

The Point Spread Function (PSF) – What is it and Why Care?

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Abstract:

Conventional scanning electron microscopes (SEMs) and scanning transmission electron microscopes (STEMs) depend on a focused electron beams interacting with a sample. On contact, the beam is impeded, scattered or generates secondary signals used to characterize the morphology, chemical composition and/or the crystalline nature of a sample. The spatial resolution of techniques that utilize these signals is largely determined by the interaction volume of the electron beam with the sample. The interaction volume depends on many factors including beam energy, sample composition, sample thickness and the electron probe size and shape as it strikes the sample. The latter is often referred to as the two dimensional point spread function (PSF). Having a small and symmetric PSF is viewed as critical requirement for obtaining optimum high resolution in SEMs and STEMs. This presentation will review how PSFs are determined and how knowledge of the PSF can actually improve the overall quality and resolution of SEM and STEM images.