interface shape, and without knowledge of the interactions of thermal fields from growth elsewhere, even from contiguous regions of the same interface.

There can be little doubt that the kinetics and their anistropy play a prominent part in determination of interface shape. It would be profitable to seek the exact relation. Even in the limit of fast kinetics, the mathematical difficulties are formidable, for, as we have seen, the interface is an elliptical paraboloid, which could be treated only with a considerable sacrifice in the present level of precision. Thus, despite the success of the present theories, the process which ultimately determines the problem is, for the time being at least, inaccessible.

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Pressure Dependence of Creep in Zn and Cd*

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Bending creep in Zn is reported as a function of hydrostatic confining pressure P up to 8 kbars. The ratio of activation volume for creep to atomic volume, $\Delta V^{\ddagger}/V_0=0.65-0.044\ P$ (P in kbars), is essentially independent of temperature between 27° and 57°C. The ratio $\Delta V^{\ddagger}/V_0=0.63-0.035\ P$ for creep of Cd is independent of temperature between 0° to 57°C. $\Delta V^{\ddagger}/V_0$ for Zn at a given pressure was 5 to 15% higher for creep than for self-diffusion in the basal plane reported by Liu and Drickamer.

INTRODUCTION

The ratio of activation volume for creep to room-pressure atomic volume, $\Delta V^{\ddagger}/V_0$, in an alkali halide[1] (AgBr), fcc[2,3] Pb, bcc Na,[4] and tetragonal[5] Sn have been reported independent of hydrostatic confining pressure. Where diffusion data were available for comparison, the activation volume ratios for creep and diffusion were similar. This paper reports similar studies on hcp Zn and Cd. The pressure dependence of the ratio $\Delta V^{\ddagger}/V_0$ in Zn, as reported by Liu and Drickamer,[6] is shown in Fig. 1 by triangles for self-diffusion along the c axis, and by squares along the basal plane.

SAMPLE PREPARATION AND EXPERIMENTAL PROCEDURE

Samples were prepared from 99.999% Zn and Cd purchased from the American Smelting and Refining Company. The Zn, received as spatters, was melted and cast in vacuum into an ingot approximately $\frac{3}{8}$ in. in diameter and several inches long. The Cd was received as $\frac{3}{8}$-in.-diam rods. In each case an ingot of material was compressed in a press to approximately 0.2-cm thickness, then cut and filed to size: $0.177\times0.177\times2.5$ cm for Zn and $0.2\times0.2\times2.5$ cm for Cd. The specimens were then annealed in a vacuum for one hour at 300°C (for Zn) or 100°C (for Cd). The final average grain size was 0.3 mm (Zn) or 0.1 mm (Cd).

The pressure equipment, three-point loading device, and deflection measuring apparatus have been described.[3,5] The sensitivity of the differential transformer circuit was 5 V/cm. Deflection rates between about 2×10^{-8} and 10^{-5} cm/sec were observed. The spring-applied load, about 1 kg, corresponded to a maximum tensile stress of 55 kg/cm² and 35 kg/cm² for typical Zn and Cd samples, respectively; varied 50% from sample to sample (depending on individual sample size); and changed during any run by approximately 10% because the sample deformation resulted in a change of spring elongation.

RESULTS AND DISCUSSION

Figure 2 shows a typical creep series for Zn and for Cd where the pressure P has been alternately increased and decreased at intervals of approximately one hour. In the determination of the activation volume, the slope within each of these intervals was determined. Each

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