concentration of such disperse systems under shear is unstable.

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[1] Starkey, T. V., *Brit. J. App. Phys.*, **6**, 34 (1955).
[2] Starkey, T. V., *Brit. J. App. Phys.*, **7**, 52 (1956).

Electron Bombardment of Counting Diamonds

The response of six diamonds as conduction counters for α- or β-radiation was determined, using as a criterion the maximum pulse-height versus applied-field curve obtained under conditions of minimum polarization. Without removal from their holders, the diamonds were then exposed to electron bombardment from the 15 MeV. linear accelerator at St. Bartholomew's Hospital Medical College, the counting response being redetermined after each successive bombardment. The electron beam from the accelerator passed through a water collimator. The diamond holders were cooled by water, and the overall temperature of the diamonds was kept below 70° C. during the bombardment. Radioactivity induced in thin strips of copper was used for the routine electron flux dosimetry, the absolute flux estimates being obtained by comparison with calorimetry measurements.

In each of the six counting diamonds bombarded the counting pulse heights progressively decreased with increasing bombardment flux. After a total flux of about 4×10^{16} electrons per cm.^{2} delivered at a rate of 3×10^{13} electrons per cm.^{2} per sec., the counting response was barely detectable, and the diamonds were perceptibly bluish-green in colour. In some specimens the insulation resistance also decreased after bombardment. Two non-counting diamonds were also bombarded and became bluish-green after about the same total electron flux.

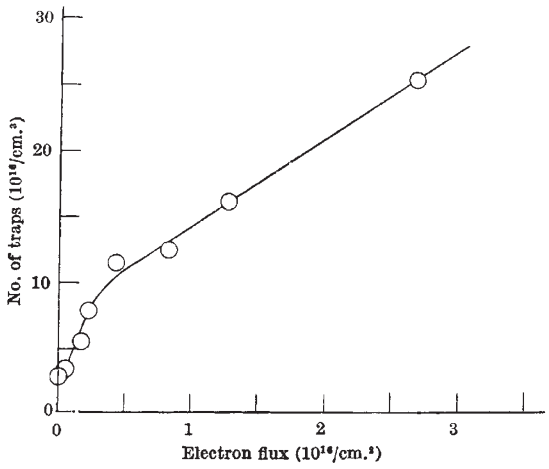

Fig. 1. Formation of additional traps in diamond by electron bombardment

The reduction in counting response is attributed to the trapping effects of additional vacant sites and interstitial carbon atoms introduced into the lattice by electron bombardment. Making certain assumptions, estimates of the number of traps introduced can be obtained from the counting response curves. Fig. 1 shows the typical increase in trap concentration with total bombardment flux. In each instance it was found that the initial rate of trap production was significantly higher than the subsequent rate. There is at present no direct experimental evidence of the causes of this effect; but some form of radiation annealing and the formation of clusters of defects, perhaps preferentially in the vicinity of barrier layers, may be suggested as possible factors. A small amount of thermal annealing at room temperature could also be detected after the lower total bombardment fluxes.

The effect on the counting response of high-energy electron bombardment is generally similar to that of neutron bombardment as reported by Benny and Champion[1]. However, the primary damage produced by electrons should be single or small groups of vacancies and interstitial atoms, whereas neutron bombardment can also give rise to larger disordered regions.

A fuller account of these experiments will be given elsewhere.

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A New Complex Phase in a High-Temperature Alloy

The grain boundary phase (Fig. 1) in Allegheny–Ludlum Steel Corporation's A-286 alloy has been separated electrolytically and examined by X-ray diffraction. (The nominal composition of this alloy is 0·05 per cent carbon, 15 per cent chromium, 26 per

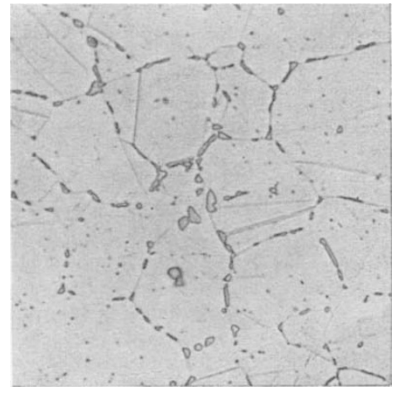

Fig. 1. Etchant: 92 per cent hydrochloric acid, 5 per cent sulphuric acid—3 per cent nitric acid. (× 500)