

substance: boron compounds with group IV elements: boron carbide
property: boron carbide doped with Ti, Cr, Fe

Ti-doped boron carbide

ESR in [80V].

***g*-factor**

(B-C-5 % Ti)

<i>g</i>	2.0025	<i>T</i> = 300 K	$\Delta H_{\max} = 5.2$ Oe	80V
	2.0030	<i>T</i> = 77 K	$\Delta H_{\max} = 3.4$ Oe	
	2.0035	<i>T</i> = 4.2 K	$\Delta H_{\max} = 12.0$, asymm. A/B ~ 2.2	
<i>g</i> ⊥	2.0037	<i>T</i> = 4.2 K	$\Delta H = 5$ Oe	
<i>g</i> ∥	2.0014	<i>T</i> = 4.2 K		

microhardness

(type not specified, in kg mm⁻²)

Content [wt %]

<i>H</i>	6190(180)	<i>T</i> = 300 K	B: 77.1	C: 21.9	Ti: 0.15	80V
	6300(220)		75.8	21.2	1.4	
	6400(250)		75.4	21.2	2.6	
	7000(350)		73.6	21.0	6.6	
	6200(240)		71.8	20.8	6.6	

Phase equilibria in the ternary system titanium-boron-carbon: the sections TiC_y – TiB₂ and B₄C_y – TiB₂ [97G].

Cr-doped boron carbide

ESR in [80V].

(B-C-7 % Cr)

***g*-factor**

<i>g</i>	2.0034	<i>T</i> = 4.2 K	($\Delta H_{\max} = 15.9$) asymm, A/B ~ 1.4	80V
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microhardness

(type not specified, in kg mm⁻²)

Content [wt %]

<i>H</i>	3400(250)	<i>T</i> = 300 K	B: 72.2	C 18.3	Cr 9.0	80V
	4050(220)		73.5	19.2	6.3	
	4850(380)		74.1	20.8	4.7	
	5100(400)		75.2	21.0	2.9	
	3690(260)		77.0	26.6	1.1	
	4430(350)		77.4.8	21.1	0.11	

Fe-doped boron carbide

Mössbauer effect investigation [89K].

Quasicrystalline phase (approximant phase)

Orthorhombic approximant phase (type $1/0 - 1/0 - 0/1$) in the quasicrystalline range of the B-C system [93T2, 93T1].

Annealing of a $B_{100-x}C_x$ ($x = 3, 5, 7$) amorphous phase for 10 min at 1700 K yields a new type of $1/0 - 1/0 - 1/0$ orthorhombic approximant phase. This strongly supports the assumption that semiconducting quasicrystals of boron-rich solids are possible [94T].

Ternary system boron-carbon-oxygen

Thermodynamic analysis of the complex boron-carbon-oxygen system in [91M].

References:

- 80V Vlasova, M.V., Kakazey, N.G., Kosolapova, T.Y., Makarenko, G.N., Marek, E.V., Usokovic, D., Ristic, M.M.: J. Mater. Sci. 15 (1980) 1041.
- 89K Kazanin, M.M., Kutasov, V.V.: Phys. Status Solidi A 113 (1989) 143.
- 91M Mindin, V.Yu.: in: Boron-Rich Solids, Proc. 10th Int. Symp. Boron, Borides and Rel. Compounds, Albuquerque, NM 1990 (AIP Conf. Proc. 231), D. Emin, T.L. Aselage, A.C. Switendick, B. Morosin, C.L. Beckel ed., American Institute of Physics: New York, 1991, p. 436.
- 93T1 Takeda, M.: Mater. Trans. 34 (1993) 128.
- 93T2 Takeda, M., Kimura, K., Hori, A., Yamashita, H., Ino, H.: Phys. Rev. 48 (1993) 13159.
- 94T Takeda, M., Hori, A., Yamashita, H., Kimura, K., Ino, H.: Proc. 11th Int. Symp. Boron, Borides and Rel. Compounds, Tsukuba, Japan, August 22 - 26, 1993, Jpn. J. Appl. Phys. Series 10 (1994), p. 29.
- 97G Gusev, A.I.: J. Solid State Chem. 133 (1997) 205 (Proc. 12th Int. Symp. Boron, Borides and Rel. Compounds, Baden, Austria, 1996).