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Effects of Zr Doping on the Oxidation of Low-index Crystal Surfaces of Single Crystal beta-Nickel Aluminum SERIF URAN, Pittsburg State University, MARCOS GRIMSDITCH, BOYD VEAL, PAUL PAULIKAS, Argonne National Laboratory — Addition of small amount (∼0.1 atm %) of a reactive element (e.g., Y, Zr, Hf) to substrate alloy prior to oxidation is known to improve the oxidation properties (i.e., adherence) of these alloys. This phenomenon is known as the reactive element effect. The purpose of this investigation is to determine the role of reactive element doping during oxidation of a single crystal. It can be argued that absence of grain boundaries in the underlying metal might change or inhibit the improved scale adherence normally produced by doping with a reactive element. By comparing the effects of reactive element doping on the oxidation of different crystallographic faces, we expect to improve our understanding of this still very poorly understood phenomenon. In this study, we have measured scale thickness, composition and residual stress as a function of oxidation temperature for the three principal low-index surfaces (001), (1-10) and (111) of zirconium doped specimen. Systematic differences are observed among different surfaces and the results are compared to those of the undoped crystal.

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