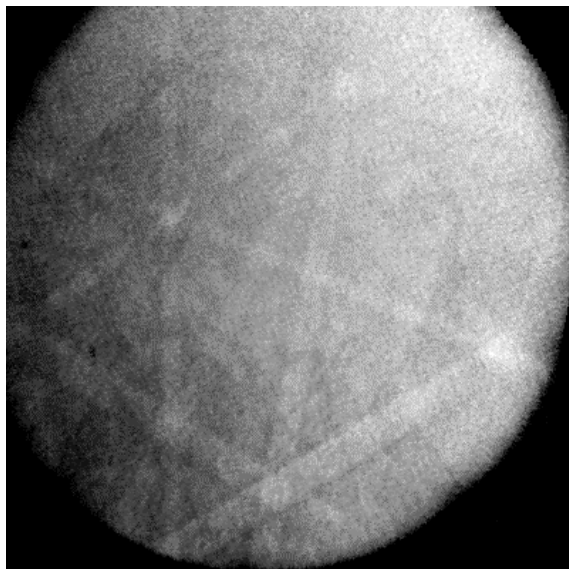
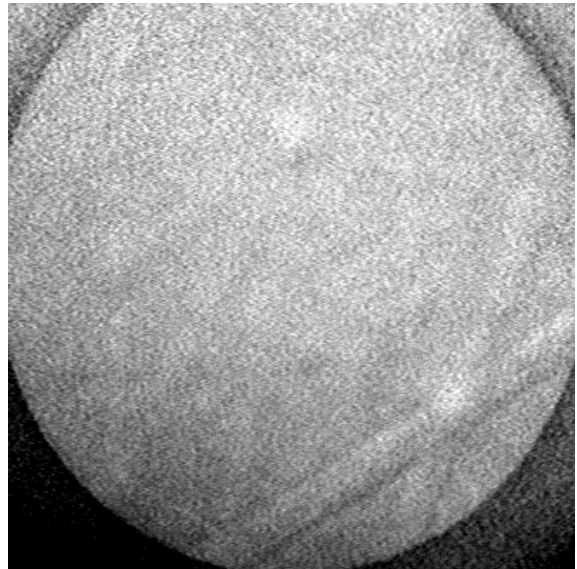


Applications Note: Specimen Preparation for Electron Backscattered Diffraction (EBSD) by Ion Milling

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INSTRUMENTS

In Electron Backscattered Diffraction (EBSD) in the SEM, the diffraction pattern is formed within the first few (typically 5-10) nanometers of the specimen surface. Therefore, for optimal pattern quality and thus accurate Orientation Imaging Microscopy (OIM), it is of utmost importance that these first few atomic layers are in pristine, crystalline form. Typical specimen preparation for EBSD consists of mechanically polishing the specimen to a high quality finish, typically better than 0.05 micron. For very soft materials, even the final few steps can induce local lattice distortion near the specimen surface – destroying backscattered pattern quality. Therefore, a final preparation step is often needed. One such popular step is electropolishing. However, appropriate parameters must be determined such that surface smoothness is maintained. Furthermore, electropolishing may leave behind a surface solvent residue that may itself degrade pattern quality.



Another possibility is ion milling. Ion milling is a popular final processing step in TEM for removing very small amounts of specimen material while inducing minimal specimen damage. By modifying a specimen holder for the Model 1010 Ion Mill, we have been able to introduce EBSD specimens into the ion mill for the removal of the first few damaged atomic layers. The patterns above and to the left are of a specimen of aluminum oxide, before and after 30 minutes of low energy ion milling respectively. The result after ion milling is a nice, well defined diffraction pattern that can be easily indexed.