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Opinion Article

Application of Electron Microscopy in Microbiology

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DESCRIPTION

Electron microscopy (EM) is a technique for taking high-resolution pictures of both biological and non-biological material. Biomedical research examines the precise structure of organelles, macromolecular complexes, tissues, cells, and cells. The incredibly tiny wavelengths of electrons, which are used as the source of illumination, help explain why EM images have such high resolution. Electron microscopy is used with a variety of auxiliary techniques to meet specific problems such as thin sectioning, immunolabeling, and negative staining. EM pictures offer important details on the structural foundations of cell function and illness. The two main types are the Scanning Electron Microscope (SEM) and the transmission electron microscope. A transmission electron microscope is used to see thin specimens such as molecules, tissue slices, etc. that permit electrons to pass through and create a picture. Both the common compound light microscope and the Transmission Electron Microscope (TEM) share numerous similarities. The positioning of protein molecules in cell membranes, the structure of protein molecules in contrast to metal shadowing, the arrangement of molecules in viruses and cytoskeletal filaments in preparation for negative staining, and the visualisation of the interior of cells in thin sections are all examples of applications for TEM.

BIODIVERSITY RESOURCES

It is feasible to characterise and analyse organic materials using electron microscopy, which is crucial knowledge for mining companies. The microscopes have the ability to quickly and automatically generate quantitative, unbiased data on the environment. Oil and gas companies can also survey an area and collect data using this technique. This may help to reduce the risk associated with finding and extracting oil and gas. For example, quantitative lithotype and porosity characteristics of the reservoir, seal, and source rocks can be found. It can also strengthen and validate information that has been incorporated into geological models made from seismic, wireline, and mud log data.

The different types of electron microscopes are transmission electron microscopes, scanning transmission electron microscopes.

Transmission electron microscope

The surface of a cell is carefully inspected using this type of electron microscope. This type of microscope, however, is not used to see internal structures and does not transport electrons through a specimen. When preparing a specimen, a thin layer of metal is initially put on its surface. Then, an electron beam repeatedly scans the object's surface. The electrons in the specimen become free as a result. These electrons are referred to as "secondary electrons." They can then be observed under a microscope once they have been reflected as radiation and entered the viewing chamber.

Scanning electron microscope

The scanning transmission electron microscope is one of the most important tools for imaging and spectroscopy of materials with high spatial resolution, particularly at atomic resolution. With the use of electron optics, a stream of electrons is focused into a tiny illumination probe that is raster-scanned across a substance. The sample is thinned such that most of the electrons are transferred; the scattered electrons are then located using some kind of detector geometry. The intensity as a function of probe position creates a picture. The diversity of potential detectors and the resulting imaging and spectroscopic modes are what make scanning electron microscope so powerful.

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