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STEP

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TITLE:

On some external influences upon the photostimulated exoelectron emission of stretched Al foils

PERIODICAL:

Acta Physica Polonica, v. 22, Supplement, 1962, 59 - 69

TEXT: The influence of the measuring arrangement, hygroscopic moisture, thermal pretreatment and surface layer on the photostimulated exoelectron emission from industrial Al foils during and after plastic stretching is investigated. The samples were in the form of shouldered rods (60 · 10 · 0.1 mm), cleaned in KOH and rinsed in H₂O and acetone. The measuring arrangement comprised a light source (tungsten lamp 50 w/6 v, unfiltered) an air point counter with wire-lattice cap (size of mesh 2 · 2 mm) and a tensile testing machine (stretching rate 0.003 - 0.05 cm sec⁻¹ = 0.04 - 0.55 % sec⁻¹) placed in a dry-box to keep the hygroscopic moisture and the temperature constant, also voltage generators (high voltage and 50v accelerating voltage), amplifier,

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integrator and chart recorder. Through a plexiglass lens a light spot of 6 mm diameter was thrown on the sample. Maximum intensity distribution occurred when the light spot coincided with the place of rupture, this being where deformations are greatest. However, in different sites near the rupture, different attenuation rates were found. The timing of the electron emission is much influenced by the strain. Hence the zero point of the attenuation measurement can be determined with sufficient accuracy in samples whereon cracking quickly spreads over the total width, because the mechanical stress vanishes suddenly, but not so with samples having several lateral flaws. A thermal treatment (2 hours at 500°C in air) resulted in an emission increase according to the formula by Grunberg and Wright (Acta phys. Austriaca, 10, 375, 1957) $N/t = A(\epsilon - \epsilon_0)^n$. Depending on the kind of cooling, the mean value of the measurements was $n = 2.93$ for samples chilled to room temperature and $n = 2.18$ for samples cooled slowly at 2°C/min. The attenuation curves indicate two exponential processes and yield higher emission with chilled samples, while the partial processes decrease more rapidly if samples are cooled slowly. The hygroscopic moisture (18 - 35% at 30°C) influences the attenuation curve of the exoelectron emission in such a way that with higher hygroscopic moisture the

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intensity decreases more rapidly per unit of time. No emission could be found on pure oxide layers (produced by anodic treatment and etching of the metallic backing). There are 9 figures.

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