TABLE I. Line widths and line-width parameters.

		ΔH (gauss)	T_2 (seconds $\times 10^{-4}$)
Octadecane	$CH_3(CH_2)_{16}CH_3$	0.37	1.0
Hexadecane	$CH_3(CH_2)_{14}CH_3$	0.29	1.3
Tetradecane	$CH_3(CH_2)_{12}CH_3$	0.15	2.7
Dodecane	$CH_3(CH_2)_{10}CH_3$	0.05	8

frequency was 20 mc. The field was swept sinusoidally at 400 cycles with an amplitude much less than the line width, and the data for the derivative plot[2] of the absorption mode[1] was obtained using a twin-tee narrow band filter in the audio amplifier.

Preliminary measurements have yielded the results given in Table I. T_2 was calculated using the Bloch formulation.[1] All measurements were made at room temperature. The line width for octadecane agrees with that reported by Andrew.[3]

We are now continuing our investigation using proton control of our electromagnet and the steady-state pulsing technique.[4] With this combination of methods, measurements can be extended to narrower line widths. Very narrow line widths (i.e., less than 0.05 gauss) are expected in the short chain hydrocarbons that are being investigated.

* This work was made possible through partial support by the AEC.
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[2] Bloembergen, Purcell, and Pound, Phys. Rev. **73**, 679 (1948).
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New Segregation Phenomena in Metals

M. T. STEWART, R. THOMAS, K. WAUCHOPE, W. C. WINEGARD, AND B. CHALMERS
Radioactive Tracer Laboratory, Department of Metallurgical Engineering, University of Toronto, Toronto, Ontario, Canada
(Received June 18, 1951)

LEAD-BISMUTH alloys containing radioactive bismuth have been examined for segregation of the polonium resulting from the decay of the Bi^{210}. Three types of segregation have been established.

(*1*) *Crystal boundary segregation.*—Bicrystals of bismuth-lead alloys were prepared, a small proportion of the bismuth being the radioactive isotope Bi^{210}. The decay product of Bi^{210} is polonium which, when these experiments were performed, was present in a concentration of approximately one atom of polonium in 10^{10} atoms of bismuth or of the alloy. Autoradiographs of the bicrystals showed that, in spite of its very low concentration, polonium segregates at the crystal boundary. A typical autoradiograph is shown in Fig. 1.

(*2*) *Surface segregation.*—Measurements of the alpha-emission from specimens of similar composition show that the concentration of Po at the surface increases rapidly during annealing, or slowly at room temperature, in alloys of Pb with 10 or 20 percent Bi. The region under examination is restricted to a very thin layer by the extremely short range of alpha-particles. It is concluded that there is a tendency for polonium to segregate at the surface.

(*3*) *Inhomogeneous crystallization.*—When crystals of bismuth containing polonium at a concentration of 10^{-10} are allowed to solidify under conditions of linear growth, the concentration of polonium varies periodically; the periodicity is related to variations in the speed of solidification. A similar effect has also been observed in gold-silver alloys; Au^{198} used as a tracer has shown periodic changes of composition in alloys containing 1/10 percent, 10 percent, and 20 percent gold. The autoradiographs show bands transverse to the direction of growth. An example is shown in Fig. 2.

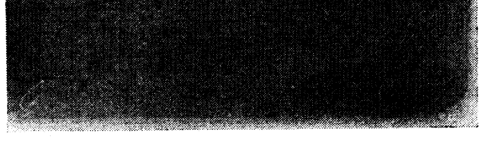

FIG. 1. A typical autoradiograph, showing crystal boundary segregation.

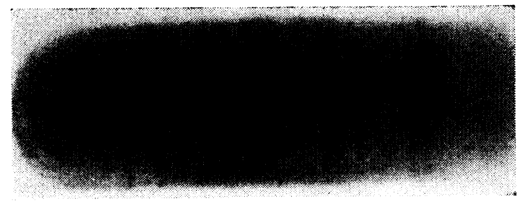

FIG. 2. An autoradiograph showing bands transverse to the direction of growth.

Paramagnetic Resonance Absorption Crystals Containing Color Centers*

MICHAEL TINKHAM AND ARTHUR F. KIP†
Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Massachusetts
(Received June 14, 1951)

HUTCHISON[1] has published results of microwave absorption experiments on alkali halide crystals (LiF and KCl) which were heavily irradiated with neutrons. This treatment produced a very high density of color centers. The resulting microwave absorption at 9350 Mc showed a peak absorption at a magnetic field giving a g factor of 2.00. This corresponds to the result which would be expected on the basis that the spins of the trapped electrons are nearly free. It is also consistent with the observed paramagnetic susceptibility of crystals containing color centers.[2] A perhaps unexpected result was that the absorption was not symmetrical about the peak. On the highfield side a sloping plateau about 500 gauss wide and about one-quarter the height of the peak was found.

We have measured absorption at a frequency of 9480 Mc on crystals of KBr which may have an appreciably smaller density of color centers. The apparatus used in this work was of high sensitivity as compared with the conventional equipment. The method involves sweeping the external magnetic field and displaying the absorption curve directly on a cathode-ray oscilloscope.[3] Details of the apparatus and measuring techniques will be published in a forthcoming paper. The first sample tried (of volume 0.5 cc) had been electrolytically colored (current being passed through the crystal at about 500°C), and had of the order of 10^{19} centers per cc. This sample was kindly provided to us by J. Gelatis and E. Klokholm of the Laboratory for Insulation Research. Our sensitivity was such that we were able only to detect the peak position and not to study its shape. The g value was found to be 2.00 ± 0.04.

Another sample of KBr was bombarded with high energy electrons and gamma-rays (18-Mev peak energy) on the microwave linear accelerator at the Massachusetts Institute of Technology for about 4 hours. Optical absorption measurements indicated between 10^{19} and 10^{20} centers per cc. The peak of the optical absorption band was at 6300A, indicating that the predominant optical absorption was due to F-centers.[4] In this sample, the microwave absorption was sufficient to allow accurate determination of the shape of the absorption curve as well as its position. In contrast to Hutchison's results, we found complete symmetry of the absorption curve about its peak. Moreover, our sensitivity was such that we could have seen a plateau which was less than 10 percent of the height of the peak absorption. The g

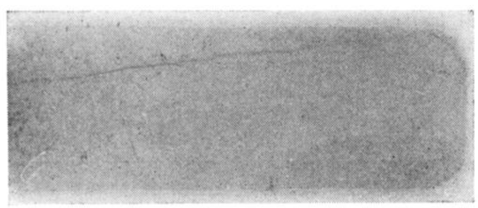

FIG. 1. A typical autoradiograph, showing crystal boundary segregation.

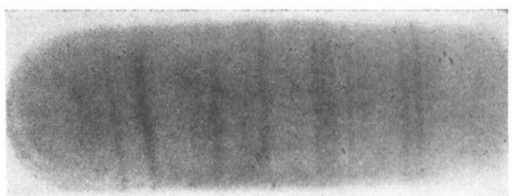

FIG. 2. An autoradiograph showing bands transverse to the direction of growth.