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Wed-Af-Po3.18-01 [38]: Development of High Je 2G HTS Wires for High-Field Magnet Applications

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Recently, deposition of REBCO layer on thinner C276 Hastelloy substrate for the second generation high temperature superconductors (2G HTS) wires have attracted more attentions. The main advantages are i) to effectively increase the critical engineering current (Je) without additional efforts on enhancement of current carrying capacity in the superconducting layer, ii) to improve the electricomechanical properties such as critical bending diameters. Shanghai Superconductor Technology Co., Ltd. (SST) as an emerging 2G-HTS manufacturer is aiming to contribute significantly to the wire availability on the market. In this work, we described the deposition processes and characterization of 2G HTS wires using 30 micrometer thick C276 Hastelloy substrate at SST. After optimization of the whole processes, 4 mm wide tapes (60 micrometer thick in total, with 15 micrometer thick Cu-stabilizer at each side) are obtained. Current carrying capacity of the REBCO layer (with intrinsic pinning centres optimized for magnet applications) is comparable to that made on 50 micrometer thick substrate typically used in our process. And Je values of the tape are over 700 A/mm2 at 77 K, self-field and 2.3 kA/mm2 at 4.2 K, 10 T, respectively. Electricomechanical tests on the 4 mm wide tapes at liquid nitrogen condition show that the Ic retention is over 90% when applying tensile stress of 700 MPa, while no significant Ic degradation is discerned at bending diameter of 2 mm. This work demonstrates the high potential of using such high Je 2G HTS wires for high- field magnet and high-current conductor applications.

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