Progress in Development of High-performance REBCO Tapes and Wires

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Abstract **– Combining thick films (4 – 5 µm) with optimized distribution of nanoscale defects, we have fabricated REBCO tapes with high critical currents over a wide range of temperatures and magnetic fields. Critical currents of our tapes have reached 6200 A/12 mm (engineering current density (J_e) = 5200 A/mm^2) at 4.2K, 15T which is 7X the J_e of commercial REBCO tapes and 5.4X the J_e of best Nb_3Sn tapes. At 65K, 1.5T, critical currents exceeding the milestone of the U.S. Department of Energy Next Generation Electric Machines program of 1440 A/cm have been demonstrated. We have also developed a Symmetric Tape Round (STAR) wire technology to fabricate round REBCO wires 1.3 mm to 1.9 mm in diameter with J_e of 600 A/mm^2 at 4.2 K, 20 T. These wires exhibit excellent tolerance to bend strain, retaining their high critical currents even when bent to a radius of 15 mm.**

Keywords (Index Terms) **– REBCO, engineering current density, round wire, bend strain, defects.**

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