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Development of small diameter HTS Cross Conductors for Fusion Magnet Application

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Karlsruhe Institute of Technology (KIT) developed the HTS Cross Conductor (CroCo), a round twisted stacked REBCO strand with outer Cu envelope, optimized for high current density and easy long length fabrication. First generation of HTS CroCos were built from 6 mm and 4 mm wide REBCO tapes with critical currents $I_c \sim 3$ kA (77 K / s.f.) and $I_c > 8$ kA (4.2 K, 12 T). Due to the continuously increasing REBCO tape performance, I_c of HTS CroCo is now > 10 kA at 4.2 K / 12 T. This HTS CroCo diameter will be used for a high current power transmission cable demonstrator with LN₂ cooling in the 35 kA range. For the planned use in large fusion magnets, smaller HTS CroCos would be preferable, because improved bending properties are beneficial. Therefore, the HTS CroCo fabrication technique was extended to smaller HTS CroCos.

HTS CroCos were fabricated from 3 mm and 2 mm wide REBCO tapes. Straight samples were measured at 4.2 K / 12 T in the FBI facility and bending experiments at 77 K, s.f. were performed with similar samples, too. First results from measurements of straight and bended HTS CroCos will be presented and compared with expectations.

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