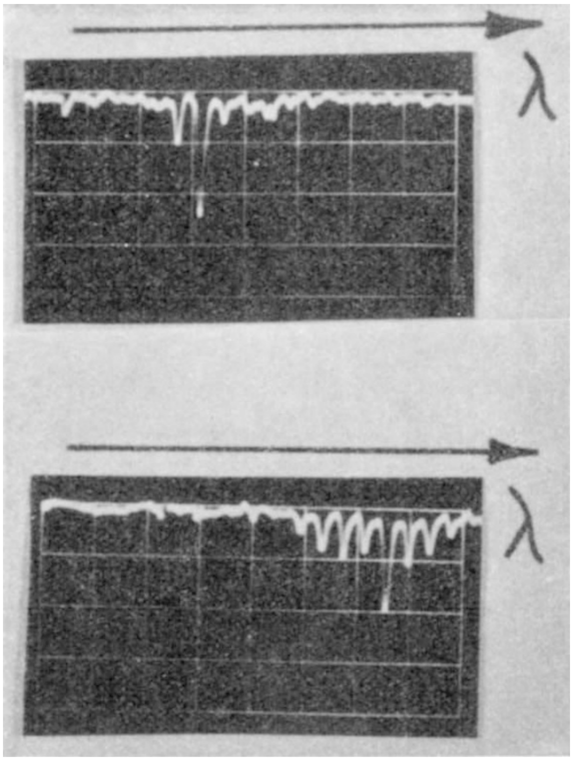

Fig. 1. Above, oscillogram giving spectrum of laser alone; below, oscillogram giving spectrum of laser and plasma together

end of the cable was terminated and the other passed to the input of a Tektronix 517 *A* oscilloscope. The photomultipliers were RCA type 7265. Variations in sensitivity among the channels due to the attenuations of the delay cable, different transmissions of the light guides and variations in the sensitivities of the photomultipliers themselves were compensated by adjusting the voltages applied to the dynodes of the different tubes. Because the shot noise arising from the light emitted by the plasma would combine from the different channels to give a noise level $(14)^{1/2}$ times larger than that of each channel alone if the photomultipliers were continuously active it was necessary to include an electro-optic shutter which would admit light to the analyser only during the time of the giant pulse. A Kerr cell was thus placed in the system immediately before the etalon and pulsed open for 50 nsec at the time of the giant pulse. Except for this Kerr cell and the multichannel spectral analyser the apparatus and experimental conditions were essentially as described in the first reference.

The free spectral range of the etalon was 0·78 Å, hence the spectral interval between channels was 0·056 Å. Fig. 1 shows the spectrum of the laser pulse alone and the spectrum of the light in the plasma. The difference in position of the laser pulse between the two shots is an example of the troublesome fluctuations in laser emission frequency that plagued our earlier work.

It will be noted that the present spectrum is consistent with our previous results in so far as the errors in the other permit comparison. The ion temperature computed from the present profile is ~ 50 eV. The spectrum shows some evidence of the 'shoulders' or weak maxima predicted by the theory. A slight asymmetry toward shorter wave-lengths is observed, but this effect is not as strong as it appeared in the previous report, as the low-frequency wing of the ion spectrum was completely obscured by the shot-to-shot fluctuations of the laser central frequency.

The profile of the ion spectrum corresponds most nearly to that for equal electron and ion temperatures. Using the estimate of density obtained from the magnitude of the total scattered intensity the resulting value of α is well in excess of unity.

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Annealing Investigations in High Dose Graphite

AFTER irradiation, the electron microscope has been used to show that graphite contains a dense speckling attributed to interstitial aggregates[1,2]. This anneals into resolvable loops, and finally disappears between 1,700° and 2,000° C.

In the work recorded here, graphite crystals obtained from the Ticonderoga Lead Mines, New York State, have been cleaned in the usual manner and irradiated to a total nickel dose of 5×10^{20} n cm^{-2} at 200° C. As received the crystals could not be cleaved into specimens suitable for transmission electron microscopy. After annealing at 2,500° C in a carbon tube furnace flushed with argon, the crystals were easily cleaved and were found to contain a high density of large loops about 1000 Å diameter, all sheared by a 1/3 $<10\bar{1}0>$ displacement, and similar in appearance to those reported by Heerschap and Delavignetto[3]. However, by tilting the foil to remove the ambiguity of the basal plane component of the Burgers vector, and observing the way the contrast changed from one side to the other of the dislocation line on tilting the specimen through small angles about a Bragg reflexion[4], the loops were found to be of interstitial character.

A modified[5] specimen holder for the Philips *EM* 200 allowed a thin foil to be annealed in a furnace and a predetermined area to be re-examined. Hence it was possible to observe given loops after a series of 5 min anneals at 2,500° C and to measure their change in diameter with time.

It was found that all loops obeyed the equation[6] :

$$\frac{dr}{dt} = A \cdot \exp\left(-\frac{E}{kT}\right) \cdot \left[\frac{1}{r} - \frac{1}{\bar{r}}\right]$$

where A is a constant, E the energy of formation plus the energy of migration for the mobile point defects. Loops of radius r larger than a critical radius $\bar{r}$ grew, and loops smaller than $\bar{r}$ shrank. This is typical of a supersaturation controlled process. From a plot of dr/dt against r a value of 5·5 eV was obtained for E.

This result can only be taken as approximate at the moment because of assumptions made in evaluating the pre-exponential factor A. It is hoped to improve the accuracy by carrying out further isothermal anneals at different temperatures.

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