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*Physical Sciences*

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## ELECTRICAL RESISTANCE OF CADMIUM FILMS

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Continued experiments with a molecular beam apparatus in which spectroscopically-pure cadmium was evaporated and deposited on a glass plate cooled either by liquid air or by solid carbon dioxide show that these films first become electrically conducting at an equivalent thickness of  $2.7 \times 10^{-7}$  cm and have a critical thickness of  $68 \times 10^{-7}$  cm. In general the films deposited at solid carbon dioxide temperature became conducting at a smaller equivalent thickness and had a higher critical thickness than those deposited on the plate cooled by liquid air. Special precautions were taken to have good contact between the film and the electrodes, lack of which probably accounts for the large critical thickness for cadmium previously reported. [Roller and Woolbridge, *Phys. Rev.* 45; 119 (1934)].

For the liquid air cooled films, the electrical resistivity of cadmium at the critical thickness is about fifteen times that of bulk metal.

Since the critical thickness of cadmium thus turns out to be of the same order of magnitude as those reported for all other metals except mercury, it seems doubtful whether it is of much value as a criterion in predicting certain photoelectric properties of thin films as we once proposed.

The results of our experiments can be explained only on the basis of a patch theory of film structure. They are qualitatively in accord with the theory proposed by Frankel [*Zeit. f. Physik* 26; 117 (1924)].