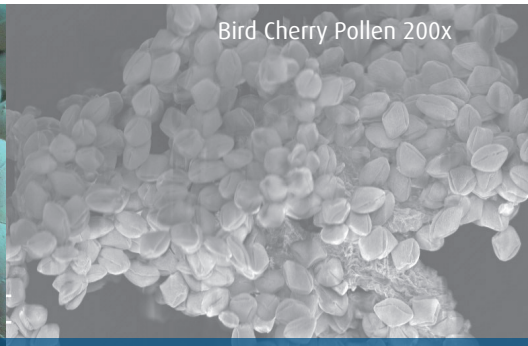

Bird Cherry Pollen 2000x


Bird Cherry Pollen 200x

Scanning Electron Microscopy SEM Analysis

Electron microscopy can be used as a magnifying glass: It is possible to see particles and textures that are not easily discernable by optical microscopy, see for instance the pictures of cherry pollen (prunus padus) above.

By equipping the electron microscope with an energy dispersive detector (EDX), new possibilities to gather information from the microscopic world arise. An energy dispersive detector reveals chemical information from surfaces and particles.

Analysing an impurity in a product could help finding the source of the pollution.

SEM-technique with EDX is suitable to characterize small airborne particles, as well as particles appearing as contaminants in water or material. Particles from a liquid sample are collected by filtration.

Solid samples can sometimes demand a more extensive sample preparation. However, not much sample material is needed, which is an advantage in using SEM-technique.

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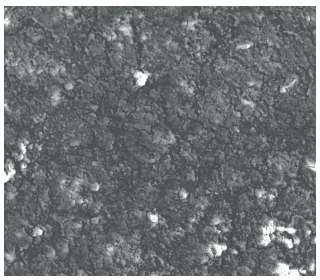
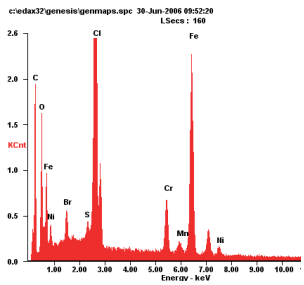
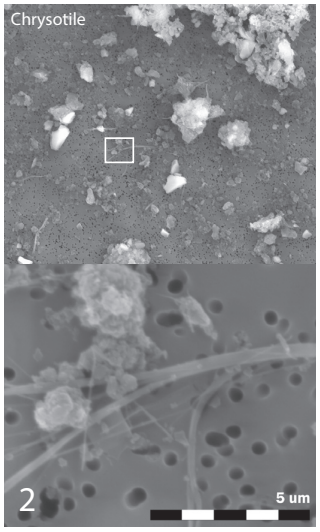
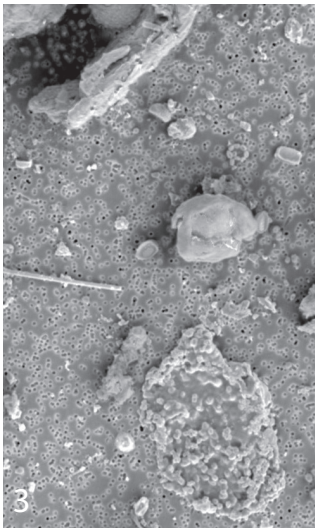
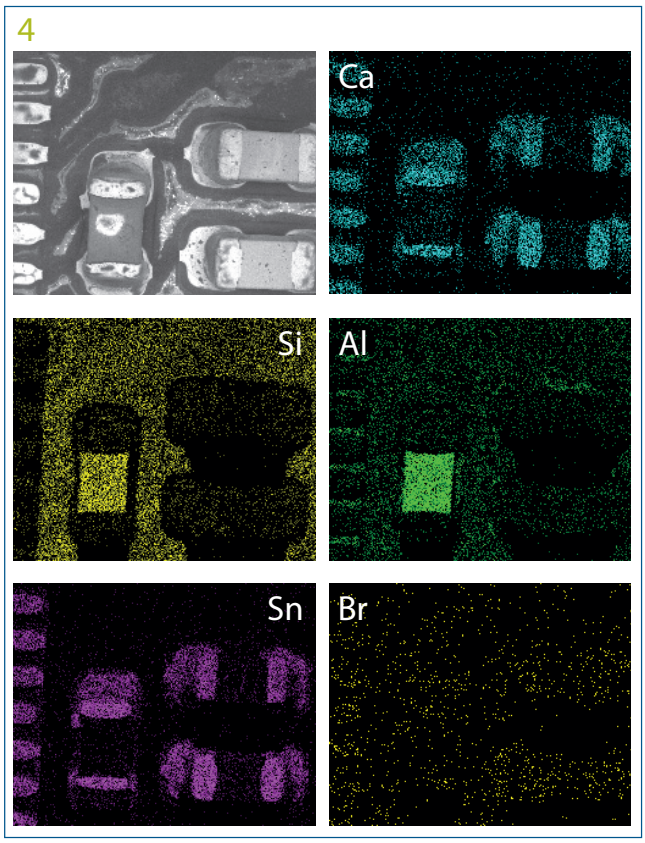
Available SEM analysis	
Asbestos	
A-1b	Asbestos analysis in material samples
A-2a	Asbestos fiber identification and counting in air
A-2b	Asbestos analysis in dust
Fiber analysis	
A-2a	Fiber identification and counting in air
A-2d	Fiber identification (other than asbestos) in dust and material
Particle analysis	
A-3g	Count of mould/ spores in an air sample
A-4a	Particle determination, quantitative, on filter samples (concentration, size and type)
A-4b	Particle determination, qualitative, in material samples or on tape (identification of different particle types)
A-4c	Particle size distribution
A-4e	Semi-quantitative analysis of material samples
A-4f	Photography
A-4g	Particle determination, qualitative, in water samples (identification of different particle types)
Special analysis	
Product control of for instance pharma products and electronics is possible upon request. Contact us.	











Analysis of surface

Picture 1a shows a surface magnified 100x. The diagram 1b shows which elements the surfaces contains.

Fiber analysis by SEM facilitates the identification of different types of fibres. From an HSE point of view it is important to detect asbestos or ceramic fibres in materials. Picture 2 shows chrysotile asbestos at 1000x and 10000x magnification.

Surveillance of production processes SEM has a large advantage when looking for contaminants in production processes. The instrument only needs individual particles and they can be small (<10 µm). Analysis of the particle(s) can provide information of the source. Find the sources of contaminants can be vital especially for pharmaceutical and chemical products.

Particles in air filters

Picture 3 shows particles from an air filter. Both biological particles and fibres occur. Also a large amount of particles are <1 µm. Such small particles in indoor air can influence people's health. The filter pores on the pictures are 0,4 µm in diameter.
One tool to identify the source of airborne particles is chemical analysis. ICP-technique gives information about the total amount of an element in an air sample, but says nothing about the contaminant which is the source. Using SEM, the chemical composition can be determined on particle level .

Chemical composition of circuit boards

The composition pictures (Picture 4) show how some elements only occur in certain components. Aluminum (green) only appears together with Silicon in some components. Silicon (yellow) is present with Al but also in the plastic. Bromine (yellow) is not enriched in any component, but appears in the underlying plastic or glue. Tin (purple) and Calcium (blue) are enriched in certain parts of the components.

Facts regarding the SEM at ALS Scandinavia AB

Electron microscope: S3400N and SU3500

Both instruments are equipped with

- SE – detector for high vacuum
- SE – detector for low vacuum (used for samples sensible for vacuum, for instance biological samples like spores and wood, whose cells deform in vacuum)
- BSE – detector, used for easily separating particles containing mainly heavy elements from particles with mainly light elements.
- EDX - detector: Silicon Drift Detector (SDD Apollo and Octane) in combination with EDAX Genesis and EDAX Team

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