Internal Friction of White Tin Single Crystal

B. CHALMERS[1] noted the existence of α- and β-ranges in the curve of creep-rate versus stress for a white-tin single crystal.

I have made a single crystal of 99·93 per cent pure tin and measured the relation between Q^{-1} and strain amplitude of this crystal at various temperatures by F. Foerster and W. Koester's method[2]. The specimen was 2·5 mm. in diameter, 8 cm. long, and had a fundamental frequency of 1·5 kc./sec. Its axis made angles of 6·3° and 7·2° with [001] and [100], respectively.

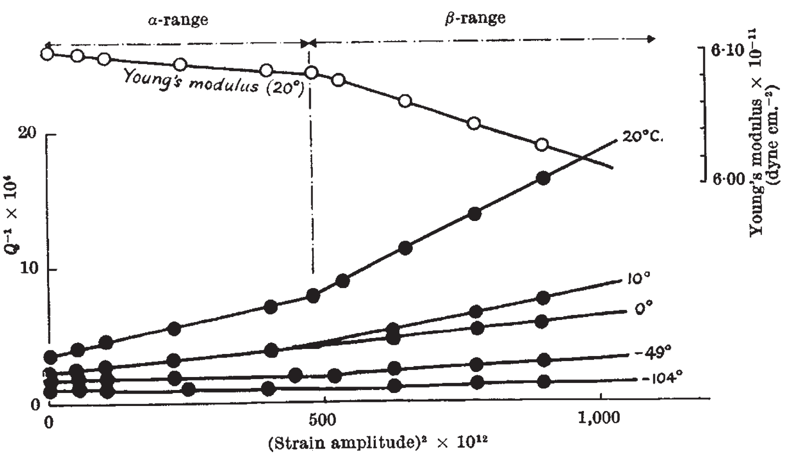

Fig. 1. ●—●—, Q^{-1}; ○—○—, Young's modulus

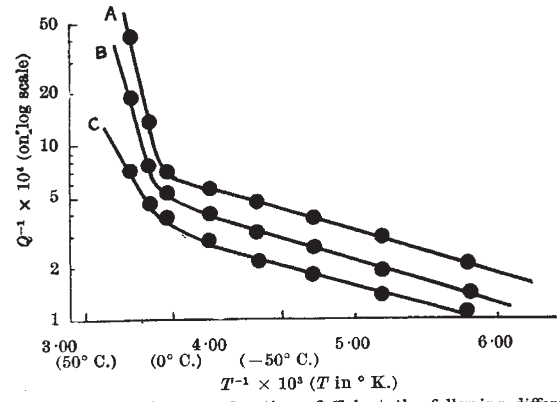

Fig. 2. log Q^{-1} as a function of T^{-1} at the following different strain amplitudes: (*A*) 40 × 10^{-6}, (*B*) 30 × 10^{-6}, (*C*) 20 × 10^{-6}

The critical points in Q^{-1} and Young's modulus curves in Fig. 1 correspond to that in Chalmers's creep-rate curve. In the α-range, Q^{-1} depends on the strain amplitude at higher temperatures, but its dependency is small at lower temperatures.

As seen in Fig. 2, at low temperatures the relation between log Q^{-1} and $1/T°$ K. is linear; but this is not the case above the recrystallization temperature.

A more detailed description of this work will be published elsewhere. I thank Prof. T. Okuda for his guidance.

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[1] Chalmers, B., *Proc. Roy. Soc.*, A, **156**, 427 (1936).
[2] Foerster, F., and Koester, W.. *Z. Metalkunde*, **29**, 109 (1937).

A New Method for measuring Electrical Resistivities

A NEW method for the measurement of electrical resistivities of conductors has recently been developed in this laboratory by inducing a momentary electromotive force in a plane uniform ring of the conductor suitably suspended in a homogeneous magnetic field and observing the resultant ballistic throw. In the actual experiments, the field was horizontal and the ring was suspended from a torsion fibre with its plane vertical and with its axis at an angle of 45° to the direction of the field. When the field is switched off in an interval of time very small compared to the time-period of the suspension, the ballistic kick θ is given by

$$\theta = \frac{A^2TH^2a}{8\pi I\rho L}$$

in which I is the moment of inertia and T the period of oscillation of the suspension, A is the area of the ring, a the area of its cross-section and L its circumference, H is the magnetic field, and ρ is the resistivity. (The effect of the field on the resistivity is ordinarily negligible.)

This expression has been used by us for determining the resistivity of copper at room temperature. The result obtained, namely, 1·83 × 10^{-6} ohm cm. at 25° C., agrees well with the known value of the resistivity of copper. The method will be particularly useful for investigating conductors to which terminals are difficult to attach.

We thank Sir K. S. Krishnan, director of the National Physical Laboratory of India, for his interest in this work.

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Focusing of Waves in Radio Reception

THE normal maximum field-strength in Kent of the broadcast transmission on 9,700 kc./s. (30·93 metres) from Sofia in undisturbed propagation conditions, and at times of the evening or night when 9·7 Mc./s. is about the optimum working frequency for the transmission path by single refraction in the *F*-2 layer, is about 1·0–1·5 millivolts per metre (Fig. 1). The aerial power of the Sofia transmitter is believed to be 120 kW. approximately, and the calculated quasi-maximum field-strength in conditions of minimum absorption agrees fairly closely with this field-strength being obtained at the path-distance involved.

In late 1952, an isolated observation was recorded by chance, in which the strength of Sofia appeared very greatly to exceed the normal value. Other similar abnormally high field-strengths were observed in 1953. In May and June a special watch was kept