substance: boron compounds with group IV elements
property: properties of boron-titanium compounds

Calculation of lattice vibrations and force constants in Group IVb diborides in [94B2].

Investigation of the interaction between boron and titanium [81N].

Nonempirical calculations of the chemical binding in titanium borides [92S].

TiB

Metallic; preparation [69L, 75S, 77L], crystalline structure [69L, 75S, 77L], electronic structure [79P].

Band structure of Ti, Zr, Hf monoborides [89I].

Ti_3B_4

Preparation [75S, 81N], crystalline structure [75S]

TiB_2

Metallic; preparation [69L, 75S, 77L, 77G, 79F, 79S, 75V], crystalline structure [69L, 75S, 76S1], electronic structure [81A2, 81W1, 77S, 79P, 76P1, 76S2], X-ray photoelectron spectra [79A], electrical conductivity [79L]

Preparation of single crystals by the floating zone method [94O2]; floating zone growth of TiB_2 single crystals using SHS rods [94O1].

Preparation by borothermic reduction (mechanochemical treatment) of titania in [96M].

Synthesis by solid state reaction in [87I].

Preparation by hot-pressing in [87M].

Shock-induced reaction synthesis in [91G].

Mechanism of formation of highly disperse TiB_2 [94V].

Growth and crystal data for preparation by high temperature solution growth [84L] and references therein.

Short range order in "amorphous" thin films of titanium diboride [90W].

Preparation and some properties of ultrafine TiB_2 (and ZrB_2) powders [95A2].

Structure in Fig. 1 [86I1], Brillouin zone in Fig. 2 [86I1].

Synthesis of titanium borides: TiB_2 nanocrystallites by solution-phase processing [95B].

Thermal and mechanical properties in [84B].

Phase equilibria in the ternary system titanium-boron-carbon: the sections $TiC_y – TiB_2$ and $B_4C_y – TiB_2$ [97G].

TiB_2 characterization by Auger electron spectroscopy [85A1].

Structure and properties of PVD TiB_2 coatings [97K1].

Space group: P6/mmm

lattice parameters

a	0.3030 nm	86I1
c	0.3227 nm	

NMR studies of borates and borides in [86B2].

Electronic and transport properties

average inner lattice potential

Φ	20.34 eV	experiment	86K
	19.29 eV	theory	

average work function of electrons

Φ_e	3.94 eV	experiment	86K
	4.99 eV	theory	

Calculated density of states distribution in Fig. 3 [86B1].

High resolution titanium K_α X-ray fluorescence spectrum in [94K].

B K_α fluorescence spectrum in [97K2].

Experiments and theory of the chemical effect of KM satellites in Kα X-ray fluorescence spectra [87K].

TiB_2 characterization by Auger electron spectroscopy in [85A1].

Electron density distribution on cubic TiB_2 (BN and boron carbide $B_{13}C_2$) [86W].

resistivity

ρ	8...16 μΩ cm	T = 298 K	84B
	60 μΩ cm	T = 1273 K	85T, 86T
	57 nΩm		86I1

Hall coefficient

R_H	$-2.4\cdot10^{-3}$ μm^3C^{-1}	86I1

carrier concentration

n	0.02 electrons / unit cell	91T

carrier mobility

μ_H	$3.69\cdot10^{-2}$ m^2V^{-1} s^{-1}	86I1

de Haas-van Alphen effect in Fig. 4 [86I1].

Impurities and defects

Irradiation-induced damage rates in [95C].

Lattice properties

thermal expansion coefficient

α	$6.63…8.65\cdot10^{-6}$ K^{-1}	T = 25...750 °C	84B, 86T

Young's modulus

E	270…545 GPa	84B, 86T

acoustic branch phase velocities
(in m s^{-1})

v_t	9800...11000	T = 300 K	calc. LAPW- method	94B2
	11000		exp.	73G
v_l	6100...7500		calc. LAPW- method	94B2
	7000		exp.	73G

***q* = 0 phonon wavenumbers**
(in cm^{-1})

E_{1u}	530	calculated	94B1
B_{1g}	580		
A_{2u}	700		
E_{2g}	1090		

Further properties

heat capacity

C	45.6 J $mol^{-1}K^{-1}$		97G

coeff. of electronic heat capacity

γ	1.08 mJ $K^{-2}mol^{-1}$		71C, 91T

formation enthalpy

H_f	–279 kJ mol^{-1}		97G

thermal diffusivity

D	0.317...0.403 cm^2s^{-1}		84B, 86T

microhardness

H_V	3370 kg mm^{-1}	load 100 g	86T

Effect of indentation load on the microhardness of TiB_2 films prepared by magnetron sputtering [95A1].

density

d	4.50 g cm^{-3}	T = 300 K	86T

On applications in [86T].

Production of $(TiCr)B_2$ powders in [91K1].

Structure and properties of PVD TiB_2 coatings in [97K1].

On the sintering of superhard TiB_2-Fe cermets [91S].

Short-time creep investigation of TiB_2- Fe composite [92A].

Preparation, composition and some properties of deposition TiB_2 – TiC_x coatings [91B].

Ti_2B_5

Preparation [75S], crystalline structure [75S]

$(B_{12})_4B_2Ti_{1.3\text{-}2.0}$

Preparation [75A], crystalline structure [75A, 76A, 76P2]

ternary compounds with titanium

TiB_xN_{1-x}

fcc structure

Photoelectron spectroscopy studies [81L].

Comparative study of mechanical properties of interstitial phase films [97A].

(x = 0.17, 0.35, 0.78), preparation [81L]

Ti–Cr–B system

Preparation [79K], crystalline structure [79K]

Technological aspects of production of titanium-chromium boride powders. Part 1 [91K2].

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Fig. 1.

TiB_2. Structure [86I1].

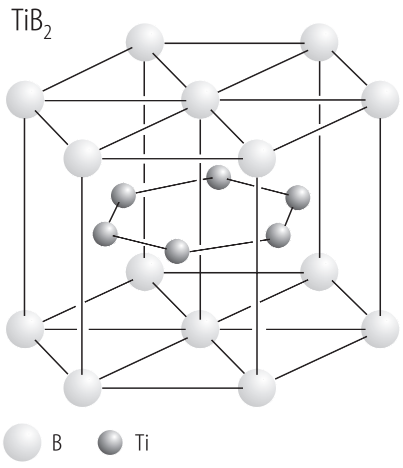

Fig. 2.

TiB_2. Brillouin zone [86I1].

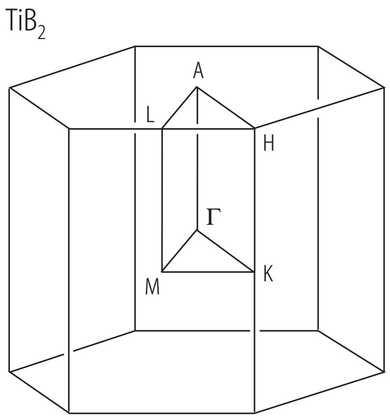

Fig. 3.

TiB_2. Calculated density of states vs. energy. The position of the Fermi energy is indicated [86B1].

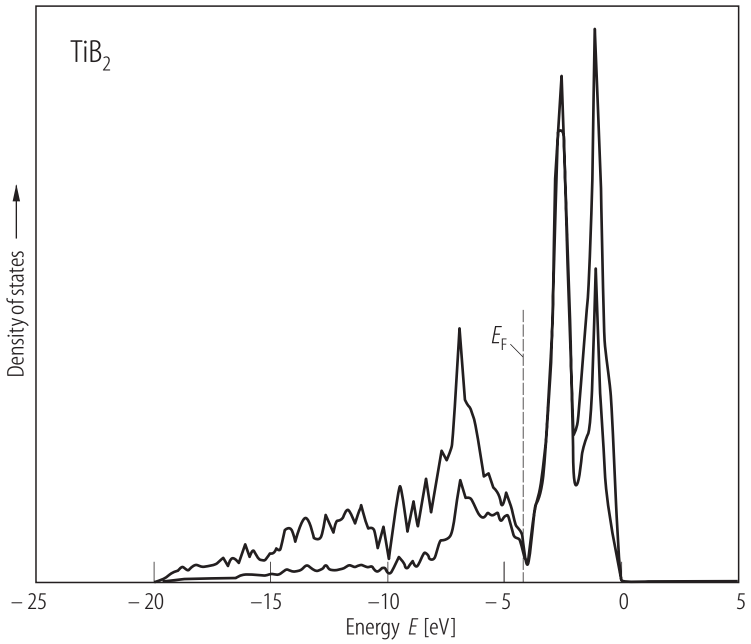

Fig. 4.

TiB_2. DeHaas-van Alphen oscillations vs. magnetic field [86I1].