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The Surface Structure of $FeTe_{1-x}Se_x$: A LEED/STM Study[1] XIAOBO HE, VON BRAUN NASCIMENTO, GUORONG LI, JIANDI ZHANG, RONGYING JIN, Louisiana State University, Baton Rouge, LA 70803, USA, A.S. SEFAT, M.A. MCGUIRE, B.C. SALES, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA, D. MANDRUS, University of Tennessee, Knoxville, TN, 37996, E.W. PLUMMER, Louisiana State University, Baton Rouge, LA 70803, USA — We have utilized low energy electron diffraction (LEED $I-V$) and scanning tunneling microscopy (STM) to investigate the structural properties of $FeTe_{1-x}Se_x$ ($x = 0$ and 0.45) surface. The LEED pattern indicates there is no surface reconstruction on both parent and doped compounds. However, the detailed surface structure calculations from LEED $I-V$ show the cleaved surface of FeTe is Te termination with a 0.06 Å compression on the top layer. The STM topography shows the extreme flatness of the FeTe surface with a corrugation of less than 8 pm. The high resolution STM topography indicates that nanoscale chemical phase separation between Te and Se atoms is unambiguously revealed on the surface of $FeTe_{0.55}Se_{0.45}$. Chemical phase separation on the nanoscale makes the LEED $I-V$ surface structural analysis of $FeTe_{1-x}Se_x$ (001) very challenging. We will discuss the solution of the LEED analysis and the STM observations as a function of x.

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