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[Invited] High Performance REBCO Coated Conductors for High Field and AC Applications

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RE-Ba-Cu-O (REBCO, RE=rare earth) coated conductors are being produced today by at least six companies world wide in lengths over 500 meters. REBCO coated conductors are being tailored specifically to the requirements in high magnetic field applications as well as AC applications. We have developed heavily-doped REBCO conductors with 15 – 25 mol% Zr addition with excellent properties in magnetic fields of 2 – 30 T over a temperature range of 4.2 K to 77 K. Critical current densities exceeding 20 MA/cm² have been achieved at 30 K, 3 T (B||c) and pinning forces over 1000 GN/m³ have been attained at 20 K. In 20% Zr-added REBCO tapes with 2.2 μm thick films, critical currents of 4000 A/12 mm have been demonstrated at 30 K, 3 T (B||c). For AC applications, we have developed a laser striation and selective electroplating process to fabricate fully-stabilized, 12-filament low AC loss REBCO coated conductors in lengths of 20 meters. 24-filament and 48-filament REBCO conductors have also been demonstrated in 10 m and 1 m lengths respectively. The latest progress in our program on high performance REBCO coated conductors for high field and AC applications will be presented.

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