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IN IIA-1

Recent Progress in the Fabrication of High Performance Superconducting Wires on Rolling-Assisted Biaxially-Textured Substrates (RABiTS)

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This talk will summarize recent progress in the fabrication of long lengths of flexible, single-crystal-like wires of $ReBa_2Cu_3O_x$ (ReBCO) superconductor via epitaxial growth of the superconductor on Rolling-assisted-biaxially-textured-substrates (RABiTS). The RABiTS technique employs simple and industrially scalable thermomechanical processing routes to obtain long lengths of near single-crystal-like, cube-textured substrates. Epitaxial buffer layers of various cubic oxides (of rock salt, fluorite, perovskite and pyrochlore crystal structures) are then deposited in a reel-to-reel configuration using web-coating employing electron-beam evaporation, sputtering or solution routes. Epitaxial ReBCO is then deposited using either ex-situ or in-situ methods to form a single-crystal-like superconducting wire. Such superconducting wires have critical current densities in long lengths of 3 Million Amps/cm^2 at 77K in self-field. Controlled incorporation on self-aligned nano-particles of second phases, misfit dislocations along the c-direction and stacking faults within the ReBCO layer is used to significantly enhance the intra-granular or in-field performance of the superconducting wires. This talk will provide a status of the RABiTS method of fabricating superconducting wire and will outline the path towards eventual realization of large-scale, bulk applications of superconductors.
Research was sponsored by the U.S. Department of Energy under contract DE-AC05-00OR22725 with the Oak Ridge National Laboratory, managed by UT-Battelle, LLC.

keywords : RABiTS, superconductor, flu-pinning, biaixial texture, substrate, thin-film deposition, conductor