glows, re-immersion of the vessel (*B*) into liquid helium resulted in the reappearance of the green glow.

It is known that atoms can be pumped some distance from a discharge of the type used here and that atomic concentrations of several percent are easily obtainable.[1] This, together with the facts reported above, leads us to the belief that the cause of the glows, including the phosphorescence, is connected with the presence of free nitrogren atoms in the solid lattice.

Spectra of the glows which we have observed have not yet been fully analyzed but it seems certain that the green bands are identical with those observed in 1924 by Vegard[2] and McClennan and Shrum.[3] These observers found a green glow on bombarding solid nitrogen with electrons and "canal rays" from an electrical discharge. Phosphorescence and phenomena corresponding to the blue flashes were also observed. Since the present method relies on the freezing of products from an electrical discharge rather than a bombardment with charged particles, these results might contribute to a fuller understanding of the actual mechanism involved.

The observations reported here constitute evidence for the existence of atoms coexisting with molecules in the solid phase. Using the same apparatus, products frozen from discharges through hydrogen, oxygen, and water vapor have led to a similar conclusion concerning the collection of atoms (H and O) and free radicals (OH) at liquid helium temperatures.

[1] H. P. Broida and A. G. Gaydon, Proc. Roy. Soc. (London) **A222**, 181 (1954); and R. E. Ferguson and H. P. Broida, Fifth Symposium on Combustion, 1954 (unpublished).
[2] L. Vegard, Nature **113**, 716 (1924), and **114**, 357 (1924).
[3] J. C. McClennan and G. M. Shrum, Proc. Roy. Soc. (London) **A106**, 138 (1924).

Energy Gap of Germanium-Silicon Alloys

A. Levitas, C. C. Wang, and B. H. Alexander
Sylvania Electric Products, Electronics Division, Ipswich, Massachusetts
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THE band structure of germanium-silicon alloys has been explored to the extent that the forbidden band width has been determined as a function of composition. A method of preparing homogeneous samples of these alloys was reported at a recent symposium[1] and this will be described more fully in a future publication, together with data on other properties.

In view of the theoretical and practical interest in these alloys, we are reporting here the results of measurements of the forbidden band widths as they were determined from the slopes of logarithmic plots of resistivity *versus* reciprocal temperature in the intrinsic range. The results are shown in Fig. 1 where it can be seen that the energy gap of germanium rises steeply as silicon is added until it is approximately the same as pure silicon at 50 atomic percent. The curve as drawn tends to have a slight maximum at about 75 percent silicon, although the existence of this maximum is uncertain since it is barely detectable within the experimental accuracy.

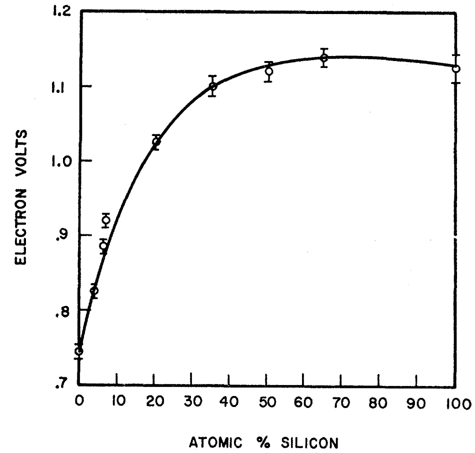

FIG. 1. Energy gap of germanium-silicon alloys against composition.

[1] C. C. Wang and B. H. Alexander, Am. Inst. Mining Met. Engrs. Symposium on Semiconductors, February 15–18, 1954, New York, New York (unpublished).

Paramagnetic Resonance Absorption in a Soft Carbon*

J. G. Castle, Jr.
Department of Physics, University of Buffalo, Buffalo, New York
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EXTENSION of our investigation of the magnetic resonance properties of carbons and graphite at room temperature[1,2] has revealed that the width of the electronic spin resonance absorption characteristic of a soft carbon powder varies with heat treatment of the powder. The observed variation suggests the existence of a physical correlation between the width of the spin resonance absorption and the Hall coefficient.

The carbon powder was prepared from a soft coke by milling it to a mean particle size of one to two microns and then heating to the desired temperature Ht. This temperature determines to a large extent the crystallite size. Each series (having several Ht values) was obtained by heat treating a batch of the coke powder to Ht_1, removing a few milligrams of powder to be labeled by Ht_1, heat treating the remainder to Ht_2, removing more powder, etc. Five such series (with interspersed Ht values) were made from the same Texas petroleum coke powder.

Preparation of the microwave samples again[1] included aligning the graphitic planes parallel to each other throughout a given sample. The geometry in the cavity was again such that the plane containing the dc and