

Bild wird mit einer Lampe auf dem Leuchtschirm



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A New Atom Probe FIM*

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The atom-probe FIM^{1,2} as conceived by the senior author consists of a field ion microscope with a movable tip and a probe hole through which a selected, pulse field-evaporated surface ion can be led into a mass spectrometer section for e/m analysis. A new instrument has been constructed³ which permits a micrometrically controlled pivoting of the specimen by a crystallographic angle of $\pm 45^\circ$. The screen image may be photographed with the same quality as in a conventional FIM. A one or two meter time of flight tube is employed. Electron multiplier detector signals are recorded on a storage oscilloscope. Operation of the instrument in the presence of the image gas is possible, particularly when image intensification and dynamic gas supply are used.

Preliminary results with the new atom-probe FIM confirm the unexpectedly high charges of some desorbates observed in our early work under less clean surface conditions. Tungsten appears as either 4-fold or 3-fold charged ion, and the mass resolution can be detected by the appearance of the isotopic mass variation in repeated shots or in events in which two ions passed through the probe hole. Tantalum is also 4-fold and 3-fold charged, while iridium exhibits only 3-fold and double charged ions in the temperature range of 21° to 78°K studied so far. The occurrence of these highly charged ions presents a challenge to the present theory of field evaporation.

1. E.W. Müller and J.A. Panitz, 14th Field Emission Symposium, National Bureau of Standards, 1967
2. E.W. Müller, J.A. Panitz, and S.B. McLane, Rev. Sci. Instr. 39, 831 (1968)
3. E.W. Müller, S.B. McLane, and J.A. Panitz, Proc. 4th Regional European Conference on Electron Microscopy, Rome 1968

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