SEM – Scanning Electron Microscopy

Scanning electron microscopy uses electron beams instead of light to produce the images. As a result, a significantly higher resolution is achieved. The scanning electron microscope images surfaces of samples with a three-dimensional perspective, wherein the large depth of focus is of particular importance. Electrons emitted from an electron source are condensed into a fine beam. This beam moves in a well-defined grid over the sample surface. The electrons emitted by the interaction with the primary beam from the sample surface are captured by detectors and converted into an image: the secondary electron (SE) imaging enables the representation of the topography of the sample surface; the backscattered electron (BSE) image also provides information about the different composition of the sample surface (in BSE mode: bright spots - heavier elements, dark spots - lighter elements).

Application:

- Surface topography and surface texture:
  - surface roughness
  - different element composition
  - fracture surface characterization
  - particle size determination of powders
- Structural examinations:
  - particle size distribution
  - phase analysis
  - identification of precipitated phases
- Layer thickness determination, layer structure analysis:
  - element analysis (EDX)
  - crystallography, orientation, texture (EBSD)

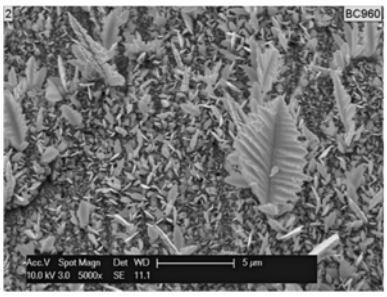

Figure 1: Topography and structure

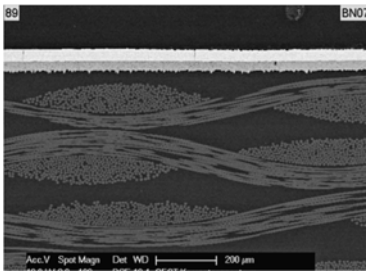

Figure 2: Cross-section analysis and microstructure

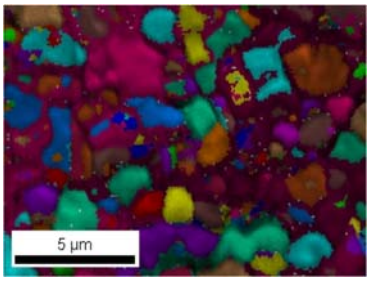

Figure 3: EBSD analysis

Specifications:

- Acceleration voltage: 0.1 - 30 kV
- Resolution: point to point resolution approx. 1 nm; due to FEG also excellent resolution at low acceleration voltages
- Maximum gas pressure in sample chamber: 1.3 mbar
- (Semi) -quantitative element analysis (EDX) for elements with atomic numbers ≥ boron (EDAX-TEAM OCTANE PLUS version 4.3 system)
- Analysis of the orientation using EBSD (resolution 100 nm)

Sample requirements:

- Sample size: max. 10 x 10 cm
- Maximum sample height (for elemental analysis): 2 cm
- Sample condition: solid, powdery

Possible samples:

- Conductive surfaces: e.g. metals
- Non-conductive surfaces: plastics, ceramics, paper, etc., ...

CEST Kompetenzzentrum für elektrochemische Oberflächentechnologie GmbH
Viktor-Kaplan-Str. 2
2700 Wiener Neustadt
Tel: +43/2622/22266-0
Fax: +43/2622/22266-50
Email: office@cest.at
www.cest.at