

# **Progress in coated conductor development for high magnetic field applications**

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Tremendous progress has been made in the development of RE-Ba-Cu-O (REBCO, RE=rare earth) coated conductors for high magnetic field applications in the last two years. By incorporation of high levels of zirconium beyond that has been previously feasible in REBCO conductors, very high critical current densities have been achieved over a wide temperature range in magnetic fields up to 31 T. Critical current density levels above 20 MA/cm<sup>2</sup> at 30 K, 3 T and pinning force levels above 1000 GN/m<sup>3</sup> at 20 K have been achieved in 25%Zr-added GdYBCO coated conductors. At 4.2 K, 15% Zr-added GdYBCO tapes exhibit an engineering critical current density of 850 A/mm<sup>2</sup> in a magnetic field of 20 T perpendicular to the tape and a nearly constant pinning force of 1700 GN/m<sup>3</sup> over a magnetic field range of 8 T to 31 T. Such high current densities have been feasible by incorporation of 5 nm-sized barium zirconate nanorods at a density of 3 to 7 × 10<sup>11</sup> cm<sup>-2</sup>. We have also discovered very interesting correlations between critical currents at 77 K in a magnetic field of 3 T and critical currents in high magnetic fields at lower temperatures. Recent performance levels of coated conductors and their potential for high-field applications will be discussed in this presentation.

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