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Effects of local sample bending on atom positions and polarization mapping in HAADF-STEM images ZHEN WANG, HANGWEN GUO, LINA CHEN, E.W. PLUMMER, JIANDI ZHANG, Louisiana State Univ - Baton Rouge, JING TAO, LIJUN WU, YIMEI ZHU, Brookhaven National Laboratory — Characterization of the structural distortion/reconstruction in the transition-metal oxide heterostructures play an important role in understanding their novel properties. In recent years, high-angle annular dark field (HAADF) in scanning transmission electron microscopy (STEM) has become a powerful technique to determine local atomic arrangements, particularly near interfaces and boundaries. However, sample bending, especially near the edge of a thin specimen, is often introduced during the TEM sample preparation process. Our recent studies reveal that small sample bending can affect significantly the measurement of atom positions in HAADF-STEM image as a result of channeling effect of the incident electron beam. Here we take $SrTiO_3$ (STO) as an example to show how to remove sample bending induced artifact from its intrinsic structural distortions. A polar-related artifact in STO at different bending angles were reveled both in our experiments and imaging simulation. This artifact can be removed successfully by quantitative comparing experimental with simulated HAADF-STEM images under the same imaging condition. The bending angle and thickness of the sample can be determined using convergent beam electron diffraction. Our study provide a useful guidance for removing the sample bending-induced artifact in STEM images for the studies of local lattice structures, polarization and distortion of complex materials.

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