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Development of Machinable Si_3N_4-BN Composite Ceramics

Keiichiro Isomura, Toshihiko Funahashi, Ryoji Uchimura

Synopsis :
Advanced composite ceramics of the Si_3N_4-BN system have been developed. The Si_3N_4-BN composite ceramics (SNB) have been produced using slipcasting technique, which utilizes homogeneous mixing of ultra-fine constituent ceramic powders, and N_2 gas pressure sintering. An essential feature of SNB is that it is possible to change widely their various properties by controlling the proportion of BN to Si_3N_4. The advantageous features of SNB are high thermal shock resistance, high corrosion resistance to molten metal, and excellent machinablity while retaining relatively high

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in consideration of the microstructure of sintered bodies. This report presents the results thus obtained.

2 Method of Experiment

		Si_3N_4 (A)	Si_3N_4 (B)	BN
$\alpha/(\alpha+\beta)\times100(\%)$		>97	93	
	Fe (ppm)	<50	1,800	60

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form ultrafine porous bodies. Similar results were

obtained for the SNB(A) ceramics.

ics ΔT increases with an increase in BN content. The

values of the SNB(A) ceramics are a little higher than those of the SNB(B) ceramics. The thermal shock resist-

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BN content (wt.%)	Young's modulus (N/m²)	Poisson's ratio	Thermal expansion coefficient (RT～1 000°C) (1/°C)	Thermal shock resistance parameter R (°C)
10	1.50×10^{11}	0.21	3.4×10^{-6}	550
20	5.80×10^{10}	0.18	2.2×10^{-6}	850

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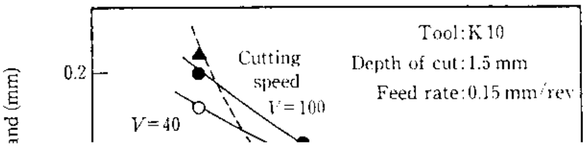
markedly with an increase in the BN content when compared with the Si_3N_4 ceramics without BN, showing a tendency corresponding to the R-value. From Eq. (1), it is considered that this improvement in the thermal



casting, and nozzles for amorphous metal. As a result, it

SNB(B) ceramics.