An atomic-scale study on deoxidation process of MoO_3 via in situ transmission electron microscopy

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Molybdenum oxide (MoO_3)-based materials have attracted considerable attentions in recent years due to the significant applications in various fields, such as catalysts and optoelectronic devices, so it is of great significance to explore the deoxidation process of MoO_3 in controlled environments. Despite the previous studies on MoO_3, the atomic-scale mechanism for structural transformation in MoO_3 deoxidation possess is almost elusive for the community. In our work, we attempt to reveal the deoxidation dynamics of MoO_3 using in situ transmission electron microscopy (TEM). The corresponding process on evolution of microstructures were analyzed by high-resolution TEM (HRTEM), selected area electron diffraction (SAED) and electron energy loss spectrum (EELS) techniques. Our results indicate that the deoxidation of orthorhombic MoO_3 involves multiple intermediate phases before the final monoclinic MoO_2 structure.