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

ZrB

critical temperature of superconductivity

T_c	3.4 K	91F, 53H

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

ZrB_2

Metallic; preparation [75S, 52P, 77G1, 77L], crystalline structure [75S, 77G1], electronic structure [77G1, 77G2, 77P, 76G], electrical conductivity [79L], electrical transport [77C].

Some properties of ultrafine zirconium boride powders and films [93A].

Preparation of ultrafine zirconium boride powders and films [94A1].

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

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

Preparation of high-purity ZrB_2 powder [95Z].

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

Preparation of single crystals by the floating zone method [96O].

Interaction in ZrN-ZrB_2 and HfN-HfB_2 systems (X-ray diffraction, metallography, microhardness, melting point) [84O].

For structure and Brillouin zone see TiB_2, Fig. 1 and Fig. 2, respectively.

Space group: P6/mmm

lattice parameters
(in nm)

a	0.3170	86I
c	0.3531	
a	0.599	91S
c	0.671	

The cited papers don’t give hints why the lattice parameters are so different.

interatomic distances
(in nm)

d	0.317(6)	Zr – Zr	91S
	0.183(3)	B – B	
	2.54(12)	Zr – B	

activation energy of chemical reaction

E_A	144.5(15) kJ mol^{-1}	T = 2609...2909 K	from profile of combustion synthesis	92D

electronic properties

Total and component electronic density of states calculation in Fig. 3 [91S].

resistivity

ρ	30 nΩ m	86I

Hall coefficient

R_H	$-2.0 \cdot 10^{-3}$ μm^{3}C^{-1}	86I

carrier concentration

n	0.04 electrons / unit cell	91T

carrier mobility

μ_H	$6.66 \cdot 10^{-2}$ m^{2}V^{-1} s^{-1}	86I

coeff. of electronic heat capacity

γ	0.93 mJ K^{-2}mol^{-1}	69T, 91T

thermal diffusivity

D	$2.10 \cdot 10^{-3}$...$1.79 \cdot 10^{-3}$ (units are misssing)	T = 2609...2909 K	thermal diffusivity of the reactants in combustion synthesis	92D

Properties of ultrafine ZrB_2 powders and films in [94A2].

Oxidation behavior of ZrB_2 [87K].

Oxidation behavior of ZrB_2 composite ceramics [87S].

ZrB_{12}

Superconducting; preparation [75S], crystalline structure [75S], Curie temperature [71F], magnetic properties [73O]

critical temperature of superconductivity

T_c	6.03 K	91F, 68M

ZrB_{51}

Interstitially doped β-rhombohedral boron, see LB III/41C (boron).

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Fig. 1.

TiB_2. Structure [86I].

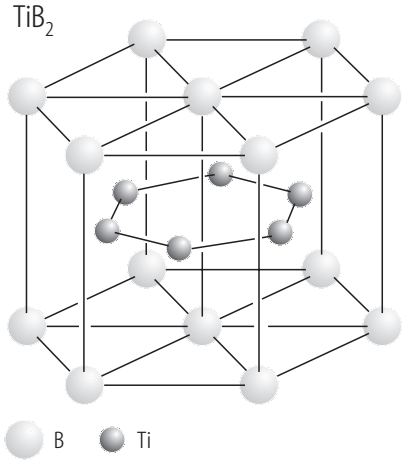

Fig. 2.

TiB_2. Brillouin zone [86I].

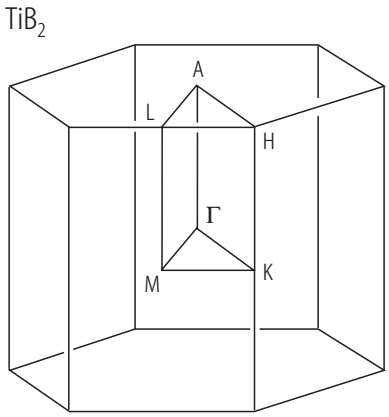

Fig. 3.

ZrB_2. Total and component electronic density of states calculation. The vertical dashed line indicates the position of the Fermi energy [91S].