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Self-Assembly, Dynamics, and Stability of Oxide Nano-Rods on the NiAl(110) Surface JOHN PIERCE, KEVIN MCCARTY, Sandia National Laboratories — We report the formation of parallel oxide rods upon exposing a clean NiAl(110) surface to oxygen at high temperatures (850- 1350 K). The rods are several microns long, several nanometers wide, and composed vertically of 2-Å-thick atomic layers. We investigate how they grow and measure their thermodynamic stability by following their assembly and decomposition in real- time with low-energy electron microscopy (LEEM). At a fixed temperature and O2 pressure, the rods elongate along their axes at a constant rate. The temperature dependence of this rate yields an activation energy for growth of 1.2 ± 0.1 eV. The layered nature of the rods leads to sharp changes in their rates of elongation due to their tendency to gain (lose) atomic layers as they descend (climb) atomic steps on the surface. Thermodynamic measurements indicate that alumina in the form of nano-rods on NiAl(110) is far less stable than alumina that forms upon oxidation of aluminum surfaces. This work was supported by the Office of Basic Energy Sciences, Division of Materials Sciences of the U.S. DOE under Contract No. DE-AC04- 94AL85000.

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