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Oxygen-induced faceting of NiAl(111) E. LOGINOVA, W. CHEN, N. M. JISRAWI, Department of Physics and Astronomy, Rutgers University, F. COSANDEY, Materials Science and Engineering, Rutgers University, T. E. MADEY, Department of Physics and Astronomy, Rutgers University — Our research is focused on the adsorption of oxygen and oxygen-induced faceting of NiAl(111), as studied by means of LEED, AES, SEM, AFM and high-resolution soft XPS (HRSXPS, using synchrotron radiation at NSLS). The atomically rough NiAl(111) surface remains planar at room temperature when exposed to oxygen. However, the surface changes its morphology and becomes faceted upon annealing at 1100K and higher; nucleation and growth of facets are studied. The adsorption and reaction of oxygen are characterized by HRSXPS measurements of Al 2p and Ni 3p core levels for the faceted and planar surfaces. The data indicate that a well-ordered thin aluminum oxide film can be formed on the faceted NiAl surface. After extensive annealing in oxygen, symmetric oxide features of micrometers in length are observed on the surface. We investigate the stoichiometry of these features by X-Ray mapping and propose a model for their formation. Our work is motivated by the possibility that alumina thin-film-covered NiAl facets might be used as templates for growth of metallic nanostructures with controlled size and spacing. The Al_2O_3/NiAl(111) system is a good model for studying catalytic reactions over Al_2O_3-supported metal catalysts.

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