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“Three-dimensional Reconstruction using Stereovision for Transmission Electron Microscopy”

ABSTRACT

Electron tomography methods are used to produce three-dimensional reconstructions of two-dimensional TEM projections. Results using the electron tomography methods have many issues causing distortion and inaccuracies, which include the missing-wedge problem, spatial and temporal drift, and low signal to noise ratio. Additionally, these methods require many views of the sample, increasing the likelihood of sample damage. The process takes longer to complete, which increases the expense of doing 3D reconstructions of TEM images. Alternatively, stereovision can be used to extract 3D information from multiple 2D views. The main advantages of using stereovision are that significantly fewer images are needed to produce the 3D reconstructions, the missing wedge problem is avoided, high contrast features can be seen easily without relying on sample geometry, and dynamic (4D) measurements are possible. This talk will review current methods of 3D reconstruction of TEM images, introduce stereovision as a reconstruction approach, highlight the benefits and issues of the various reconstruction methods, and show some preliminary results.

BIOSKETCH

Ms. Rachel R. Byer received her B.S. degree in Physics from Bucknell University in May 2013 and began her graduate study at Virginia Tech in August 2013. She is currently a PhD candidate supervised by Dr. William T. Reynolds Jr. in the Materials Science and Engineering department at Virginia Tech. Her research is mainly focused on three-dimensional reconstruction using stereovision for transmission electron microscopy, especially for the application of this novel approach to dynamic measurements with improved accuracy of dimensional features.