

between the h.c.p. phase and the d.h.c.p. phase

$$\frac{(c/2a)_{\text{d.h.c.p.}} - (c/a)_{\text{ideal}}}{(c/a)_{\text{h.c.p.}} - (c/a)_{\text{ideal}}} = 0.5 \quad (1)$$

according to theory.

In the Bi-Pb alloy system, the c/a ratio of the h.c.p. intermediate phase centering around 30 at.% Bi is 1.65 at the transformation pressure. For the d.h.c.p. phase, $(c/a)/2 = 1.64$ upon formation. Substituting these values into (1), the ratio 0.41 is obtained, which is slightly smaller than the theoretical ratio, 0.5.

The d.h.c.p. structure may be regarded as a structure intermediate between the face-centered cubic and close-packed hexagonal arrangements. The stacking sequence for the d.h.c.p. structure is ABACABACABACA. For this stacking arrangement to hold, the number of f.c.c. structures must equal the number of h.c.p. structures. In the composition range in which

the d.h.c.p. structure is formed under pressure, the alloy contains approximately equal proportions of α and β before transformation. If the bismuth present (α phase) transforms to f.c.c. packing under pressure, then the two-phase alloy would contain approximately equal amounts of f.c.c. and h.c.p. phases. Then an intermediate phase such as d.h.c.p. is energetically possible in this composition range. Klement *et al.*¹² have proposed that the structure of BiV could be f.c.c. in analogy with the high-pressure phase in thallium. The vol/atom of the d.h.c.p. structure immediately upon formation is 29.8 \AA^3 . The vol/atom of Bi III upon formation is 30.2 \AA^3 . Due to the relatively small energy difference between Bi III and Bi V ($\Delta V = 1.2\%$ upon formation of Bi V from Bi III), it is conceivable that the bismuth (α phase) present in the $\text{Bi}_{0.625}\text{Pb}_{0.375}$ sample transforms to Bi V in order to form the intermediate d.h.c.p. phase at high pressure.

REFERENCES

1. PEREZ-ALBUERNE E.A., CLENDENEN R.L., LYNCH R.W. and DRIKAMER H.G., *Phys. Rev.* A142, 392 (1966).
2. HISCOCKS S.E.R. and HUME-ROTHERY W., *Proc. R. Soc.* 282, 318 (1964).
3. COOKE C.J. and HUME-ROTHERY W., *J. less-common Metals* 10, 42 (1966).
4. BRIDGMAN P.W., *Collected Experimental Papers* Vol. VII, pp. 4451-4468, Harvard University Press, Cambridge, Mass. (1964).
5. HANSEN M., *Constitution of Binary Alloys* pp. 324-326, McGraw-Hill, New York (1958).
6. KLEMENT W., Jr., *J. chem. Phys.* 38, 298 (1963).
7. PIERMARINI G.J. and WEIR C.F., *J. natn. Bur. Stand.* 66A, 325 (1962).
8. WARD K.B., Jr. and DEATON B.C., *Phys. Rev.* 153A, 947 (1967).
9. BLUM F.A., Jr. and DEATON B.C., *Phys. Rev.* 137A, 1410 (1965).
10. GORDON D.E. and DEATON B.C., *Phys. Lett.* 27A, 116 (1968).
11. HODGES C.H., *Acta Metall.* 15, 1787 (1967).
12. KLEMENT W. Jr., JAYARAMAN A. and KENNEDY G.C., *Phys. Rev.* 131, 632 (1963).

Nous présentons des expériences à hautes pressions sur des alliages de Bi-Pb. Les résultats de la diffraction par rayons X montre que la modification à haute pression (16 kbar) d'un alliage de Bi-Pb, ayant approximativement 37% de plomb atomique, est une structure double-hexagonal serrée (type La). Des discontinuités dans la résistivité électrique et le volume spécifique ont été observé durant la transformation.