April 2018

Explain It: Scanning Electron Microscope

News and Communications Services

Recommended Citation

News and Communications Services (2018) "Explain It: Scanning Electron Microscope," *Seek*: Vol. 8: Iss. 1.
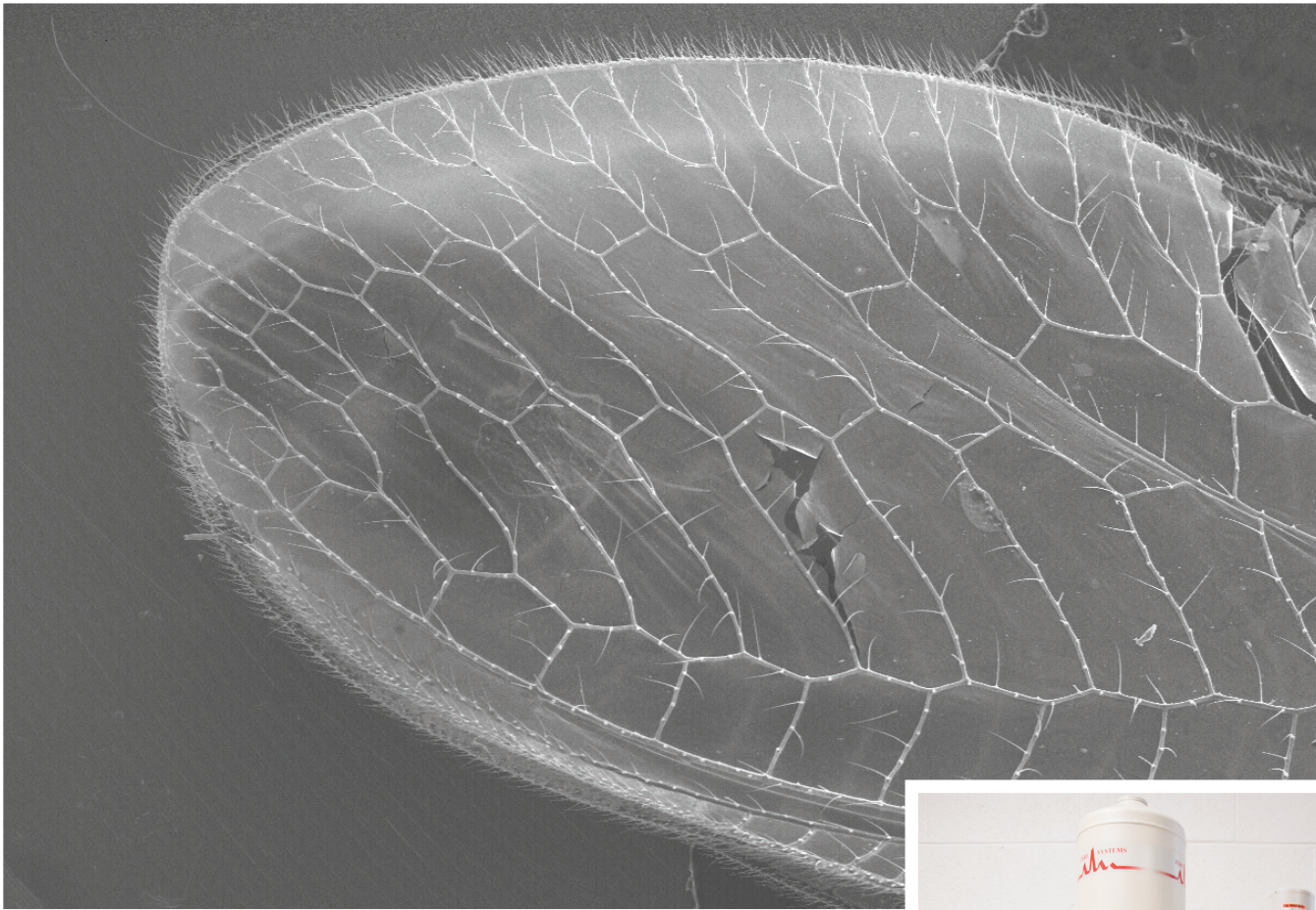
Scanning electron microscope

ˈskan- nin i-ˈlek-trän mī-krə-skōp

Douglas McGregor, university distinguished professor of nuclear engineering and director of the Semiconductor Materials and Radiological Technologies Laboratory, or S.M.A.R.T. Lab, in K-State's College of Engineering, explains in just a little over 100 words how a Hitachi scanning electron microscope, right, was used to produce an image of the honeybee on the cover of Seek and the photo of the lacewing's wing above. The microscope is used to investigate microstructures in semiconductor devices produced by various etching methods. Equipped with X-ray fluorescence and detection capability, the microscope is also used to analyze elemental composition of materials and electrical contacts.

A lifeless insect is first coated with a submicron layer of conductive material, usually gold or carbon. The insect is then placed in the vacuum chamber of the scanning electron microscope, where a focused beam of electrons is scanned over the sample, causing the emission of secondary electrons. These secondary electrons are detected by a sensor, producing a synchronized signal that provides information about the sample surface topology and composition. The signal is converted into an image. The conductive layer prevents the accumulation of space charge around the sample while being scanned and ultimately improves the image resolution.