High Repeatability Precision and Trueness of Au / Pd Coating Measurements on Leadframes

As the electronics industry makes use of ever thinner coatings, manufacturers increase their demands on measuring technologies to provide reliable parameters for product monitoring and control. The coating system Au/Pd/Ni is frequently used in the electroplating of leadframes, with CuFe2 (CDA 195) as substrate material. Typical coating thicknesses are between 3-10 nm Au and 10-100 nm Pd. For monitoring the quality of these coating systems, X-ray fluorescence instruments have established themselves as the measurement method of choice.

A series of comparative tests employing other physical measurement methods was used to determine the capabilities of X-ray fluorescence instruments within the mentioned ranges. Sample specimens were measured with the X-ray fluorescence method using the FISCHERSCOPE X-RAY XDV-SDD model, Rutherford backscatter and absolute, synchrotron radiation based X-ray.

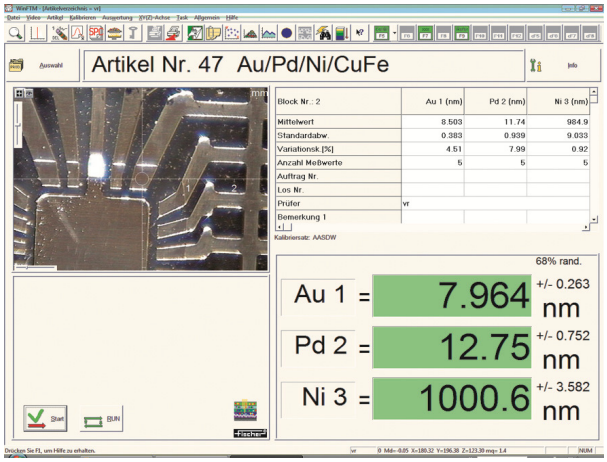

Fig. 1: High resolution measurement of an Au/Pd/Ni coating system on a leadframe and presentation of the results with the analysis software, WinFTM®.

For Au coating thicknesses of about 4, 6 and 9 nm, the results from the X-ray fluorescence instruments were all between the two other methods, with deviations in the sub-nm range, confirming not only the low scatter but also the trueness of measurements using X-ray fluorescence instruments. Traceability of the measurement results is ensured by using the FISCHER calibration standards developed specifically for this measuring application. The simple handling of X-ray fluorescence instruments also allows for easy scanning of a specimen to determine the homogeneity of the coating thickness, if required (see Fig. 2).

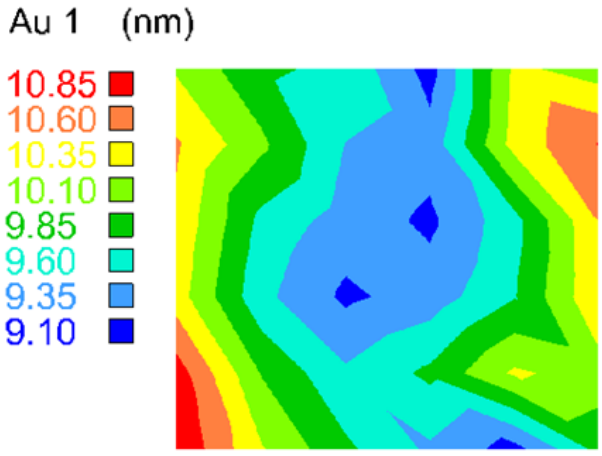

Fig. 2: Lateral coating thickness distribution of a specimen coated with only a few nm Au.

The combination of state-of-the-art detector technology and the powerful analysis software, WinFTM®, allows for reliable, accurate measurements of coating thicknesses even in ranges below 10 nm. For use on leadframes, the FISCHERSCOPE® X-RAY XDV®-SDD instruments are recommended for relatively normal-sized specimens; for very small structures, the XDV®-µ model, with its special X-ray optics, ensures a very small measurement spot of only 20 µm on the specimen.