THE SCANNING ELECTRON MICROSCOPE

A Small World of Huge Possibilities

It’s been 50 years since the first commercial scanning electron microscope (SEM) was launched, and researchers’ view of the nanoscale world is sharper than ever. SEMs create surface images of bulk material by scanning an electron beam over the sample, recording the resulting echoes and electrical interactions point by point. Resolution in the nanometer range is routine.

SEM TECHNOLOGY AND SIGNAL DETECTION

Analogous to design lens scanning optical microscopes, SEMs are electromagnetic "lenses" to focus an electron beam to a sharp point and raster scan across the sample. Instead of recording fluorescence, however, SEMs create images by recording the interactions of the electron beam with the sample surface, which could be a ceramic material, metal, or biological specimen. These interactions can take many forms, and SEM users can install a range of detectors around the sample chamber to interrogate them, as described below.

Backscatter diffused electrons (EBSD)

Image diffusors reconstruct the EBSD beam to the point of the crystal. The resulting image is a Bragg diffraction pattern that can be recorded.