

APPLICATION NOTE

Application of FISCHER products

AN001en

Au / Pd Coatings in the nm Range on Printed Circuit Boards

As the electronics industry makes use of ever thinner coatings, manufacturers increase their demands on measuring technologies to provide reliable parameters for product monitoring. One example is the Au/Pd/Ni/Cu/printed circuit board system with coating thicknesses for Au and Pd of just a few nm. For monitoring the quality of these coating systems, X-ray fluorescence instruments have established themselves as the measurement method of choice.

The thinner the coatings, the more important it becomes to select a suitable detector. Table 1 shows a comparison of results from FISCHERSCOPE® X-RAY instruments fitted with a proportional counter tube, PIN diode and silicon drift detector (SDD), respectively.

Detektor type	50 nm Au		24 nm Pd	
	Standard deviation	Coefficient of variation	Standard deviation	Coefficient of variation
Proportional counter tube (0,2 mm aperture)	2,2 nm	4,3 %	3 nm	13 %
PIN detector (1 mm aperture)	0,9 nm	1,8 %	1,2 nm	4,8 %
SDD detector (1 mm aperture)	0,2 nm	0,4 %	0,5 nm	2,1 %

Table 1: Various types of detectors and their corresponding achievable standard deviations and variation coefficients

As illustrated in Table 1 above, the SDD's significantly superior repeatability precision allows for the reliable measurement of even very thin Au and Pd coatings.

The trueness is also better for instruments with SDD because the high energy resolution of the usable signal is less susceptible to influence from the background or adjacent fluorescence lines.



Fig. 1: The FISCHERSCOPE® X-RAY XDV®-SDD measurement system is equipped with SDD, allowing for the quick and repeatable determination of extremely thin coatings

Proper handling of the fluorescence signal generated by the substrate material is also more important with thinner coatings. While a general subtraction of the background signal does improve the repeatability precision, it can also introduce errors into the results. The evaluation software WinFTM® therefore explicitly allows the composition of the substrate material to be taken into account with every measurement.

Your local contact person for FISCHER products will be happy to assist you in selecting a suitable X-ray fluorescence instrument for measuring Au/Pd coatings on printed circuit boards – FISCHERSCOPE® X-RAY XDL® with proportional counter tube, XDAL® with PIN detector, or XDV®-SDD with SDD detector.