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Advanced HTS tape for high-field applications by THEVA

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In recent years, a huge demand for HTS tape to be used in future commercial fusion reactors has emerged. High requirements on the mechanical properties and the tape performance in high magnetic fields for this market and other high-field magnet applications led to several developments at THEVA that are now transferred to regular production. Major improvements to the engineering critical current density have been achieved by reducing the substrate thickness from 100 μm to 50 μm and by introducing artificial pinning centers. We will present performance of this new product and compare it to the standard HTS tape highlighting the improvements at low temperatures and high magnetic fields.

Additionally, the quality of the copper surround coating was improved by a new PVD process by replacing the previously used electrochemical deposition. This allows a significantly more homogeneous thickness of the copper coating avoiding the typical dog boning effect of the electrochemical process and thus a more reliable and compact stacking of the tapes. Furthermore, a laser slitting method will be presented that allows to produce narrow tapes without burr and significantly reduced damage of the superconducting layer at the slitting edge.

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