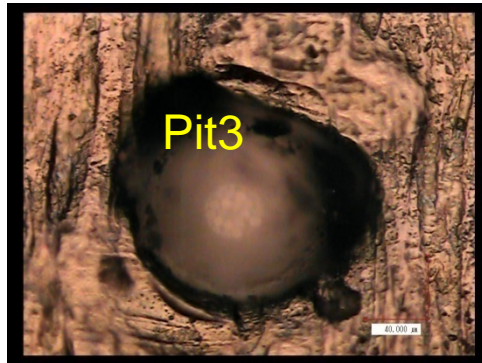
After BCP 150  $\mu\text{m}$



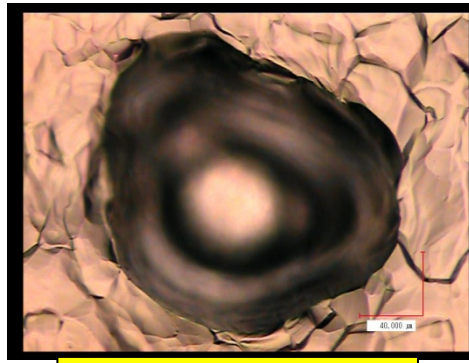
Slope angle  $26^{\circ}$ - $47^{\circ}$



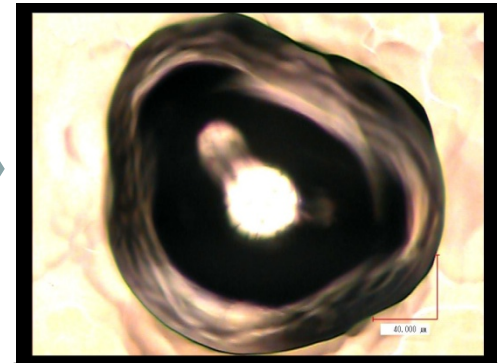
# EP Effect on Pit (KEK)



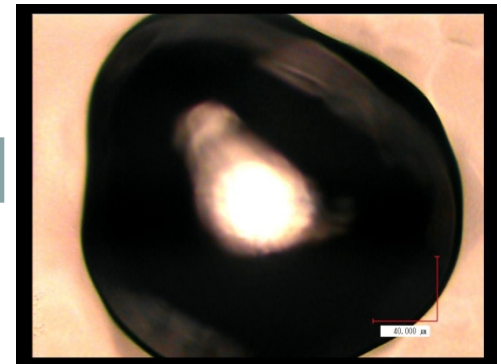
As received



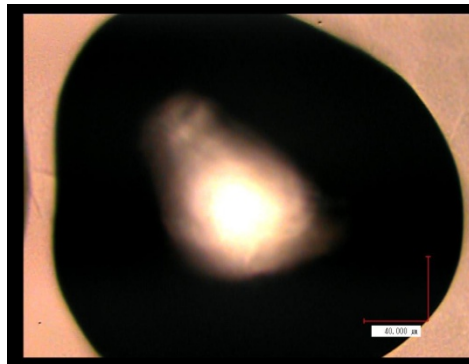
BCP (30um)



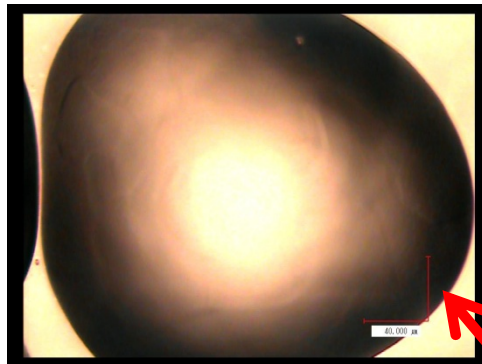
BCP(30um)+EP  
(30um)



BCP(30um)+EP  
(60um)



BCP(30um)+EP  
(90um)



BCP(30um)+EP (120um)

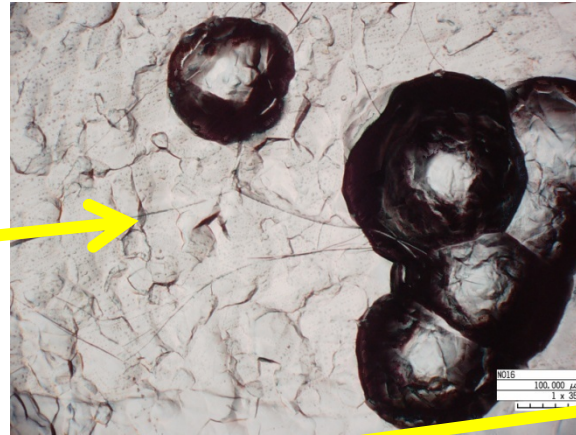
After BCP(30um)+EP(120um), still the edge of pit is very sharp!

# E-beam Re-melting Removes Pit

Controlled defects (pit)  
Created along center line

original

Re-melted



# Conclusion

- Preliminary experiments show a pit can not be removed by BCP or EP, even after heavy ( $\sim 150\mu\text{m}$ ) removal.
- This is true for pits of various sizes (sub-mm in diameter, up to  $200\ \mu\text{m}$  in depth).
- Preliminary profiling of pits show geometric features that could cause local magnetic field enhancement of  $\sim X2$ .
- Preliminary experiments show encouraging results of removing localized pits by using the E-beam re-melting method.
- Further studies under way to characterize relationship between pit features and quench behavior.