

Difference between SEM and TEM		
Features	Scanning Electron Microscope	Transmission Electron Microscope
Classification of electrons (e-) used	Scattered (backscattered or secondary) e-	Transmitted e- beam
Image formation process	Image is produced after microscope collects and counts the secondary e-	Internal or beyond e- that directly pass through the sample are the ones illuminated in the image
Focus of analysis	Surface of sample (e.g. fine hairs, eye of a housefly, head of a pin)	Internal or beyond surface (e.g. viruses, organelles, atoms, macromolecules)
Image presentation	3-D	2-D
Special sample preparation	Sample must be "stained" by element that captures secondary e-	Sample must be cut extremely thin
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Dark-field Microscopy

dark-field describes an illumination technique used to enhance the contrast in unstained samples. It works by illuminating the sample with light that will not be collected by the objective lens and thus will not form part of the image. This produces the classic appearance of a dark, almost black, background with bright objects on it.

The effect produced by the dark field technique is that of a dark background against which objects are brilliantly illuminated. This is accomplished by equipping the light microscope with a special kind of condenser that transmits a hollow cone of light from the source of illumination as shown. Most of the light directed through the condenser does not enter the objective; the field is essentially dark. However, some of the light rays will be scattered (diffracted) if the transparent medium contains object such as a microbial cells. This diffracted light will enter the objective and reach the eyes; Thus the objective or microbial cell, in this case, will appear bright in an otherwise dark microscopic field. Dark field microscopy is particularly valuable for the examination of unstained microorganisms suspended in fluid - wet mount and hanging drop preparations.

https://en.wikipedia.org/wiki/Phase-contrast_microscopy

<https://www.ccber.ucsb.edu/collections-botanical-collections-plant-anatomy/transmission-electron-microscope>

https://serc.carleton.edu/research_education/geochemsheets/techniques/SEM.html

<https://www.ijcmas.com/6-5-2017/Om%20Prakash%20Choudhary%20and%20Priyanka.pdf>

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