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Thu-Af-Or19-02: New product line of SuperOx 2G HTS tapes customized for application in specific ranges of magnetic fields and temperatures

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In 2018 SuperOx Japan reached production capacity of 200 km of 4 mm 2G HTS wires per year. The manufacturing of our standard 2G HTS wires was aimed at the needs of light-weight cables and superconducting fault current limiting devices (SFCL), which operate under the conditions of self-field and 70-77K. Although the standard SuperOx wires with $I_c > 500A$ for 12 mm width outperformed the needs of such applications, we could identify the growing demand for the wires requiring excellent performance in the moderate and strong magnetic field and in the range of lower temperatures, which could not be always satisfied by the existing 2G HTS wires. At the same time, the upgrade of the PLD equipment allows to double production capacity in 2019, and it created urgent need for development of the new types of HTS wires for the operation in moderate and high magnetic field.

Based on the prospective operating conditions in terms of magnetic field strength and temperature we outlined four target areas of interest for the development of the new HTS wires: 1) superconducting rotating machines (1-3T and 65-77K); 2) accelerator magnets and coils for levitating devices (3-5T, 30-40K), 3) superconducting magnets for fusion reactors (12-20T, 20K) and 4) high-field NMR (30T, 4.2K).

The development strategy for new line of SuperOx 2G HTS wires relied on the combination of the following approaches:

- Optimizing the overall superconducting material stoichiometry;
- Variation of chemical composition by substitution into RE-site;
- Introduction of artificial pinning centers in the PLD process;
- Heavy ion irradiation of the HTS wires to create columnar defects;
- Fabrication of multilayered superconductor structures;

SuperOx Japan is ready to supply 2G HTS superconducting wires customized for the applications operating in the various magnetic fields and temperatures.

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