Abstract
Recently, THEVA started to produce HTS coated conductors at its facilities in Germany. The performance and length of the tapes has been steadily increased over the last one and a half years reaching 400 m as a standard production length with critical current up to 500 A/cm (77 K, s.f.) in the production tapes. An overview is given on the current status of the tape manufacturing. Electrical performance data at various temperatures and magnetic field levels will be given and discussed. Different types of stabilization like lamination with Cu foil and surround copper plating were developed. For applications in cables as well as magnets the mechanical properties like dimensions, bending properties or delamination strength of the final stabilized tapes are important aspects of qualification. Results gained with the various types of tapes are given.

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Pro-Line HTS wire
Cu laminated   TPL2100
Ag coated   TPL1100
Cu plated  TPL4100

• Cu stabilization according to application
• Stabilized width 12 mm
• Smaller width samples available

ISD MgO Process
- E-gun evaporation on a tilted substrate (30°)
- Simple process and fast (>6 nm/s)
- Tilt angle of MgO<100>: β ≈ 30°
- In-plane texture: Δβ[002] = 10°

HTS Process
- Tilt leads to textured overgrowth of precipitates and misoriented regions
  • Jc is thickness independent
  • Very high Jc possible

HTS tape production à la THEVA
Continuous vacuum tape locking
Vacuum Chamber
Production galvanization
Roll-on with in-line quality control
Physical vapor deposition with electron beam evaporation
Pay-off (back side)

Pilot line features
• Built 2012-2014, commissioned end of 2015
• Maximum production capacity: 150 km/yr (12 mm width)
• Production tape length: 350 m, up to 600 m demonstrated!

Goals
• Cost efficient production
• Robust process allowing high yield
• Implementation of industrial standards
• Proof of production: high quality tape

First step towards industrial HTS wire production

Thermal stability
HTS Tape has to withstand thermal stress during further processing:
• VPI or potting: curing for hours at elevated temperature (100°C typical)
• Soldering: high temperatures for shorter time (<1 m of soldering)

Mechanical properties
Optical width measurement after lamination
Optical thickness measurement after lamination

Bending test
Critical bending radius HTS outside (tension)
Critical bending radius HTS inside (compression)

Homogenous Thickness
• Homogenous thickness is important for high density packing of turns and reproducible coil thickness
• Development of homogenous thickness

Magnetic field performance
• B(perp) > 1 T
• Value of B is about 30°
• Tilt is always to the side of the tape
• Tilt direction is marked on the tape

No artificial pinning centers
• Lift factor of 15 samples taken out of production over about 1 a:
  LF(1-5 T, 30K) ≈ 2.2 ± 0.4 (±18%) Reliable magnetic field performance!