

Transmission Electron Microscopy (TEM)

Transmission electron microscopy (TEM) is a microscopy technique in which a beam of electrons is transmitted through a specimen to form an image. The specimen is most often an ultrathin section less than 100 nm thick or a suspension on a grid. An image is formed from the interaction of the electrons with the sample as the beam is transmitted through the specimen. The image is then magnified and focused onto an imaging device, such as a fluorescent screen, a layer of photographic film, or a sensor such as a scintillator attached to a charge-coupled device.

Transmission electron microscopes are capable of imaging at a significantly higher resolution than light microscopes, owing to the smaller de Broglie wavelength of electrons. This enables the instrument to capture fine detail—even as small as a single column of atoms, which is thousands of times smaller than a resolvable object seen in a light microscope. Transmission electron microscopy is a major analytical method in the physical, chemical and biological sciences. TEMs find application in cancer research, virology, and materials science as well as pollution, nanotechnology and semiconductor research. TEM is also used in other fields such as paleontology and palynology.

TEM Applications:

- A Transmission Electron Microscope is ideal for a number of diverse fields such as life sciences, nanotechnology, medical, biological and material research, forensic analysis, gemology and metallurgy as well as industry and education.
- TEMs provide topographical, morphological, compositional and crystalline information.
- The images allow the researchers to view samples on a molecular level, making it possible to analyze structure and texture.
- This information is useful in the study of crystals and metals, in addition to industrial applications.
- TEMs can be used in semiconductor analysis and the production and manufacture of computer and silicon chips.

About TEM installed in Jamia Hamdard University:

- The Thermo Scientific™ Talos L120C TEM is a 20-120 kV thermionic (scanning) transmission electron microscope uniquely designed for performance and productivity across a wide range of samples and applications, such as 2D and 3D imaging of cells, cell organelles, asbestos, polymers, and soft materials, both at ambient and cryogenic temperatures.
- The Talos L120C TEM is designed from the ground up to allow users at any skill level to acquire high-quality results with minimal effort. Fast, sophisticated automation and advanced 3D imaging workflows allow

applied researchers to focus on scientific questions rather than microscope operation.

