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Image Reconstruction for Low Dose Scanning Electron Microscopy.[1] PETRU FODOR, Cleveland State University, ALINA LAZAR, Youngstown State University — Scanning electron microscopy is one of the most popular characterization techniques in material science, natural sciences, and nanotechnology when high resolution surface characterization is required. However, due to complex noise profiles associated both with the electron signal production, as well as the signal processing units the signal-to-noise ratio for data collection can be quite low. The typical way to address this issue is to increase the dwell time that the electron beam spends at each point during the acquisition process, and thus average out the random fluctuations in the signal. However, this is not possible for many organic samples and some inorganic ones such as zeolites which are highly susceptible to the thermal damage associated with long exposures to the imaging electron beam. In this work we describe methodologies based on block-matching to reconstruct accurate results from noisy images acquired at low doses/fast speeds. To this end we develop a model for the typical noise profiles encountered in electron microscopy. The strategies proposed are transferable to other imaging methods used in material science, such as composition mapping.

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