



TOKYO METROPOLITAN UNIVERSITY
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High Entropy Superconductor

High efficiency and anti-irradiation material

[Keywords] Nuclear fusion, Superconductor, High entropy, Irradiation Tolerance

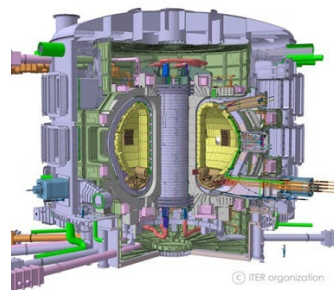
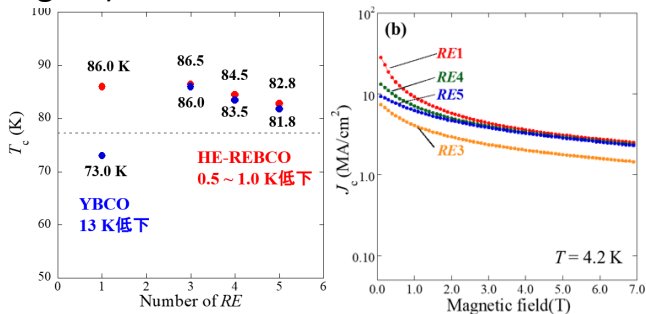


Summary of this Invention

This technology relates to High-entropy type Cu-oxide superconductor (hereinafter; HE-REBCO), incorporates the concept of high-entropy (HE) into the RE site.

One of the applications expected of superconductors is superconducting coils used in fusion reactors. However, superconductors such as Nb₃Sn, which are currently used in ITER, have a problem that the critical temperature (T_c) is dropped by irradiation of neutron rays generated by nuclear fusion reactions.

In the HE-REBCO, when comparing T_c before and after He ion irradiation, it was found that **Tc drop was suppressed to only 1K**, in the comparative example YBCO was 13K (left figure). In addition, the critical current density is 4~11MA/cm² at 4.2K and 7T, which is high **above the order of 1.0MA/cm² required for practical use up to a temperature range of 20 K** (right figure).



Graphic by ITER HP



Uses of this Invention

For high economic efficiency in the practical application of fusion power generation, it is important to obtain high economic efficiency, and since this invention will contribute to the development of fusion power generation, we would like to collaborate with fusion reactor-related companies and superconducting material manufacturers.

In addition, HE-REBCO can be applied not only to nuclear fusion applications, but also to MRI and other applications.



The Laboratory

The present inventors have pioneered HE-REBCO. In addition, we aim to create new materials and new functional materials such as superconductors and thermoelectric conversion materials other than present invention.

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