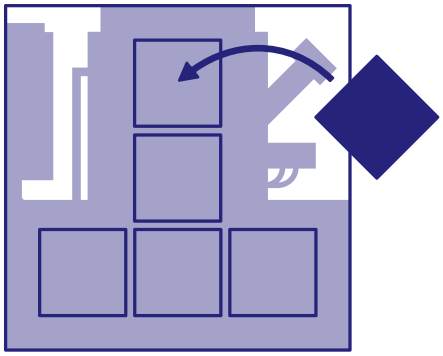
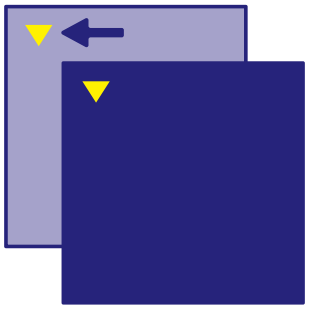
NANORAMA

Scanning Electron Microscope (SEM)

Print the microscope and illustrated cards at your disposal and match the right picture to each steps. Find the right combination on the board and use **HP Reveal** to reveal the SEM universe.





assemble

cut

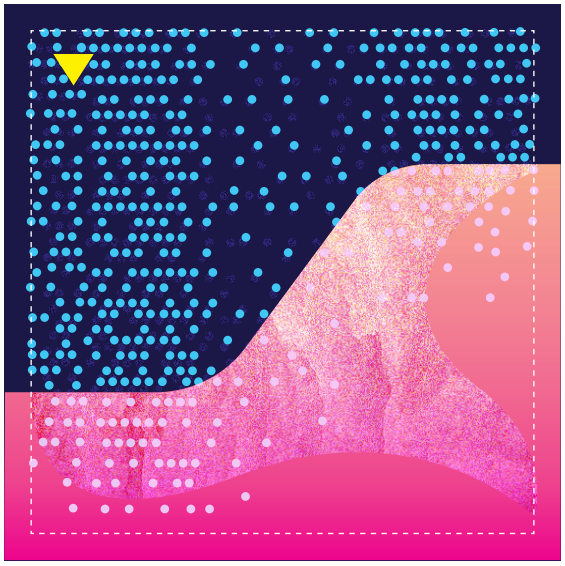
When the high-energy electron beam strikes the surface of the sample, X-rays are emitted. Their analysis makes it possible to determine the chemical nature of the atom encountered and thus the chemical composition of the sample.

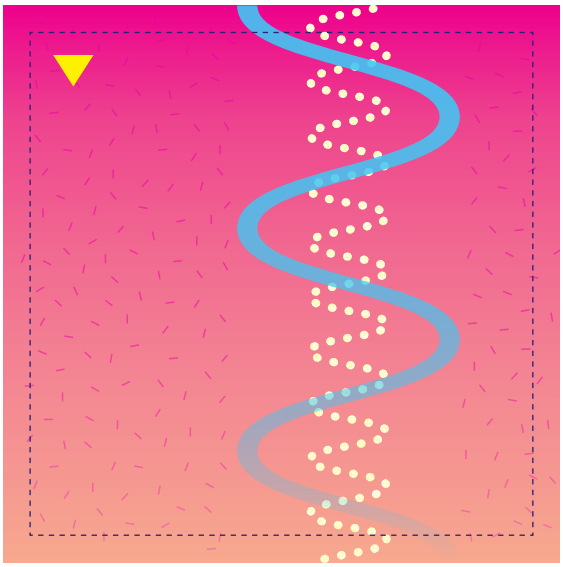
Optical microscopes are unable to resolve objects of less than a few hundred nanometers (500 nm), the wavelength of light. To reach an atomic scale resolution, one can use electrons. Electrons being quantum, they behave like waves with much shorter lengthwaves, it therefore becomes possible to access details up to one-tenth of a nanometre !

In the electron gun, electrons are accelerated by high electrical voltages. Electromagnetic lenses, which play the same role as glass lenses in microscopes, focus progressively electrons into a thinner beam. The beam is focused on the sample and then swept on its surface.

The electrons hit the sample with such energy that secondary electrons are ejected from the atoms of the sample. Under the impact of the beam, X-rays are also emitted by the sample. The detection of these different types of radiation provides a great deal of information.

When the electron beam scans the sample, the relief changes the number of secondary electrons emitted: flat surfaces will emit more electrons than inclined planes. The topography of the sample can then be reconstructed, hence its relief.





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