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Atomic structure of single-layer FeSe/SrTiO3 interface studied by synchrotron X-ray diffraction RUI PENG, KE ZOU, STEPHEN ALBRIGHT, CLAUDIA LAU, HAICHAO XU, Yale University, HAWOONG HONG, Argonne National Lab, C.H. AHN, F.J. WALKER, Yale University — The superconducting transition temperature of single unit cell epitaxial FeSe/$SrTiO_3$ interface (60-109 K) is significantly enhanced compared to the transition temperature in bulk FeSe (8K). It is now widely accepted that the oxide-FeSe interface plays a crucial role in enhancing the superconductivity of FeSe. One key prerequisite to understanding the role of the interface is to resolve its atomic structure and chemistry. Here we report synchrotron X-ray diffraction studies on single-layer FeSe/$SrTiO_3$ grown and measured in ultra-high vacuum chamber. Crystal truncation rod analysis reveals a $\sqrt{13}\sqrt{13}$ reconstructed $SrTiO_3$ surface with double TiO_2 termination and rumpling of $SrTiO_3$ atoms near the interface. The details of the interface structure provide an experimental foundation towards acquiring a theoretical understanding of the interface-enhanced superconductivity in single-layer FeSe/$SrTiO_3$.

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