

THEVA INTRODUCES ISD BUFFERED TAPE

From September 2004, THEVA has started the commercial sale of long length of flexible metal tape carrying a highly oriented buffer layer. The tape based on Hastelloy® C 276 can be directly used for the deposition with superconductor layers and addresses customers aiming at the development of HTS deposition methods for coated conductors. The orientation of the MgO buffer is generated by the Inclined Substrate Deposition (ISD) technique.

The begin of the coated conductor development at THEVA dates back to 1998, where the unique reactive co-evaporation approach was used to deposit buffer- and HTS - layers on RABITS® substrates. Parallel to this development, inclined substrate deposition (ISD) has been investigated in close collaboration with the Technical University of Munich. Over several years all critical process parameters have been identified and studied systematically. As an outcome, the FWHM of the in-plane MgO orientation has improved towards 8° and the subsequent DyBCO films exhibit critical current densities in excess of 2 MA/cm². Encouraged by the rapid progress and the favourable IP situation THEVA finally decided to pursue the ISD - route for its commercial products.

At the same time the entire processing technology from substrate preparation and polishing to film deposition has been reviewed. Nowadays, mechanical grinding and electro - polishing of the Hastelloy® substrates are operated at a line speed of 6 m/h and are greatly automated.

As a unique advantage of the ISD process the buffer texture improves with increasing deposition rate. Electron gun deposition of MgO could be demonstrated up to 28 nm/s translating into a tape deposition speed beyond 20 m/h. Currently, the ISD deposition is run at a speed of 6 m/h in a pre-pilot system. The standard batch length of 10 mm wide tape is in the range of 30 – 40 m.

Thanks to the large area accessible to evaporation all further vapor deposition steps, e.g. for the MgO cap layer and the HTS films, can be operated at even higher throughput. Since last year the original evaporation technique has also been redesigned considerably in view of scalability and reliability. Continuously operating electron gun evaporation has eliminated sophisticated composition control and solved the refilling problem.

Since the basic process development is nearly completed, THEVA has decided to open its technology to interested customers. To demonstrate the potential of the ISD technique, in the first step buffered tape has been put on sale to supply high quality templates for all those who are developing coated conductors. The MgO buffered tape is 10 mm wide, 90 µm thick, and can be delivered up to a length of 40 meters.

The subsequent step of selling the entire coated conductor tape is expected for the near future.

LONG LENGTH
BUFFERED METAL
TAPE COMMERCIALY
AVAILABLE FOR
COATED CONDUCTOR
DEVELOPMENT

EXCELLENT RESULTS
AND FAVORABLE IP
SITUATION HAVE MADE
ISD A VIABLE
ALTERNATIVE TO
OTHER ALIGNMENT
TECHNIQUES.