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### Development and production of 2G HTS wires for moderate and strong magnetic field application at SuperOx

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Installation of the new manufacturing equipment at SuperOx Japan allowed for increasing HTS wire production capacity from 150 km/year (in terms of 4 mm wire) in 2018 to almost 400 km in 2020. At the same time, current demand for the standard 2G HTS wires based on GdBaCuO manufactured by SuperOx was almost satisfied, and development of new wires with improved Ic-B characteristics is necessary to expand the presence of SuperOx in the market.

Considering the prospective operating conditions of the future 2G HTS wires, we identified 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 (10-20T, 20K) and 4) high-field NMR (30T, 4.2K).

To obtain such a new 2G HTS wire or a set of wires, which will possess considerably higher Je under the specified operating conditions, we employed the following development strategies:

- 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;

Extensive R&D yielded two prospective materials compositions for the production of wires with increased Je by the factor of two. Their Ic-B properties are optimized for medium and high magnetic field range application. Launch of the production of new 2G HTS wires was successfully accomplished in the 3<sup>rd</sup> quarter of 2019, and we expect to reach a benchmark of 300 km/year by the end of 2019 of the wires for the application in a high magnetic field.

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