

2006 Wire Development Workshop
Session III, Summary Notes
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Alex Malozemoff, AMSC

2G Conductor

- Selling 4.4 mm, 1-cm, 4-cm wide 2G YBCO tape
- Moving towards 10-cm wide tape
- Using a soldered 3-layer composite structure for low cost fabrication
- Similar to 1-G, anticipate high current density, high strength, compression tolerant, and hermetic variety tapes
- Better to have high I_c than thicker YBCO coatings

Venkat Selvamanickam, SuperPower

2G Conductor

- Fabricating thinner tape, going from 100 μm to 50 μm
- 50 μm tape shows less bowing
- Minimum bend diameter improved from 22 mm to 11 mm
- 40 n-ohm-cm² splice resistance with little degradation on 50 μm tape after mechanical bending
- thicker 100 μm tapes show degradation in splice resistance as function of mechanical strain
- work on electro-deposition of Cu continues, for improved behavior at high voltages due to rounded edges

Isidor Sauers, ORNL

Cryogenic Dielectrics

- 1G tapes now being sold in US with two different insulations options, Kapton™ and Gore™ PTFE
- Need for better cryogenic dielectric materials
- Need for engineered cryogenic dielectric materials not just a search for the best existing material
- Need to study insulation aging effects
- Need better materials and methods to reduce PD
- Problem with volume scaling in impregnated materials
- Still no long length chemical solution equivalent to a FormVar™ in LTS NbTi

Robert Duckworth, ORNL

Quench and Stability

- Usual problems of more normal metal for enhanced stability leads to higher ac loss
- Some calculations show that higher I_c leads to lower J_e
- Need for better quench detection and protection methods particularly in high electrical noise environments of motors and generators
- Test results show difference in stable and unstable behavior < 1 A at 77 K in YBCO coil

Steve Ashworth, LANL

Ac Loss

- AC tolerant YBCO conductor possible how tolerant is key question
- Making fine filaments is possible, but need to determine methods for twisting and transposing
- Need to clarify the ac environment for a given application
- Different applications may lead to different optimization techniques

Danko Van der Laan, NIST

Mechanical Properties

- Excellent tensile and yield strength properties of IBAD YBCO on C-276 Hastelloy at 77 K
- Reasonable compressive strengths
- Concern for tensile stress along c-axis of YBCO, showed degradation after only 16 MPa
- Possible need for cyclic fatigue measurements and bending stress
- Question from reviewer: Was anyone unsatisfied with mechanical properties of YBCO? Transformer manufacturer indicated that existing winding techniques using copper would need to be modified for flat tape geometry

Yi-Yuan Xie, SuperPower and Alex Malozemoff, AMSC

FCL Requirements

- 2G YBCO far superior current carrying capacity of Bi-2212 tube
- Better uniformity, consistency, and material homogeneity than Bi-2212
- Excellent modularity with 2G YBCO
- AMSC and SuperPower showed current limiting capability on short samples
- AMSC showed slow-motion video of uniform quenching in YBCO pancake coils
- Question: Is an inductive FCL better than resistive FCL or should we have a combination of impedances
- YBCO with high n-value > 31 , quenches at $I_c \sim 2-3 I_c$