

Abstract Submitted
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Optical Investigation of the Effects of Substrate Orientation on Oxidation of Single Crystal beta-nickel aluminum (NiAl) SERIF URAN, Pittsburg State University, MARCOS H. GRIMSDITCH, Argonne National Laboratory, BOYD W. VEAL, Argonne National Laboratory, PAUL, A. PAULIKAS, Argonne National Laboratory — Nondestructive optical techniques have been used to study the oxidation of low-index crystal faces of single-crystal beta-nickel aluminum (NiAl) as a function of temperature. Using these techniques, residual stress, phase composition, and thickness of the scales were determined at various temperatures. The oxidation of the three low-index surfaces, (001), (110) and (111) exhibit discernible differences. Consistently lower stress values are observed on (001) surfaces. Fluorescence and Raman results indicate a higher concentration of theta-aluminum oxide (Al_2O_3) on (001) faces and lower concentrations on (111) faces at all temperatures between 800 and 1200 Celsius degrees. Although the residual stresses are higher on (110) faces, these are the only surfaces which maintain adherence up to 1450 Celsius degrees. All surfaces exhibit a stress anomaly between 1200 and 1250 Celsius degrees.

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