

Calibration of Surface Densities of Metal
Films by Optical Transmittance

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ABSTRACT

For evaporated metal coatings (Al, Cr, Cu, Au, Ag, Sn, and Ti) we have developed curves of optical transmittance vs surface density that can be used to estimate surface densities to within about $\pm 20\%$.

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We have found that calibration curves of optical transmittance of carbon⁽¹⁾ and metal films are particularly useful in the preparation of beam-foil targets and ultraviolet filters. We have therefore developed such curves for a number of metals of use to us.

In order to produce such curves, microscope slides were cleaned and weighed, and then metal films were evaporated onto them by conventional techniques. The optical transmittances of the coated slides were then measured at $\lambda 5461\overset{\circ}{\text{A}}$, and the slides were re-weighed to determine the surface densities of the coatings. We found during this procedure that it was not possible to carry out accurate measurements with slides that had been coated with a soap-like parting agent, since these would lose weight upon being placed in vacuo.

Pressures in the vacuum system during evaporation were typically 1×10^{-5} torr. It is certain that all of our coating were contaminated either by oxide layers, burial of residual gas, and/or adsorption of active molecules. The curves indicate such effects by the extent of their non-reproducibility, most serious for the active species Ti, Al,

Cr, and less serious for the other metals. However, the conditions under which these layers were made are typical of those used in the preparation of conventional nuclear targets, and hopefully have some application to such targets.

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References

- 1) John O. Stoner, Jr., J. Appl. Phys. 40, 707 (1969).

See Also: I. S. McIntock and J. C. Orr, Chemistry and Physics of Carbon, P. L. Walker and P. A. Thrower, editors, Vol. II (Marcel Dekker 1973); John O. Stoner, Jr., and Stanley Bashkin, Proc. INTDS (1976); P. Maier-Komor, Proc. INTDS (1976).

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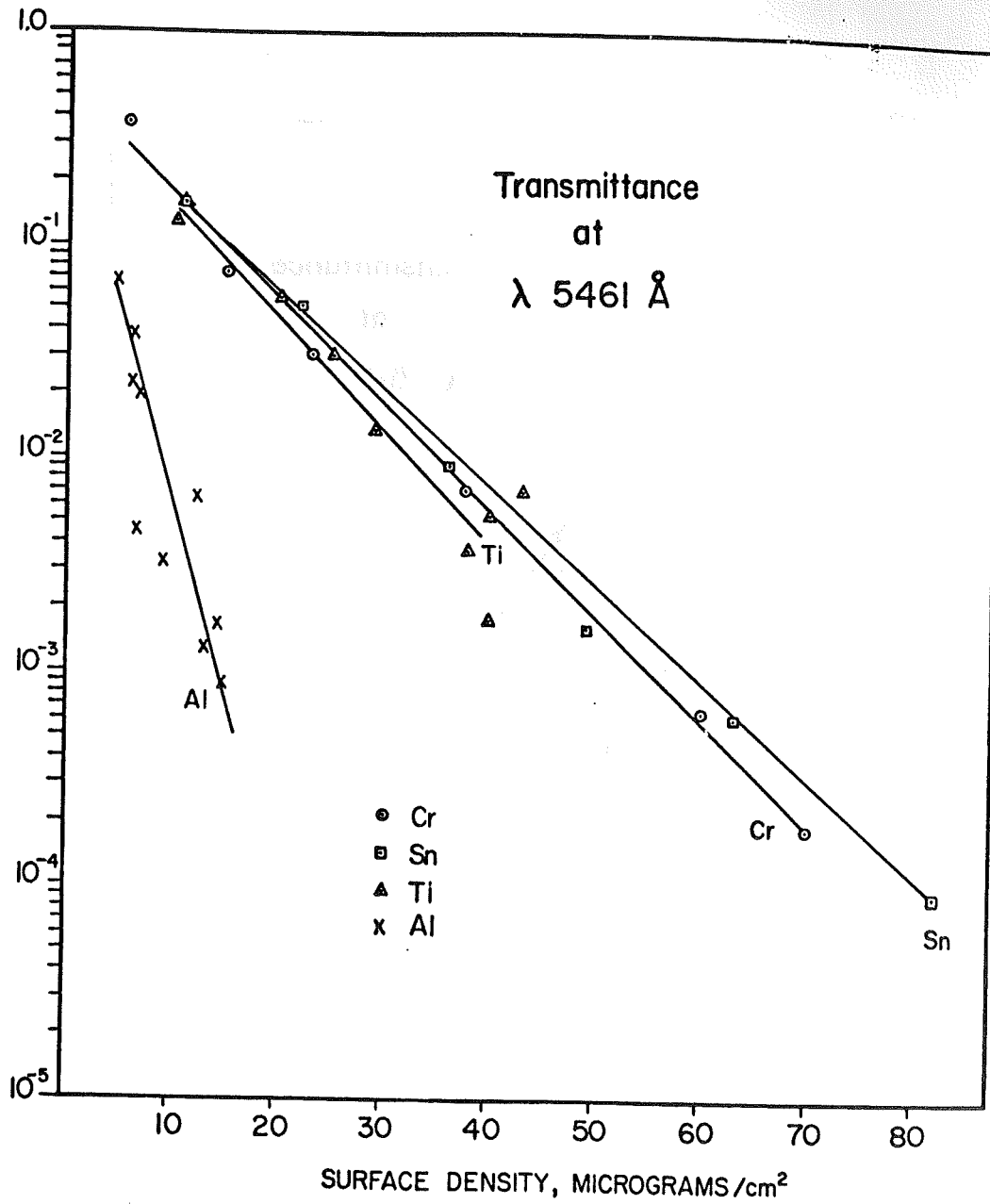


Figure 1. Calibration curves for Al, Cr, Sn, and Ti films deposited on microscope slides by vacuum evaporation.

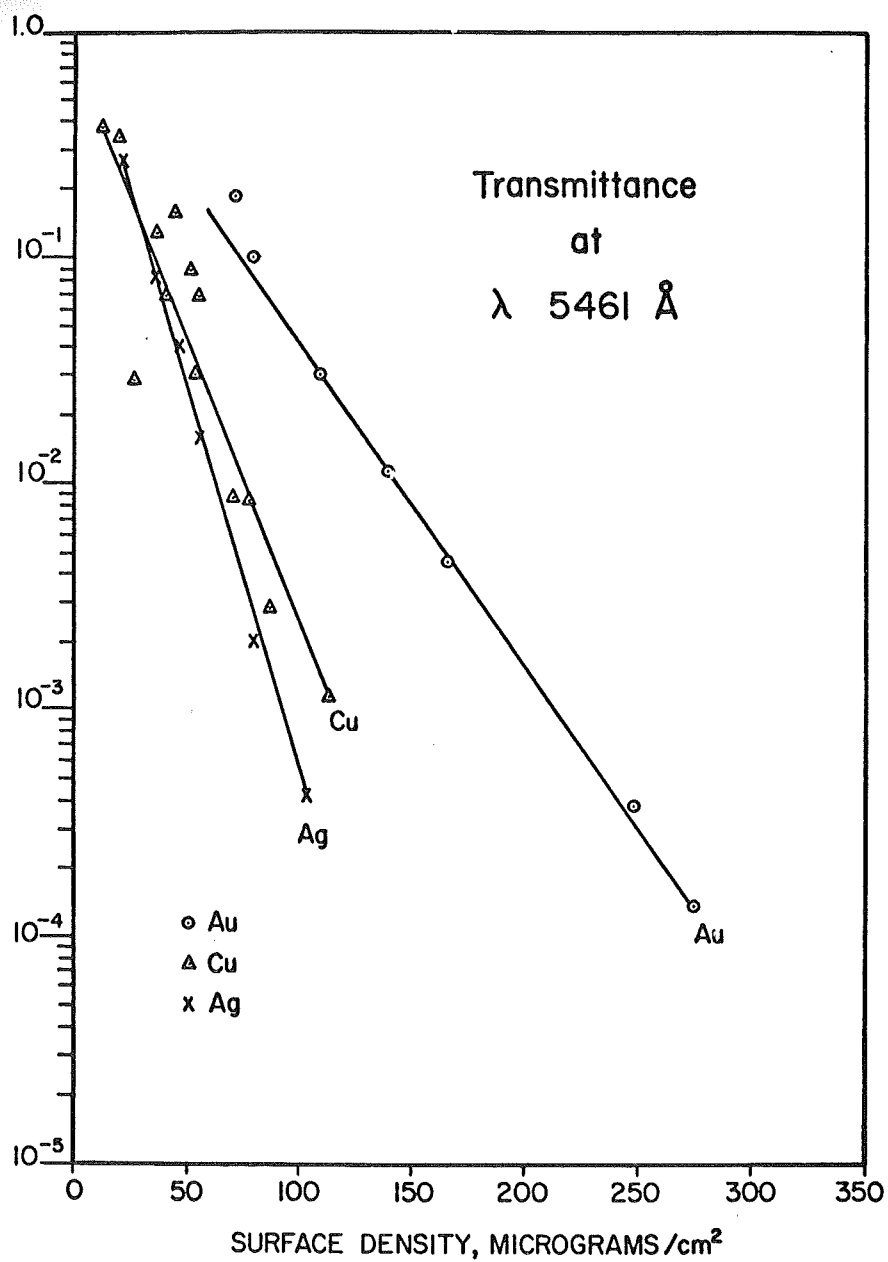


Figure 2. Calibration curves for Ag, Au, and Cu films deposited on microscope slides by vacuum evaporation.