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Source oxidation problem in oxide-MBE environment and its solution NAMRATA BANSAL, YONG-SEUNG KIM, SEONGSHIK OH[1], Rutgers University — Maintaining stable fluxes for multiple source elements is a challenging task when the source materials have significantly different oxygen affinities in a complex-oxide MBE environment. Although this problem has been known to the complex oxide MBE community since the late 1980s, a detailed study and solution is still lacking. Here, using Sr as a test source, because of its easy oxidation and popularity in complex oxides, we investigated the source-oxidation problem in a number of different conditions. We found that the source oxidation was less for higher flux rates, unmelted source shape, and extended port geometry. The extended port geometry was also found to eliminate the flux transient, usually observed in a standard port, after opening the source shutter. Furthermore, a crucible aperture insert scheme was found to be very effective in suppressing the source oxidation. In this scheme, a disk-shaped aperture was mounted inside the crucible and we found that it blocks most of the oxygen species coming to the source. However, the depth of the aperture disk was critical for its performance. We will discuss how these configurations suppress source oxidation and lead to significantly enhanced stability of Sr-flux in harsh oxidation conditions.

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