TABLE II X-ray data for the glycine sulphates

	Triglycine sulphate	Diglycine sulphate monohydrate	Diglycine sulphate
Reference	[2]	[1]	This work
Mol wt	323.3	266.2	248.2
Structure	Monoclinic, $P2_1$	Monoclinic, P2/a	Orthorhombic
a_0	9.15	13.50	10.93Å
b_0	12.69	8.67	17.74Å
c_0	5.73	9.62	9.88Å
β	105° 40′	106° 30′	—
Volume	641	1080	1920 $Å^3$
Z	2	4	8
ρ_x	1.68	1.64	1.72
ρ_m	1.69	1.63	1.743
Transition	49°C	72°C	None

the *a*, *b* and *c* directions at room temperature. No dielectric anomalies were noted up to 100°C. The values for the dielectric constant at 80°C were respectively 7.5, 8.0 and 16.0 in the three directions. The resistivity of the material at room temperature was measured as 1.4×10^9 ohm cm.

Acknowledgements

The authors would like to acknowledge the help provided by Mr C. K. McVean, who carried out the chemical analyses and that this work has been supported by the Procurement Executive, Ministry of Defence.

References

1. E. DOMINGUEZ, B. JIMENEZ, J. MENDIOLA, and E. VIVAS, *J. Mater. Sci.* **7** (1972) 363.
2. E. A. WOOD and A. N. HOLDEN, *Acta Cryst.* **10** (1957) 145.

Received 24 July and accepted 10 August 1972

P. W. WHIPPS
R. S. COSIER
K. L. BYE
Mullard Research Laboratories, Redhill, Surrey, UK

Note on an etching technique for orientation confirmation in a directionally solidified eutectic

The pseudo-binary eutectic between a nichrome matrix and TaC fibres is being studied to determine fracture mechanisms under monotonic and cyclic loading conditions. This NiCrTaC alloy has been directionally solidified at 0.635 cm/h through a temperature gradient of approximately 80°C/cm to give a good fibrous structure of predominantly square TaC rods in a nichrome matrix. The resulting structure has rods 1.5 to 2.0 μm square with an average inter-rod spacing of 7.5 to 8.0 μm. The aspect ratio of the rods is 10^4 or greater.

Both the matrix and fibres are nominally oriented with the ⟨100⟩ direction parallel to the

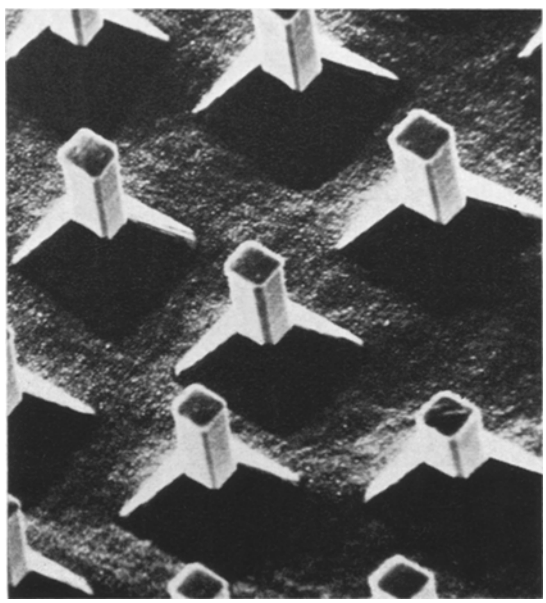

Figure 1 Etched, transverse section of a directionally solidified eutectic showing rod shape and (111) planes in the matrix (× 3000).

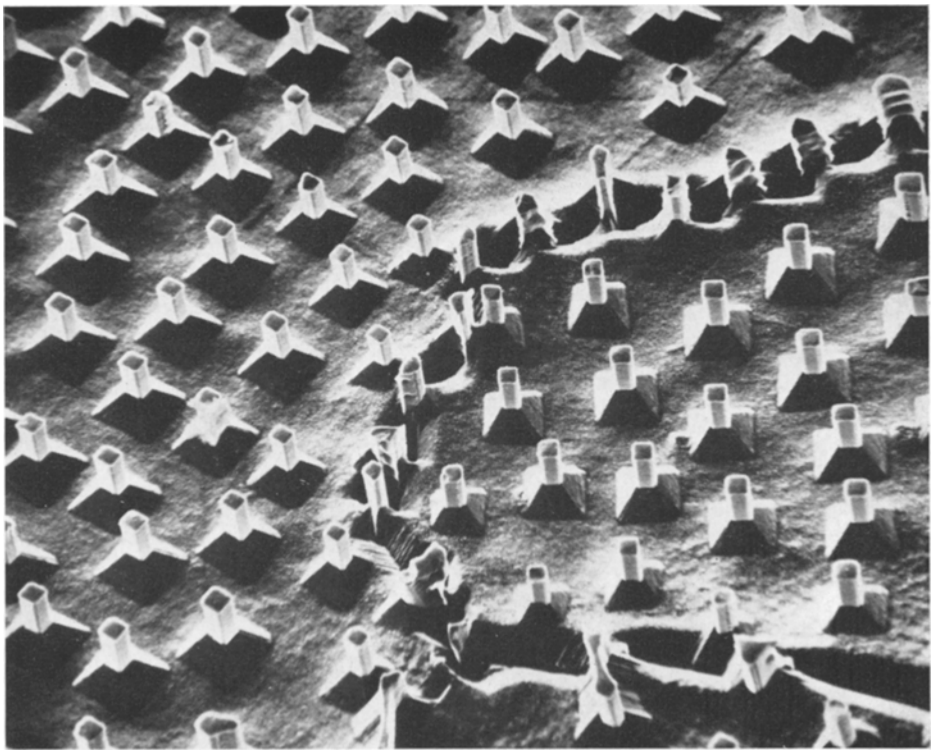

Figure 2 Etched, transverse section showing rotation across a grain boundary ($\times$ 1350).

growth direction. With the aid of M. D. McConnell and O. Pittman (metallographers at the G. E. R. & D. Center) a simple technique has evolved for confirming both fibre morphology and crystallographic orientation of the matrix. A transverse section can be cut from each ingot, polished and then etched with a mixture of 80% HCl and 20% H_2O_2 (30% strength). A typical result is seen in Fig. 1. The etch not only reveals the fibre shape, but also facets the (1 1 1) planes in the fcc matrix and gives a clear indication of the $\langle 100 \rangle$ direction in the matrix. Occasionally the growth process will yield a matrix with the $\langle 100 \rangle$ direction 5 to 15° off-axis even though the rods are still $\langle 100 \rangle$. This is detected easily as a non-symmetry in the "pyramids" at the base of each fibre. The technique is also useful when the $\langle 100 \rangle$ direction is on-axis for observing the rotation in (1 0 0) plane across grain boundaries. Fig. 2 shows a typical grain boundary in this NiCrTaC alloy. Both Figs. 1 and 2 were taken by E. C. Underkoffler (G. E. R. & D. Center) using a scanning electron microscope.

Received 24 July
and accepted 4 August 1972

MICHAEL F. HENRY
General Electric Research and Development Center
Schenectady, New York, USA

NORMAN S. STOLOFF
Rensselaer Polytechnic Institute
Troy, New York, USA