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Three-Dimensional Imaging of Single Large Macromolecules Using Equally Sloped Tomography[1] E. LEE, B. FAHIMIAN, J. MA, University of California at Los Angeles, C. IANCU, C. SULOWAY, E. WRIGHT, G. JENSEN, California Institute of Technology, J. MIAO, University of California at Los Angeles, UNIVERSITY OF CALIFORNIA AT LOS ANGELES TEAM, CALIFORNIA INSTITUTE OF TECHNOLOGY COLLABORATION — We report the development of equally sloped tomography for the reconstruction of the 3D structure of single large macromolecules. In a combination of pseudo-polar fast Fourier transform and the oversampling method with an iterative algorithm, equally sloped tomography makes superior 3D reconstruction to conventional tomography which has an intrinsic drawback due to the use of equally angled 2D projections. By employing equally sloped tomography and cryo electron microscopy, we have obtained the 3D structure of single hemocyanin protein molecules and HIV viruses at ~ 5 nanometer resolution. Preliminary analysis based on cross- correlation has indicated that the 3D images using equally sloped tomography are superior to those of the conventional method. We believe this general approach will find broad applications in high-resolution 3D imaging of large macromolecules.

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