

NON-DESTRUCTIVE ANALYSIS OF COMPLEX LAYER STRUCTURES USING MICRO X-RAY FLUORESCENCE

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With the advancement of electronic technology, the structure size of electronic components is being drastically reduced. In addition, the complexity of the layer structures is increasing while the thickness of the layers is decreasing. For non-destructive quality control of such layers systems, more sensitive analytical methods and equipment are a requirement.

With the advent of X-ray focussing optics, laboratory-based micro-XRF equipment offers the possibility to effectively analyse an area as small as 10 μm in diameter. X-ray analysis allows for the examination of relatively thick layer structures up to roughly 30 μm , depending on the materials in the layers and it is possible to characterize both layer thickness and composition. Used in conjunction with high-resolution energy-dispersive detectors, micro-XRF can analyze all layers in the structure simultaneously with high sensitivity. The limits of detection for most elemental layers are in the range of sub-nanometer thickness.

In this paper, the advantages and limitations of capillary optics with respect to the XRF analysis of small areas is discussed. XRF analyses of complex layered electronic components, for example solar cell devices, and of other structures, such as small lead frames, are described.