TABLE I Isomer shifts and quadrupole splitting derived from the energy resolved conversion electron Mössbauer spectra

Spectrometer Setting I (A)	Isomer shift (δ) (referenced to iron foil) (mm sec^{-1})(± 0.004)	Quadrupole splitting (Δ) (mm sec^{-1})(± 0.006)
0.56	0.201	0.507
0.58	0.205	0.508
0.60	0.206	0.520
0.62	0.203	0.525
0.64	0.203	0.521

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Received 20 June and accepted 21 July 1978.

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Microstructural stability of directionally solidified CoTaC eutectic in a high temperature gradient

At the "Conference on In Situ Composites-II", (Bolton Landing, New York, 1975) the problem of microstructural instability of directionally solidified CoTaC in a high temperature gradient transverse to the fibres was discussed. It appeared that an unexpected and unwanted instability of TaC fibres was responsible for the complete degradation of the composite [1, 2].

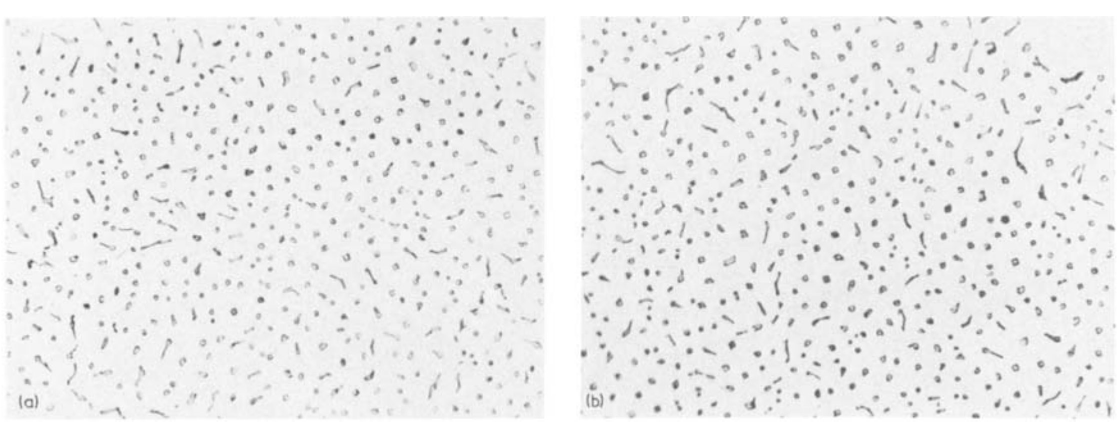

Figure 1 Microstructure of directionally solidified eutectic in a high transverse temperature gradient: (a) as solidified; (b) after 250 h annealing in a temperature gradient of 270 K mm^{-1} at 1383 K maximum temperature.

Stimulated by these results, a new gradient furnace has been built. Its main characteristic is that the heat flow is transverse to fibres in dovetail-shaped samples. The temperature distribution is symmetrical and the temperature is carefully controlled. Details are to be published elsewhere [3].

A Co–17% Cr–10% NiTaC eutectic was directionally solidified at a rate of $0.6\,cm\,h^{-1}$. 5 mm diameter specimens were annealed in a temperature gradient of $270\,K\,mm^{-1}$ in a vacuum in excess of 10^{-1} Pa. After 250h annealing no change in microstructure was detected, and no increase in the fibre diameter or spacing or any change in fibre shape were observed (Fig. 1).

It is concluded, therefore, that under the above-mentioned test conditions there is no visible coarsening or fibre degradation in this eutectic system.

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Received 27 June and accepted 17 July 1978.

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Flux growth of lanthanum borate, $LaBO_3$

The rare earth borates, RBO_3, fall into three groups according to their crystal structure, each group being structurally related to one of the three forms of calcite. $LaBO_3$ has the orthorhombic structure of aragonite and is pseudohexagonal, with the pseudohexagonal *c*-axis parallel to the orthorhombic *b*-axis [1–3].

It has been shown that $LaBO_3$ can be grown from $PbO–B_2O_3$ in the form of small rods or platy crystals [4]. Recently, a model has been proposed for the prediction of starting compositions for the flux growth of crystals with one

TABLE I Compositions and growth conditons for $LaBO_3$

Starting composition* (mol%) (dry materials)			Crucible volume (ml)	Max. temperature and soak period		Cooling rate and minimum temp.		Notes on the results
La_2O_3	B_2O_3	PbO		°C	h	$°C\,h^{-1}$	to °C	
4.0	40	56.0	10	1250	15	3	700	Many small transparent platelets grew in a layer at the surface
3.7	12	84.3	10	1250	15	3	700	Large transparent platy crystals, up to 10 mm × 3 mm × 1 mm, at the melt surface only
4.3	13.2	82.5	10	1250	15	3	700	All crystals grew at the base of the crucible. Rods up to 3 mm × 1.5 mm × 1 mm, tabular crystals up to 4 mm × 3 mm × 1 mm and equi-dimensional crystals 2 mm on edge
4.6	13.2	82.2	10	1250	15	3	700	Rods up to 4 mm × 1.5 mm × 1 mm and faceted crystals 3 mm × 2 mm × 2 mm grew at the crucible base. Solution was complete
5.0	13.1	81.9	10	1250	15	3	700	Many intergrown crystals, indicating that solution was not complete

*Several batches of each composition were prepared.