

Applications of 3-D Electron Tomography for TEM

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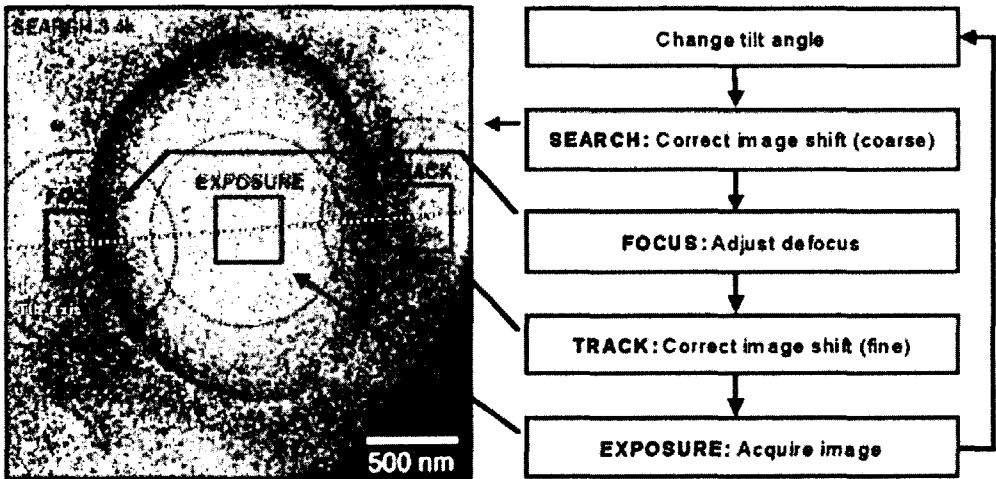
Tomography is a method for reconstructing the interior of an object from its projections. Especially the term electron tomography is used for any technique that employs the transmission electron microscope to collect projections of an object and uses those projections to reconstruct the object in its entirety (overview in [1]). Currently it is the only available technique for three-dimensional structure determination of unique objects at a molecular resolution.

The automated electron tomography (AET) is a technique for automated acquisition of a tilt series with specimen tilt induced displacement correction. As the displacement has components in X, Y and Z direction, the image has to be shifted back and the focus has to be re-adjusted. The lateral displacement is measured by cross-correlating an image with an previously recorded reference image and corrected using the image shift facility of the microscope. For compensation of very large displacements corrections are performed in lower magnifications. For the focus adjustment the auto focus procedure developed by Koster et al² is used. For low dose imaging four different specimen positions (areas) are used.

Several examples illustrating the various fields (material science, life science) of application for automated electron tomography will be presented.

References:

1. Frank, J. (Ed. 1992), Electron Tomography, Plenum Press, New York and London
2. A.J. Koster, D. Typke and M.J.C. de Jong, Fast and accurate autotuning of a TEM for high resolution and low dose electron microscopy, Proceedings of the XIIth International Congress for Electron Microscopy 1990



Basic principle of automatic data acquisition in low-dose mode