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Wed-Af-Po3.19-06 [51]: Development of Cost-effective Secondary Generation High-temperature Superconducting REBaCuO Tapes for Power Applications

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With the performance/price improved, there are increasing market demands and power applications for the cost-effective secondary generation high-temperature superconducting REBaCuO Tapes. In the past decade, main challenges are realized for metallorganic solution-derived (MOD) REBaCuO Coated Conductors to achieve higher critical currents with and without applied fields, such as microcracks or misorientation with increasing thickness of REBaCuO layers, and the competitive effects on the destruction or enhancement of in field critical current density performance Jc(H) with a large amount of artificial disorders. In the present talk, we report our recent efforts on the improvement of the superconducting thickness and associated current-carrying abilities in the field for MOD-derived REBaCuO coated conductors.

It is revealed that the low fluorine, reduced atmosphere pressure, chemical doping and controllable heterostructures are effective for MOD technique to improve the in-plane texture as well as to suppress the microcracks for the film thickness up to 2-3 μm. More than 500 hundred meters of MOD coated conductor tapes with the above thickness of superconducting multilayers or heterostructures exhibit excellent biaxially textured and superconducting performances. The critical currents along the long tapes reach 500 A/cm-width at 77 K, measured by both reel-to-reel transport and inductive systems. As well, various artificial techniques, including chemical doping, ion irradiation, multilayers, or heterostructures of superconducting layers are investigated on the REBaCuO coated conductors, showing the cost-effective MOD technique very promising for the achievement of high-quality coated conductor tapes.

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