At a carbon concentration of 2×10^{-4} the critical velocity is about 20 atomic distances per second at room temperature. The corresponding shear stress to obtain this movement is $\tau_{cr}\approx5\times10^{7}$ dyne/cm^2 which is about a fifth of the yield strength of iron single crystals.

The effects described above should show up in experiments on internal friction and on microcreep.[7] It might be difficult to detect the described energy dissipation of dislocations in the background of the internal friction due to the external forces. There should be, however, a pronounced influence on microcreep. At stresses below τ_{cr} the dislocations can move in typical cases only several atomic distances per second. The corresponding strain rate should be of the order of 10^{-8} sec^{-1}, if we assume a density of moving dislocations of 10^6. Above τ_{cr} the dislocations can move too fast to build up a substantially ordered atmosphere and their velocity is limited by other forces. At τ_{cr}, therefore, a break in creep rate should occur.

[7] B. Chalmers, Proc. Roy. Soc. (London) A156, 427 (1936).

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Hall Coefficient and Thermoelectric Power of Thorium Metal*

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The Hall coefficient of two samples of thorium metal was measured at room temperature in magnetic fields on the order of 4000 gauss, and an average value of -1.2×10^{-11} volt-cm/abampere gauss obtained. The voltage of a thorium-platinum thermocouple in the temperature range 400°C to 1100°C is also reported.

MEASUREMENT of the Hall coefficient of thorium metal at room temperature was performed on two samples of rolled sheet of nominal thickness two and five mils, obtained from A. O. Mackay, Inc. Hall specimens of approximately $\frac{3}{8}$-inch width and $2\frac{1}{2}$-inch length, with an attached potential probe on the midpoints of each of the long sides, were cut from the sheet so that as the Hall current passed longitudinally through the specimen these probes were on an approximate equipotential. These probes were about $\frac{1}{32}$ in. wide at the junction with the side of the specimen and $\frac{3}{8}$ in. long. Each end of the specimen and the Hall probes were held between separate pairs of brass jaws, the latter mounted on a lucite plate and the entire assembly thermally shielded from air currents. The assembly was mounted between the poles of an electromagnet capable of producing fields of the order of 4000 gauss. Hall currents of the order of 5 amperes were passed through the specimen, and readings were taken of the change in probe potential difference as the magnetic field was applied and then reversed. The Hall voltage changes were measured by a null method using a galvanometer of sensitivity 7.7×10^{-11} amp/mm and resistance 600 ohms, the "bucking" potential being supplied and measured by a battery and a calibrated voltage divider. The results obtained are shown in Table I. According to the simple theory of the Hall coefficient of metals, these results indicate conduction in thorium by electrons with a carrier density of approximately 4.7×10^{22} per cc or 1.6 electrons per atom at room temperature. The variation in R_H between the two specimens, exceeding the standard deviations of either specimen, may well be due to differences in past histories of the specimens.

TABLE I. Hall coefficient of thorium.

Specimen No.	Specimen thickness, mils	Hall current range, amp	Magnetic field range, gauss	R_H Hall coefficient, volt cm/abamp gauss
1	2.9	4–5	3700–4500	-1.3×10^{-11}
2	5.2	4–5	3700–4500	-1.1×10^{-11}

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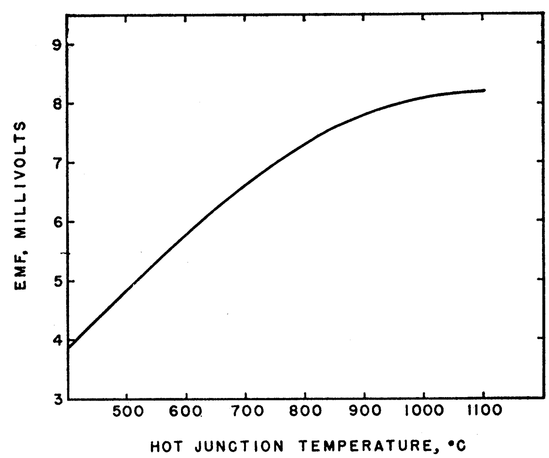

FIG. 1. Emf *vs* junction temperature. Thorium-platinum thermocouple with 0°C cold junction. Th positive with respect to Pt.

A "triple" theormocouple of platinum, platinum-10% rhodium, and thorium was constructed, the thorium wire being strips of the nominal 5-mil sheet spot-welded end to end. This was placed in a thoria insulating cylinder in the heating coil of a vacuum furnace, with the three wires running out through a teflon plug into an ice bath. The resultant emf generated by the thorium-platinum thermocouple (measured with a Beckman portable potentiometer) as a function of the junction temperature, measured by the platinum and platinum-rhodium thermocouple, in the 400°C to 1100°C range, is shown in Fig. 1.