

Title: High performance-low cost Iron BaSed Coated condUctorS for high field magnets (HIBiSCUS)

Source of funding: Italian Ministry of Education, University and Research (MIUR)

Scientific funding program: PRIN 2017 (Research Project of Relevant National Interest)

Project coordinator: Marina Putti (University of Genova)

SPIN coordinator: Valeria Braccini

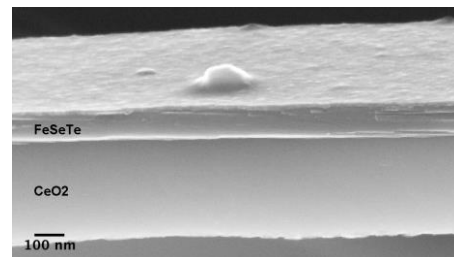
Other partners: University of Roma Tre, Politecnico di Torino

Project objectives. High superconducting transition temperature, upper critical field and critical current density are the three major requirements for high magnetic field applications of superconductivity. Iron-based superconductors (IBS) could be a breakthrough of the intrinsic limits of low- T_c Nb_3Sn (20 T at 4.2 K) and of the extreme material complexity of copper oxide high- T_c superconductors (HTS), which leads to articulated and expensive processes for wires/tapes fabrication. In fact, the superconducting properties of IBS largely exceed those of Nb_3Sn and their intrinsic properties and preparation procedures appear less critical than those of HTSs.

The project HIBiSCUS aims at developing highly optimized IBS coated conductors (CCs), focusing on the trade-off between cost effectiveness and performances and taking advantage of an accurate material characterization. In particular, we will develop new fabrication processes for IBS-CCs, relying on the advanced technologies developed in the last decades for HTS-CCs, but focusing on the possibility of simplifying the processes to drastically reduce fabrication costs and times. The optimization of IBS-CCs and their suitability for specific applications will be addressed by the combined use of complementary techniques, including microstructure and superconducting properties on the local and macroscopic scale. HIBiSCUS is an Italian project funded by the Italian Ministry of University and Research (MIUR). It sees the collaboration between research groups that have always been active internationally in the field of applied superconductivity: the University of Genova with the role of project coordinator; CNR-SPIN with the task of making the tapes, assisted by ENEA in the creation of metal templates; Politecnico di Torino and the University of Roma Tre with the advanced structural and electromagnetic characterizations in charge and the study of the effect of the irradiation on the performances of the CC (PoliTo). The team has the final task of validating the new IBS-CC technology with respect to other technical superconductors.



A metallic biaxially textured substrate developed at CNR-SPIN for the deposition of IBS coated conductors



A FeSeTe CC deposited on a RABiTS template