Summer 6-23-2014

# The effect of exposure variables on the development of alumina scales

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# THE EFFECT OF EXPOSURE VARIABLES ON THE DEVELOPMENT OF ALUMINA SCALES

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The early development of an adherent, slowly-growing α-alumina film on the bond coat is a critical factor in the life of a thermal barrier coating system. This presentation will include results of recent experiments at the University of Pittsburgh and reanalysis of older data from the literature on the selective oxidation of aluminum from Ni-base alloys.

The following aspects of alumina scale establishment will be addressed:

- The manner by which alloy composition affects the kinetics and mechanism of the transition of alumina from the θ to the α polymorph.
- The influence of the θ to α transition on the critical Al concentration for developing and maintaining a protective external alumina scale.
- The manner by which $SO_2$ and $H_2O$ affect the kinetics and mechanism of the θ to α transition.
- The influence of $SO_2$ and $H_2O$ in affecting the critical Al concentration for developing and maintaining a protective external alumina scale.

This presentation will be relevant to alumina-scale forming alloys and coatings, with the latter including the more recent bond coatings based on $\gamma'$-$Ni_3Al$.

1. This work was supported by the Office of Naval Research under ONR Contract N00014-10-1-0661, David A. Shifler, Scientific Monitor.