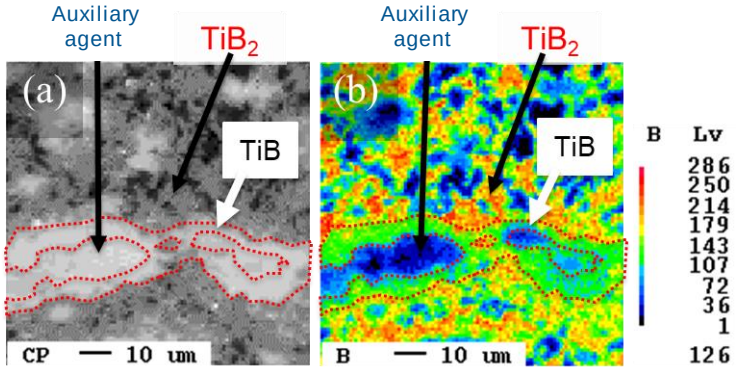
Tohoku Univ. Technology

hard-sintering transition metal boride

Expanding application by increasing density through low-temperature sintering !



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

Overview

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.

Hardness

Auxiliary agent	Sintering Temp. (℃)	Density (g/cm^3)	Hardness (HV)
With	1600	4.56	2373
Without	1600	4.43	1923

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)

Product Application

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

Related Works

[1] Yuki Jimba, Sosuke Kondo, Hao Yu, Haoran Wang, Yasuki Okuno, Ryuta Kasada, Effect of mechanically alloyed sintering aid on sinterability of TiB2

IP Data

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