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How a NiAl alloy changes its stoichiometry – special role of bulk dislocations KEVIN MCCARTY, Sandia National Laboratories, JOHN P. PIERCE, Sandia National Laboratories, Livermore, CA — We are studying how a NiAl alloy changes its composition when exposed to an Al flux. As Al atoms deposited on the surface diffuse into the bulk of the Ni-rich crystal, Ni atoms are displaced to the surface, where they combine with Al to form new alloy crystal. We directly observe this crystal growth by watching atomic steps advance using low-energy electron microscopy (LEEM). We find that bulk dislocations play a special role in the mass transport between the surface and the bulk. Al deposition causes the points at which bulk dislocations terminate on the (110) surface to move linearly across the surface. The dislocations provide a channel for fast mass exchange between the surface and the bulk; as they move, new crystal is left in their wake. We will discuss the relationship between the dislocation motion and the crystal equilibration. 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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