T19-801

Tohoku University's Invention

Expand the application domain of transition metal boride which is a difficult sintering material

Get high density by low temperature sintering!

Summary

With the increasing demand for highly efficient energy sources and the development of aerospace technologies, materials used in these fields must be able to withstand harsh environments. Among the materials expected in the aerospace field, TiB_2 is used as a heat-resistant and wear-resistant material because of its high melting point and strength, as well as its high electrical conductivity, etc. However, TiB_2 is a hard-sintering material that requires high temperature and pressure for sintering, which limits its domain of usage.

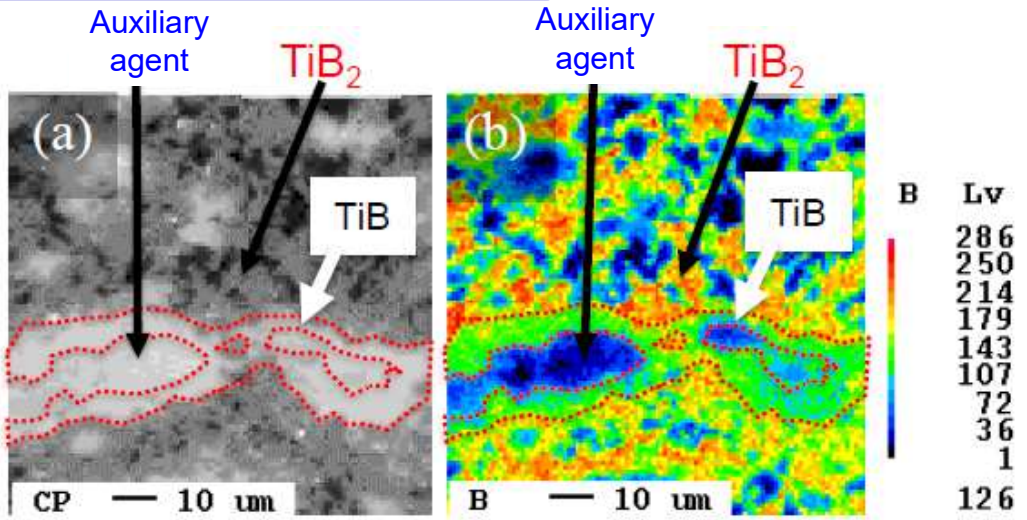
The sintering technology of this invention has an effect similar to the original properties of transition metal boride even with the addition of auxiliary agents. This result expands the possibilities of using transition metal diborides as structural components, which have been limited to powder and thin film applications due to their difficult sintering properties.

Effect

- Transition metal boride sintered body with high strength and density
- Auxiliaries containing no other main component than the transition metal diboride (figure)

Application

● Cutting Tools ● Aircraft parts ● Neutron shielding material



B distribution in TiB_2 sintered body at 1300℃ with the addition of auxiliary agent

Achieved equivalent hardness as the base metal (24.2GPa)* by adding auxiliary agent

*References: R. G. Munro, Material Properties of Titanium Diboride, J. Res. Natl. Inst. Stand. Technol. 105, 709-720 (2000)

Auxiliary agent	Sintering temperature (℃)	Density (g/cm³)	Hardness (HV)
With	1600	4.56	2373
Without	1600	4.43	1923

Patent Data Sheet

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