

LETTERS TO THE EDITOR.

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Soft X-Rays and Photoelectrons from Nickel at Different Temperatures.

TARTAKOWSKY AND KUDRJAWZEWA¹ found that the secondary electron current from heated nickel showed a sudden decrease at the Curie point (358° C.). They inferred that the conduction electrons emitted when the metal was bombarded were also responsible for the ferromagnetism of the metal. Hayakawa² utilised this method to study transformations in metals and metallic alloys. He has reported the existence of a critical potential for each ferromagnetic metal, the variation of the secondary current changing sign as the applied potential is increased to values higher than this critical voltage. He has accounted for the existence of such critical values from the point of view of Richardson's structure electrons.³

The close connection between the soft X-ray excitation on the one hand and secondary electron emission and photoelectric activity on the other, has been the subject of extended investigation in Professor Richardson's laboratory in London.⁴ The question hence arises as to whether any sudden variations exist in the soft X-ray excitation and photoelectric efficiency of ferromagnetic metals as their temperatures are raised beyond the Curie point. Nickel was chosen for special investigation.

The experimental tube was of pyrex. The electrical connections were similar to those employed by Richardson and Rao⁵ in their study of soft X-rays from metals.

The working pressure was maintained below 10^{-6} mm. as indicated by a Macleod gauge.

The photoelectric efficiencies of copper and nickel when exposed to soft X-radiation (applied potentials of 100 and 150 volts) were found to be independent of temperature in the range 30° to 500° C. These results agree with similar observations made in the optical region.⁶

The soft X-ray intensity from well degassed polycrystalline nickel increased with temperature gradually at first and more rapidly at higher temperatures. No abrupt change in intensity was observed at the Curie point of nickel.

A comparative study was also made of the photoelectric efficiencies of polycrystalline nickel and a single crystal of nickel with 110 face. The photoelectric efficiency of the 110 surface was found to be smaller than that of the polycrystalline nickel face by about 12 per cent. This interesting observation can be accounted for in the following manner.

Nakaya⁷ has shown that a heavy bombardment on a well-polished metal has the same effect as etching and that the crystal facets are brought out in the process. We have X-ray evidence⁸ to show that the structure at the boundaries of the large number of crystals developed during bombardment is considerably distorted. Hence it is likely that the photoelectric emission (as also secondary emission) from these regions is much greater than from regions of more perfect structure,

