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# Persistence of the Nb(100) Surface Oxide Reconstruction at Elevated Temperatures

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Helium atom scattering (HAS) and Auger electron spectroscopy (AES) measured surface structure and composition of an unexplored regime of the oxidized Nb surface at SRF Nb3Sn cavity preparation temperatures. These in situ measurements revealed the high temperature stability of a NbO surface reconstruction, specifically the (3x1)-O Nb(100). HAS diffraction peak intensity, line shape, and location showed that the atomic scale structure and surface coherence length of the (3x1)-O Nb(100) surface remain unchanged up to 1130 K. Furthermore, unchanging relative peak heights from a corresponding AES experiment confirmed a stable surface composition between 300 K and 1150 K. Due to Nb's strong affinity for oxygen, an ever-present oxide layer covers Nb surfaces. The structure of the oxidized Nb surface at temperatures of Sn deposition was previously unknown. However, these results reveal that (3x1)-O Nb(100) is present and fully formed at temperatures of Sn deposition. This implies that the interfacial mechanisms driving the quality of Nb3Sn films depend on the behavior of the oxidized Nb surface and provides crucial information for Nb3Sn growth models.

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