investigations. This makes it impossible to predict which of the metals should be adsorbed on the surface. If we assume, however, that the difference of surface tensions is the cause of highly selective oxidation of aluminium-beryllium and aluminium-magnesium alloys, it is to be inferred that the surface tension of magnesium and beryllium is much lower than that of aluminium.

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¹ Preston, G. D., and Bircumshaw, L. L., *Phil. Mag.*, **20**, 706 (1935).

² Iitaka, I., and Miyake, S., *NATURE*, **136**, 437 (1935); **137**, 457 (1936).

³ Dobiński, S., *NATURE*, **141**, 81 (1938) and *Bull. Int. de l'Acad. Pol.*, **169** (1938).

⁴ Dobiński, S., and Jagielski, A., *Bull. Int. de l'Acad. Pol.*, **424** (1938).

⁵ Dobiński, S., and Gryca, J., *Acta Physica Polonica*, in the press.

Extremely Bright Spots on Coolidge Tube Target

WHILE making tests with a newly made Coolidge tube with molybdenum target, we discovered several bright spots of unusual brightness on its target surface.

The accompanying illustration shows (a) photographs of the target when only the cathode of the Coolidge tube was heated, that is, while the X-rays were not being radiated, and (b) of the same target taken when a voltage of 50-cycle 40 kv. (peak value) was impressed on the anti-cathode and an electronic current of 20 mA. D.C. was flowing, that is, while X-rays were being radiated. In front of the lens of the camera, a right-angled glass prism was attached so as to prevent the X-rays being projected on the sensitized plate of the camera. In (b) several white spots will be seen, whereas in (a) no such spots exist. The photograph does not show these spots well; the actual bright spots glare quite intensely and look as if they were embossed on the target surface. The target of the Coolidge tube was continuously cooled with running water.

In order to ascertain whether these bright spots were produced during the half-cycle in which the

electronic current follows, or during the other half-cycle, a stroboscopic observation was made, and it was found that they were produced only during the former half-cycle, and the larger the instantaneous value of current the greater the intensity. Furthermore, when the heating current of the cathode was kept constant, there was practically no change in the brightness of the spots, even when the anode voltage was lowered to a voltage such as 10 kv. (peak value), at which no radiation of the characteristic X-rays of molybdenum would take place; but when the heating current was varied, the brightness was greatly affected, these spots being nearly invisible when the electronic current was less than 10 mA.

From these results it would appear that the spots are due to electronic bombardment; in other words, due to a particularly intensified electric field at some minute protrusions accidentally existing on the target surface, the protruding points become incandescent. As clearly seen from the photographs, the surface of the target is not perfectly smooth; it is covered with scratches, as if the surface had been brushed over. These facts support the view put forward.

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A SIMILAR phenomenon to that described by Messrs. Koga and Tatibana has been observed during the course of certain research work on multi-segment magnetrons operating under rather abnormal circuit arrangements at about 80 cm. wave-length.

Brilliant points of luminescence have been observed on the rear surfaces of the anode segments, which are each in the form of a hollow tantalum triangle with one curved face receiving the electron stream, and generally running very hot, about yellow-white. The appearance of these spots of light was so distinctive that it was at first thought that holes had been formed in the anode rear surface, making visible the almost white-hot inner face. On examination, when not operating, it was seen that the anodes were not punctured, nor was it possible to account for such puncturing, although a 'cyclotron' effect has been observed giving a charge on a screen surrounding the anodes four times the voltage applied to the anodes.

It was found that a high output was needed before the spots appeared and the general order was about 400 watts radio frequency with the anodes dissipating about 175 watts. Furthermore, the spots were critical with regard to filament emission and also disappeared suddenly below 2,100 volts on the anodes, but were quite unchanged by large variations of voltage above this: a fact which is noticed by the Japanese investigators.

I remember noting several years ago similar effects in a Farnsworth cold cathode multiplier (photo-electric cathodes with focusing magnetic field) where flash-overs kept occurring, maybe due to the liberation of gas from an almost microscopic incandescent protuberance.

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