

# SEM/EDX analyses

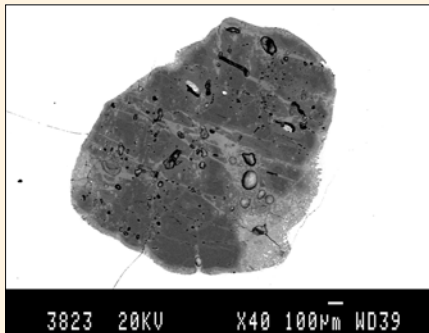
A SEM (Scanning Electron Microscope) can be utilized for high magnification imaging of almost all materials. With SEM in combination with EDX (Energy Dispersive X-ray spectroscopy) is it also possible to find out which elements different parts of a sample contain.

The instrument is very suitable for different kinds of investigations. It is possible to investigate e.g. the fibre structure in wood and paper, metal fracture surfaces, production defects in rubber and plastic.

## Which is the minimum size?

The smallest detail that can be seen at the SEM image is 4-5 nm (4-5 millionths of a millimetre).

The smallest detail that can be analysed is 2-3  $\mu\text{m}$  (2-3 thousandths of a millimetre).



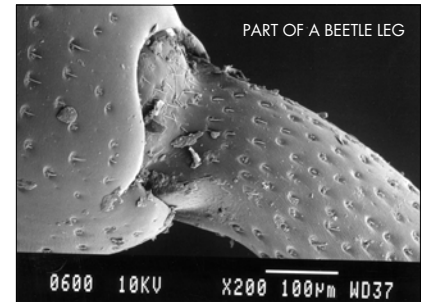
STONE IN GLASS, ORIGIN: STOPPER.

By investigating the content of the glass defect one can determine possible contamination sources and take care of them.

## Glass defects

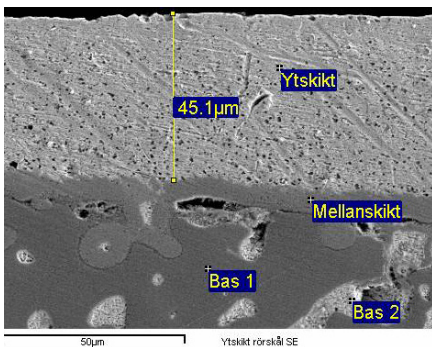
Glassworks sometimes get problems with defects in the glass batch, like stones or cords.

Stones consist of small, unmelted particles, which might come from e.g. refractory material or contaminations in raw materials.



## Biological material

With special sample preparation one can examine biological materials by SEM. If the sample is dry enough and durable, is it sufficient to cover the sample with a thin metal layer of e.g. gold or carbon. That is to prevent charging of electrons at the sample.



CROSS-SECTION OF SURFACE COATINGS ON A LOCOMOTIVE BEARING BRASS.

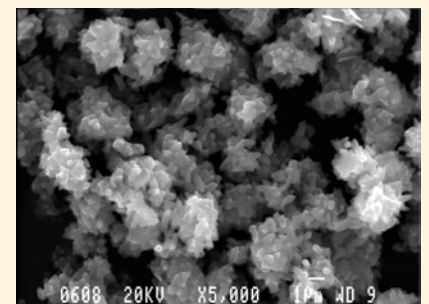
## Metals

SEM is often used for metals, which are well suited as the samples are electrically conducting.

Examples of analysis objects: Surface coatings, segregations and casting defects. By investigating fractures you can find out why a material has broken.

## Wood and paper

SEM is used for studying surfaces and structures of fibres, surface coatings and print in wood and paper. Inorganic elements can be analysed chemically and it is possible to see how they are distributed in the material.



PRECIPITATED CHALK (PCC), USED AS COATING MATERIAL OR FILLER IN PAPER

## Identification of glass flakes

Another way to use SEM/EDX is to make a quantitative chemical analysis of an unknown material.

We use that for example when we want to determine the origin of glass fragments, found in different types of foodstuffs.

