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Image Reconstruction of An Amorphous Object from Electron Diffraction. Z.Y. Liu¹, D.J. Miller¹, J. Tao², J. M. Zuo², S. Marchesini³, ¹Electron Microscopy Center and Materials Science Div., Argonne National Laboratory, Argonne, IL 60439 USA, ²Dept. of Materials Science and Engineering, Univ. of Illinois at Urbana-Champaign, Urbana, IL 61801 USA, ³Physics and Advanced Technologies, Lawrence Livermore National Laboratory, Livermore, CA 94550 USA.

Reconstruction of the image of an object from its diffracted intensities based on oversampling and iterative algorithms is known as diffractive imaging. Diffractive imaging in transmission electron microscopy (TEM) is difficult due to the fact that, in general, multiple scattering is not negligible. Reconstruction of complex wave functions including multiple scattering requires the knowledge of the true boundary of an object (a tight support). In addition, preparation of TEM specimens suitable for electron diffraction can be challenging. In this work, we have adapted an electrochemical etching process to prepare TEM specimens. We have also developed a new technique for determining a tight support. Our results show that the complex-valued image of an amorphous object can be reconstructed to an acceptable level. The results presented here are significant for both materials scientists and the development of the diffractive imaging as a unique imaging technique.