of 2400A from a monochromator was polarized by a pile of quartz plates and passed through a jet of potassium vapor. A cylindrical grid provided a field-free space in the region of the illuminated vapor so that electrons passed out of the grid in the original directions of ejection by the light. A slit and faraday cylinder arrangement served for the measurement of the number of photoelectrons ejected in various directions relative to the electric vector of the exciting light. Though the energies of ejection were less than one volt-electron, the experiments have clearly shown that the optimum direction is that of the electric vector. Approximately twice as many electrons were observed to be ejected in the direction of the electric vector as at right angles thereto. It seems probable that the electrons observed as ejected at right angles to the electric vector were scattered by the vapor. Correcting for this scattering the observed variation with angle of ejection follows the cosine squared law deduced by Sommerfeld on the basis of the wave mechanics.

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Electrostatic Surface Fields near Thoriated Tungsten Filaments by a Photoelectric Method

The electrostatic fields acting on electrons emitted from a thoriated tungsten filament[1] were studied by the photo-electric method described in a paper by E. O. Lawrence and the writer.[2] The cell was essentially the same as that used in the previous work. In the absence of potassium, a calcium deposit in a side tube immersed in liquid air was used as a getter.

The applied accelerating fields varied from 360 volts/cm, with a corresponding threshold at 4900A (6.1×10^{14} sec^{-1}), to 48,200 volts/cm, with a corresponding threshold at 5500A (5.5×10^{14} sec^{-1}). The apparent reduction in the work function by the increased field was 0.25 volt. This reduction is much larger than was produced by corresponding fields on potassium films, or the reduction which would occur if the Schottky (image force) law held. In the latter case the reduction would be 0.08 volts.

When the fields are calculated, as in the previous work, they are found to approximate the Schottky fields at distances less than 1.5×10^{-6} cm. At 10^{-5} cm from the surface there is a field of about 6000 volts/cm, and at 8×10^{-5} cm from the surface, a field of about 1000 volts/cm. The image fields at these distances are 350 volts/cm and 6 volts/cm respectively. The observed fields are very nearly the same as those Becker and Mueller[3] calculated for 70% thoriated tungsten from thermionic data. The agreement between the two independant methods of determining the fields is striking, and shows that sufficiently large fields are present near thoriated filaments to cause the noted deviations from Schottky's thermionic emission equation.

The hypothesis that the thorium ions exist on the surface in patches[4] which are electropositive with respect to the tungsten, appears best to explain the fields. Electrons emitted through these patches would not only be retarded by the image field, but also by the field between the patches and the ions. A uniform charge distribution on the surface could not cause the observed fields.

The writer intends to continue the studies under different methods of activation before making a detailed report of the work.

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[1] A 4.4 mil thoriated tungsten filament (T122×10) kindly furnished by the Bell Telephone Laboratories, New York.

[2] Lawrence and Linford, Phys. Rev. **36**, 482 (1930).

[3] Becker and Mueller, Phys. Rev. **31**, 431 (1928).

[4] Reference 12 of the paper by Lawrence and Linford lists several articles on the theory of patches.