

Homogenous REBCO Coated Conductor Production Developed by Using IBAD and Hot-Wall PLD Process

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Abstract—REBCO coated conductors by IBAD/PLD process have excellent and uniform in-field J_c properties with robust mechanical strain strength. They are suitable to high field applications as high-end NMR systems, which strongly requires good transporting uniformity in long piece length. Moreover, tremendous REBCO conductor demands emerged for “compact” nuclear fusion research which requires quite high in-field I_c even at 20 K, 20 T, with affordable I_c variations and cost. This talk describes current status and perspectives of REBCO coated conductor by mass productive PLD process at Fujikura Ltd.

Pulsed-laser-deposition (PLD) is a non-equilibrium vapor process characterized to have high growth rate with quite largely supersaturated conditions though it has also excellent controllability of varied deposition conditions for complexed multi-element oxide films. It allows to control high density dislocations and small-size secondary phase particles, dispersed inside good textured REBCO films growing at very high rates. In order to obtain longitudinal stability of thus optimized process conditions, we had designed and developed “Hot-Wall Type” reel-to-reel PLD apparatuses, which realized quite robust and reproducible temperature uniformity by furnace like heating system. As a result, we succeeded in commercialization of long length and uniform REBCO wires including BaHfO₃ nano-rods doped lineups, preserving deposition conditions of narrower windows. RE elemental dependence would be also reviewed on crystalline growth stability, in-field J_c performance in wide temperature and field range for c-axis aligned thick films. We are now continuing to develop productivity and quality control of those wires with varied width, toward large capacity and long piece length industrialization.

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Industrial Technology Development Organization (NEDO) and also results performed at the High Field Laboratory for Superconducting Materials, IMR, Tohoku University.

***Keywords (Index Terms)*—BMO Doped REBCO, Coated Conductors, Hot-Wall PLD**

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