However, in this paper no attempt will be made to calculate these terms. Finally, we note in passing that for our (12-6) model Poisson's Ratio varies from 0·243 at 0°K to about 0·29 at 60°K. This is to be compared with the values 0·253 at 0°K and 0·27 at 70°K listed by Peterson *et al.* (1966).

§ 5. Conclusion

We have shown that the temperature dependence of the second-order polycrystalline elastic constants of argon are in fairly good agreement with the nearest-neighbour Mie–Lennard–Jones (12-6) potential. However, the very precise isothermal compressibility data of Simmons and his co-workers suggests inadequacies in the model at the highest temperatures. If this inadequacy is confirmed by good single-crystal elastic constant data it will probably mean that a more sophisticated treatment of the higher-order anharmonicity is required for argon.

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Microanalysis of Al + 4 wt. % Cu by Combined Electron Microscopy and Energy Analysis

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Abstract

Direct observations of the energy loss spectra from θ phase precipitates in Al+4 wt. % Cu alloy have been made by means of combined electron microscopy and energy analysis in order to examine the difficulties involved in using this technique for qualitative microanalysis of precipitated phases. It is concluded that a microanalysis will be completely reliable if the peaks in the characteristic energy loss spectra (0 to 50 ev) from matrix and precipitate are reasonably well defined and well separated. If this is not so, then the precipitate must extend from the top to the bottom surface of the electron microscope specimen before any reliable information can be obtained. As far as the extension of the technique to the study of segregation effects is concerned, it is concluded that the boundaries at which such effects are expected must be aligned parallel to the incident electron beam.

§ 1. Introduction

Several techniques have been developed for the microanalysis of metals and alloys. One such method depends on the measurement of the characteristic energy loss spectrum of fast electrons transmitted through thin foils of the metal or alloy. The principle of this method was originally outlined by Hillier and Baker (1944); they envisaged the use of the energy losses produced by the excitation of x-ray levels to identify, qualitatively, the constituent atoms of a specimen. The possibility of applying this technique in conjunction with conventional transmission electron microscopy has recently been realized by the construction of energy selecting electron microscopes (Watanabe and Uyeda 1962, Castaing and Henry 1962, 1964) and energy analysing electron microscopes (Metherell *et al.* 1965, Cundy *et al.* 1966). At present both types of instrument have energy resolutions $\sim$1 to 2 ev, with operating voltages $\sim$80 kv to 100 kv, and utilize the predominant energy losses of the transmitted electrons which lie between 0 and about 50 ev. These low energy losses are characteristic of the electronic band structure of the material of the specimen and do not necessarily indicate the composition of the specimen.

The purpose of this paper is to investigate the difficulties involved in using this technique to perform a microanalysis of an alloy containing a

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