

substance: boron compounds with group VI elements
property: properties of boron-chromium compounds

Cr₂B

Metallic; preparation [75S, 77P2, 77P3], crystalline structure [75S], electronic structure [79P2], X-ray photoelectron spectra [79A], transport [75S], electrical properties [76G]

Structure: orthorhombic

lattice parameters

(in Å)

<i>a</i>	7.4021(9)	<i>T</i> = 300 K	X-ray diffraction	92I
<i>b</i>	14.7044			
<i>c</i>	4.2614(7)			
<i>V</i>	463.82 Å ³			

Cr₅B₃

Metallic; preparation [75S], crystalline structure [75S, 76C], thermal and magnetic properties [79L1], transport [75S]

Structure: tetragonal

lattice parameters

<i>a</i>	5.4781(4) Å	<i>T</i> = 300 K	X-ray diffraction	92I
<i>c</i>	10.0920(5) Å			
<i>V</i>	302.85(6) Å ³			

CrB

Metallic; preparation [75S, 77P2, 77P3], crystalline structure [75S, 76C], electronic structure [79P1, 79P2], X-ray photoelectron spectra [79A], thermal and magnetic properties [79L1]

Single crystal growth in [96O].

Structure: orthorhombic

Space group: Cmcm

lattice parameters

(in Å)

<i>a</i>	2.9723(1)	<i>T</i> = 300 K	X-ray diffraction	92I
<i>b</i>	7.8647(5)			
<i>c</i>	2.9303(3)			
<i>V</i>	68.49(9) Å ³			
<i>a</i>	2.9782(7)		Cr _{0.95} B	96O
<i>b</i>	7.870(1)			
<i>c</i>	2.9346(7)			

Atomic positions, temperature factors and interatomic distances in [87O].

Preparation between chromium and amorphous B with additions of halides [92I, 93I, 94I].

resistivity

ρ	32.0(2) μΩ cm	<i>T</i> = 300 K	96O
--------	---------------	------------------	-----

microhardness

H_V	21.1(9) GPa	$T = 300$ K	load 100 or 200 g	96O
-------	-------------	-------------	-------------------	-----

DTA and TG curves in [96O].

High temperature thermodynamic properties in [86B].

Cr₂B₃

Structure: orthorhombic

Space group: Cmcm

lattice parameters

(in Å)

a	3.0264(5)	$T = 300$ K	X-ray diffraction	87O
b	18.115(4)			
c	2.9542(4)			

Lattice parameters, atomic positions, temperature factors and interatomic distances in [87O].

Further lattice parameters in [96O].

resistivity

ρ	64.0(46) $\mu\Omega$ cm	$T = 300$ K	(010) plane	96O
--------	-------------------------	-------------	-------------	-----

microhardness

H_V	22.4(17) GPa	$T = 300$ K	load 100 or 200 g	96O
-------	--------------	-------------	-------------------	-----

DTA and TG curves in [96O].

density(in g cm⁻³)

d	5.55(3)	$T = 300$ K	pycnometric	87O
	5.593		X-ray	
	5.595(2)		Cr _{1.89} B ₃ , X-ray	96O

Cr₃B₄

Metallic; preparation [75S], crystalline structure [75S, 76C], transport [75S], electronic properties [76G]

Structure: orthorhombic

Space group: Immm

lattice parameters

(in Å)

a	3.0004(8)	$T = 300$ K	X-ray diffraction	87O
b	13.018(3)			
c	2.9516(8)			
a	3.0264(5)		Cr _{2.7} B ₄	96O
b	13.115(4)			
c	2.9542(4)			

density

d	5.72(2) g cm ⁻³		Cr _{2.70} B ₄ , pycnometric	96O
	5.740(4) g cm ⁻³		X-ray	

resistivity

ρ	64.3(85) $\mu\Omega$ cm	$T = 300$ K		96O
--------	-------------------------	-------------	--	-----

microhardness

H_V	21.9(10) GPa	$T = 300$ K	load 100 or 200 g	96O
-------	--------------	-------------	-------------------	-----

(Cr_{1-x}M_x)₃B₄ (M = W, Mo, Ta)

Single crystal preparation and structure investigation in [95Y].

CrB₂

Metallic or semimetallic; preparation [75S, 77P2], crystalline structure [77C, 75S], electronic structure [75L, 77S1, 77P1, 79P2, 81A2], transport [77C, 77S2], thermal properties [77C], X-ray photoelectron spectra [79A], magnetic and thermal properties [79L1], electronic conduction [79L2], electronic properties [76G]

Structure: hexagonal

Space group: P6/mmm

lattice parameters

(in Å)

a	2.9728(5)	$T = 300$ K	X-ray diffraction	85O
c	3.0719(4)			
V	23.51(2) Å ³			
a	2.973(1)	$T = 300$ K	Cr _{0.92} B ₂	96O
c	3.074(1)			

High-temperature thermodynamic properties in [86B].

density

d	5.16(3) g cm ⁻³		Cr _{0.92} B ₂ , pycnometric	96O
	5.195(2) g cm ⁻³		X-ray	

resistivity

ρ	64.3(85) $\mu\Omega$ cm	$T = 300$ K		96O
--------	-------------------------	-------------	--	-----

microhardness

H_V	21.9(10) GPa	$T = 300$ K	load 100 or 200 g	96O
-------	--------------	-------------	-------------------	-----

CrB₄

Metallic; preparation [75S], crystalline structure [75S]

CrB₄₁

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

References:

- 75L Liu, S. H., Kopp, L., England, W. B., Myron, H. W.: Phys. Rev. B 11 (1975) 3463.
- 75S Samsonov, G. V., Serebryakova, T. I., Neronov, V. A.: Boridy, Moskva Atomizdat, 1975.
- 76C Champagne, B., Beauvy, M., Angers, R.: Metallography 9 (1976) 357.
- 76G Guy, C. N.: J. Phys. Chem. Solids 37 (1976) 1005.
- 77B Berezin, A. A., Golikova, O. A., Zaitsev, V. R., Kazanin, M. M., Orlov, V. M., Tkalenko, E. N., in: Boron and Refractory Borides, (Matkovich V. 1., ed.) Springer: Berlin, Heidelberg, New York 1977, p. 52.
- 77C Castaing, J., Costa, P.: see [77B], p. 390.
- 77P1 Perkins, P. G.: see [77B], p. 31.
- 77P2 Pastor, H.: see [77B], p. 257.
- 77P3 Pastor, H.: see [77B], p. 457.
- 77S1 Samsonov, G. V., Kovenskaya, B. A.: see [77B], p. 5.
- 77S2 Samsonov, G. V., Kovenskaya, B. A.: see [77B], p. 19.
- 79A Aleshin, V. G., Kosolapova, T. Ya., Nemoshkalenko, V. V., Serebryakova, T. I., Chudimov, N. G.: J. Less Common Met. 67 (1979) mr
- 79L1 Leyarovska, I., Leyarovski, F., Popov, Chr., Midlarz, T.: J. Less-Common Met. 67 (1979) 389.
- 79L2 Leyarovska, I., Leyarovski, F.: J. Less-Common Met. 67 (1979) 249.
- 79P1 Pistoulet, B., Robert, J. L., Dusseau, J. M., Roche, F., Girard, P., Ensuque, L.: J. Less-Common Met. 67 (1979) 131.
- 79P2 Povzner, A. A., Zilichiklis, A. L., Abel'skii, Sh. Sh., Borukhovich, A. S., Gel'd, P. V., Knyshev, E. A.: J. Less-Common Met. 67 (1979) 211.
- 81A1 Armstrong, D. R.: Proc. 7th Int. Symp. Boron, Borides and Related Compounds. Uppsala, Sweden, 1981; spec. issue of J. Less-Common Met. 82 (1981) 357.
- 81A2 Armstrong, D. R., Bolland, J., Perkins, P. G. (abstract only): [81A], p. 358.
- 85O Okada, S., Atoda, T., Higashi, I., Takahashi, Y.: J. Less-Common Met. 113 (1985) 331.
- 86B Bolgar, A.S., Lyashchenko, A.B., Klockhov, L.A., Blinder, A.V., Muratov, V.B., Serbova, M.I., Fesenko, V.V.: J. Less-Common Met. 117 (1986) 303. (Proc. 8th Int. Symp. Boron, Borides, Carbides, Nitrides and Rel. Compounds, Tbilisi, Oct. 8 - 12, 1984).
- 87O Okada, S., Atoda, T.: J. Solid State Chem. 68 (1987) 61.
- 92I Iizumi, K., Yoshikawa, N., Kouno, S., Okada, S., Kudaka, K., Lundström, T.: Nippon Kagaku Kaishi (1992) 1320.
- 93I Iizumi, K., Yoshikawa, N., Okada, S., Kudaka, K., Lundström, T.: Nippon Kagaku Kaishi (1993) 818.
- 94I Izumi, K., Yoshikawa, N., Kudaka, K., Okada, S., Lundström, T.: Proc. 11th Int. Symp. Boron, Borides and Rel. Compounds, Tsukuba, Japan, August 22 - 26, 1993, Jpn. J. Appl. Phys. Series 10 (1994), p. 156.
- 95Y Yu, Y., Lundström, T.: J. Alloys Compounds 228 (1995) 122.
- 96O Okada, S., Kudou, K., Iizumi, K., Kudaka, K., Higashi, I., Lundström, T.: J. Cryst. Growth 166 (1996) 429.