R &D on single cell cavities

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- First summary:
  Cavities under test and preparation
  Preparations and vertical tests in 2001 - Tumbled cavities

- Tumbled cavities

- Spun cavities of E. Palmieri

- Cavity R & D
First summary:

Cavities under test and preparation:

- 9 + 3 (untested) cavities of B- and S - production for EP (incl. BCP after EP)
- 1 cavity of B- and S- production for BCP (+ results of 4 cavities of B- production before EP)
- 2 cavities of AC-production for tumbling
- 3 + 6 (untested) spun cavities
- 3 (untested) cavities of low RRR-material
- ___ Nb clad copper cavities
- ___ hydroformed cavities
- ___ cavities of DESY fabrication (under preparation)
First summary II:

Preparations and vertical tests in 2001

- 9 BCP preparations @ DESY
- 14 EP preparations @ CERN

- 30 vertical tests on 14 cavities
- 7 baking procedures 100°C on 7 cavities
Tumbling of single-cell cavities I

- Development of tumbling machine and parameters on single-cell 1K1

- Standard production of two single-cell cavities by deep drawing and e-beam welding (1AC1, 1AC2)

- Tumbling (140 µm - 160 µm); 20 µm etching; 800°C firing; 20µm final etching + HPR

- Vertical test results: $E_{acc} = 28$ MV/m; strong Q-slope above 17 MV/m

- EP (60 - 80µm) of both cavities under preparation (back at DESY beginning of March 02)
Tumbling II

Future work on single-cell cavities

- test of 1AC1 + 1AC2 after EP (+ baking)
- 2 (?) cavities of DESY production under preparation
  => fixing of final parameter set

Plans for multi-cell cavities

- new tumbling machine for multi-cell cavities under preparation
  => removal of “damage-layer” by tumbling
  + final surface treatment by EP
Q(E)-measurement of 1AC1

\[ Q_0 \]

\[ E_{\text{acc}} \]
Spun cavities I:

- Surface structure (cracks) requires grinding after spinning
- First 2 spun cavities at DESY (1P3, 1P4):
  - > (200 -300) µm removal of Nb surface necessary to cure characteristic strong Q-slope without field emission
  - $E_{\text{acc, max}} = 29$ MV/m and 32 MV/m, respectively (after BCP)
- Second batch 1P5, 1P6, 1P7
  - $E_{\text{acc, max}} = 34$ MV/m and 39 MV/m, respectively (after EP @ CERN)
- Third batch 1P8 ff
  - just arrived at DESY
  - more information about fabrication procedure needed
Q(E)-measurement of 1P4

T = 2K
Q(E)-measurement of 1P6

$T = 2 \text{ K}$; EP-treatment before and after bake at 110 C
Spun cavities II:

- Proposed preparation of 1P8 ff.:
  - EP @ Legnaro
  - 800C @ DESY
  - final EP @ Legnaro or DESY
  - optional: 1400C titanisation

- Agreement between INFN Legnaro and DESY about fabrication of
  - 15 single-cell cavities
  - 10 three-cell cavities
  - 2 nine-cell cavities (incl. stiffening rings and Bordscheibe)

- Program delayed by > 1 year
New Infrastructure for R & D

- Preparation + testing of ≤ 3-cell cavities for R & D (no nine-cell cavities possible)
- Cleanroom cl.100 for assembly and High Pressure Water Rinsing (no etching possible!)
  ⇒ in operation since Feb. 2001
- vertical cryostat with one test insert for 1,8 K
  ⇒ under commissioning
- rf-equipment for 200W cw-operation including Temperature mapping
- First cavity test: delayed to beginning of 2002