ILC Gradient R&D

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Gradient Progress

- Accomplishment of TDP-1 goal
  - 50% “production yield”
- Pushing envelope of “practical gradient”
  - 40 MV/m in 9-cell TESLA shape cavity
- Success of globally coordinated S0 program
  - Reduced field emission
  - Improved understanding of gradient limit
  - Optimized EP parameters/cavity handling proc.
  - Information feedback from lab to industry
  - Successful qualification of cavities from new vendors
    - Now 3 “ILC qualified” vendors: RI, ZANON, AES
    - More on the way: MHI, Niowave/Roark, Hitachi, Toshiba…

Gradient Challenge

- Reduce gradient scatter due to local defect
  - Further progress depends on fab/mat improvement
  - Priority of S0 program for TDP-2
- Mitigate increased field emission risk
  - High gradient operation (up to ~ 38 MV/m?) of some cavities due to the updated scheme of “averaging gradient”
  - Irreversible field emitter turn on at high gradient
- Reduce cost per MV/m
- Push gradient envelope for TeV ILC upgrade

BAW-1 Agenda

- Review gradient progress
  - Overview (RG)
  - Regional status reports (Hitoshi Hayano, Mark Champion, TBD)
- Near term R&D plan
  - Fabrication/mat improvement (XFEL/HiGrade)
  - New vendors and new cavities (H. Hayano, M. Champion)
  - Repair methods (H. Hayano)
  - Hydroformed cavities (M. Champion)
  - “Destructible” 9-cell cavity (Mark Champion, RG)
  - Field emission monitoring (TBD)
- Long term R&D plan
  - Cost reduction per MV/m
    - Large grain cavity and multi-wire slicing (K. Saito)
    - Vertical EP and mechanical polishing for bulk removal (C. Crawford)
    - Bulk removal by BCP and RF test w/o final EP (RG)
  - Performance enabling alternative concepts (RG)