

## Development of HTS Conductors for Fusion Magnets

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**Abstract** — In view of the development of cables for next generation Fusion Reactors research activities are carried out on all HTS materials available from industrial production. Preliminary design of a react and wind cable using Bi2212 wires is carried out, inspired by the Nb<sub>3</sub>Sn cable for European DEMO. The design and construction of a 60 kA prototype cable made of coated conductors have been carried out. The strands in the cable are composed of a stack of coated conductor tapes (4 mm wide) embedded in a copper profile of 6.3 mm in diameter. Tapes and copper profiles are soldered together in order to obtain a mechanically solid strand and to keep the inter tape resistance at minimum, so that current can be easily redistributed among the tapes in a strand. The strands are fabricated in pieces 2 m long, but scaling up to industrial production should not present any major problem. A flat cable is manufactured by winding twenty strands around a central copper former; the cable will be inserted in a steel jacket for force flow cooling. The critical current of each strand was measured at liquid nitrogen in self field just after the manufacturing process (twisted and straight) and after cabling: no reduction of the critical current was observed. Two pieces of cable each 2 m long are going to be prepared and assembled to form a sample that can be tested in the EDIPO facility.

**Keywords (Index Terms)** — HTS cable, coated conductor, BSCCO, REBCO, Bi2212, Bi2223, fusion magnet, fusion cable