SULZER

Materials and Failure Analysis

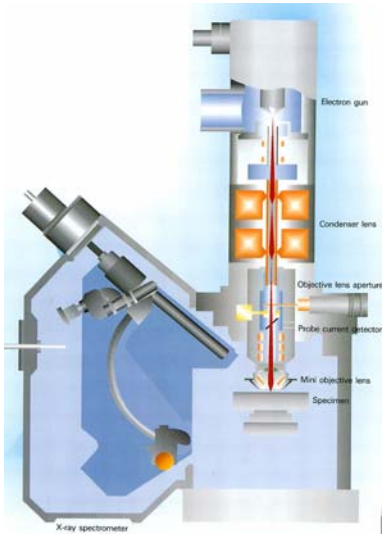
Electron Probe Microanalysis (EPMA)

Sulzer Innotec

The Electron Probe Microanalysis provides elemental analysis of solids with micrometer resolution. Both qualitative and quantitative analyses can be conducted as spot analyses, line scans (concentration profiles) and surface analyses (elemental distribution graphs).

How EPMA works

A focussed beam of electrons excites the surface of a sample which responds by emitting X-rays. Each element emits X-rays with a characteristic wavelength, so by analysing these it is possible to determine the concentration and distribution of elements to a high degree of precision



Schematic representation of the Electron Probe Microanalysis

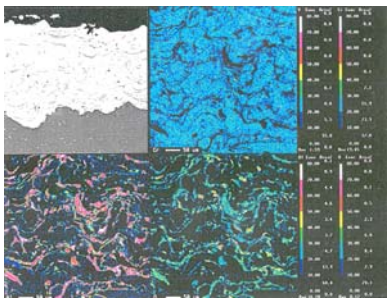
Our Jeol JXA-8800 Electron Probe Microanalysis is equipped with three WDX spectrometers and an EDX detectror.

Advantages of this method

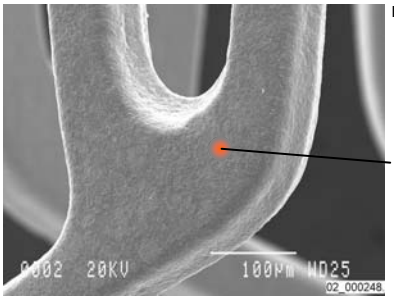
The method provides an exact chemical analysis of all kinds of materials with a high spatial resolution (1 – 150 µm). All elements with atomic no. 5 or higher, including the light elements O, C and N, can be detected. The detection limit lies between 10 – 500 µg/g (ppm), depending on the actual material and sample.

Examples of applications

- Chemical composition of small sample
- detailed analysis on the micrometre scale (phases, inclusions etc.)
- Composition of coatings (plasma sprayed coatings, galvanic coatings. oxide layers etc.)
- Detection of trace elements



Elemental distribution in a plasma sprayed coating. Clockwise starting upper left: SEM Micrograph; [Cr]; [Al]; [O]



Element	(Gew.%)
Al	<0.050
Si	0.20
P	<0.050
S	0.025
Ti	<0.050
V	<0.050
Cr	21.2
Mn	0.82
Co	0.28
Ni	12.5
Cu	0.45
Nb	<0.050
Mo	0.38
W	<0.050
Fe	Basis

Quantitative chemical analysis of a very small sample. The diameter of the analyzed zone is approximately 5 µm

Delivery

Electron Probe Microanalysis can normally be delivered within 2-3 working days

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