

Electron Microscope Tomography in Biological Research

Abstract. Electron microscope tomography (EMT) is a developing technology for three dimensional investigation of cellular ultrastructure. In combination with other techniques this technology can provide three-dimensional reconstructions of protein assemblies, correlates structure with functional investigations at the light microscope level and provide structural information which extends the findings of genomics and molecular biology. On one hand, EMT is not presently a unified field of study, but is comprised of a variety of techniques, roughly associated with the spatial scales of interest, and the nature of the objects under investigation. Researchers commonly use different techniques for elucidating the structure of small particles and microfilaments (nanometer scale) as opposed to the structure of cells and long range structure, such as exhibited by axons and dendrites in neural tissue (micrometer scale). On the other hand, detailed investigation of molecular structure in the context of the larger structure of organelles, cells and cell assemblies in tissues is crucial to the resolution of many research problems in biology. We believe that with further research in instrumentation, sample preparation and reconstruction the imaging of molecular structure in context should be achievable.