

RCE-DR, A Novel Process for Coated Conductor Fabrication with High Throughput

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Abstract - We report in detail on SuNAM's reactive co-evaporation by deposition and reaction (RCE-DR) process. We have successfully fabricated high-performance GdBCO Coated Conductor (CC) with high throughput by the RCE-DR process that consists of two steps for the deposition of elemental metal oxides and the conversion of cation oxides into the GdBCO superconducting phase. Constituting metals such as Gd, Ba and Cu were first deposited on LaMnO₃(LMO)-buffered IBAD-MgO templates at low temperatures and low pressures followed by a high temperature treatment step under high oxygen partial pressure for fast phase-conversion. GdBCO CCs fabricated by RCE-DR showed excellent transport properties such as a critical current of 794 A/cm-width at 77 K in self-field. With the RCE-DR process, we have achieved an overall processing speed of more than 120 m/hr (in terms of a real process linear tape speed equivalent). SuNAM's RCE-DR technique showed great potential as the highest throughput fabrication process compared to other methods developed previously for the second generation high temperature superconducting wires, meeting the current and future need of industry in terms of price and production speed.

Keywords - REBCO coated conductors, GdBaCuO, reactive co-evaporation, high throughput, critical transport currents

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