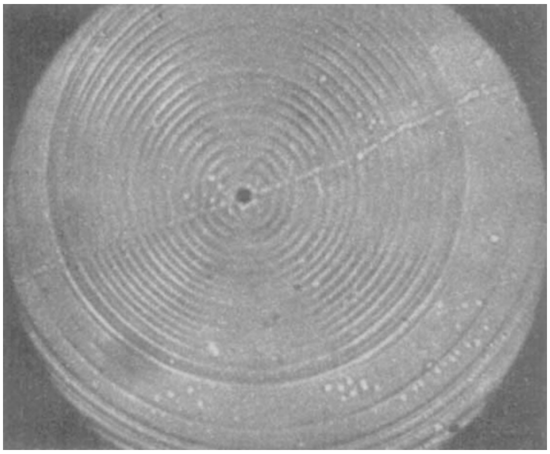

Fig. 1

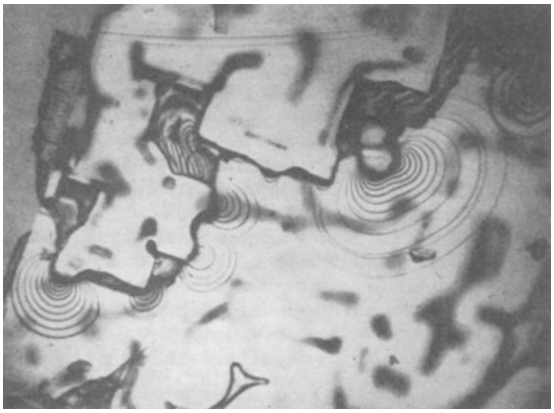

Fig. 2

especially on the edge of the surface where the two sodium chloride plates lay on each other during the evaporation.

Gy. Turchányi
T. Horváth

Institute of Medical Physics,
Budapest.

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Exo-electron Emission and the Optical Properties of Oxide-coated Metal Surfaces

Evidence suggests that exo-electron emission from ionic crystals is associated with colour centres and kindred imperfections which result in energy-levels in the forbidden band of the crystal[1]. Grunberg and Wright[2] found very strong exo-electron emission from abraded aluminium, zinc and magnesium irradiated with light at 4700 Å. The tendency of these elements to form metal excess oxides led Grunberg and Wright to suggest that these may be present in the oxide oxygen ion vacancies occupied by two electrons called, by analogy with the alkali halides, F'-centres. The excitation of the F'-centres by light of 4700 Å. was suggested as an important process in the mechanism of exo-electron emission from metals.

The method of preparation of metal surfaces is known to affect the experimentally determined

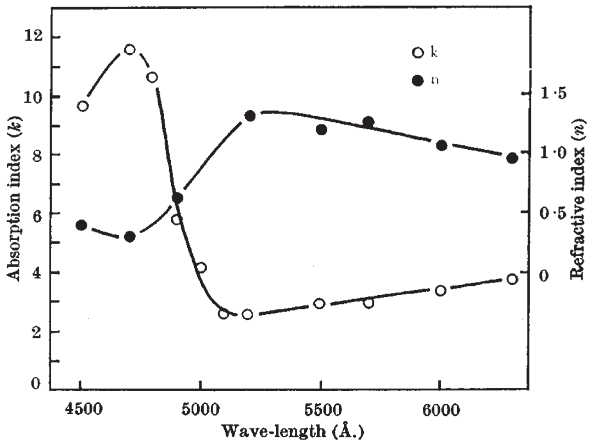

Fig. 1

optical constants, no doubt due to differences in structure of the surface layers. The oxide film on a mechanically polished metal surface would probably contain large numbers of the proposed F'-centres, which might be expected to increase the dielectric constant of the film in the region of 4700 Å. with a consequent alteration in the measured values of the optical constants.

The optical constants of mechanically polished aluminium and zinc have been measured for various wave-lengths in the visible region by the Drude method. Fig. 1 illustrates the variation in the absorption index, k, and the refractive index, n, for aluminium, showing a considerable increase and decrease, respectively, in the vicinity of 4700 Å. A similar result was obtained with zinc. Further work, at present in progress, is, however, required to establish a definite relationship with the proposed F'-centres.

J. A. Ramsey

School of Physics,
Newcastle University College,
University of New South Wales.

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Ratio of Nucleon Mass and Electron Mass

With reference to the experimental value 1840 for the ratio of nucleon and electron mass, mentioned by Prof. A. J. Rutgers in *Nature* of September 19, p. 1959, it may be noted that the ratio of proton mass and electron mass is given by the exponential equation:

$$\frac{m_p}{m_e} = \frac{1}{2}\exp(-1) \times 10^4 = 1839{\cdot}39$$

More generally, the rest mass of an elementary particle, relative to the rest mass of the electron, is $m/m_e = k\exp(-x)$, and since $\exp(-x)$ is a 'die-away factor', this formula represents the tendency of the mass of an elementary particle to decrease. For all elementary particles except the electron with minimum rest mass, and the proton with relative rest mass $m_p/m_e = k\ \exp(-1)$, the tendency to decrease of rest mass has been demonstrated experimentally.

R. L. Worrall

31 Braeside Avenue,
Sevenoaks, Kent. Nov. 1.