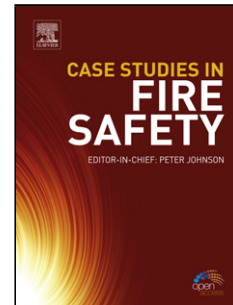


Accepted Manuscript

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PII: S0010-938X(17)31510-X
DOI: <https://doi.org/10.1016/j.corsci.2018.04.005>
Reference: CS 7470

To appear in:

Received date: 18-8-2017
Revised date: 30-3-2018
Accepted date: 2-4-2018

Please cite this article as: Dudziak T, Boron L, Gupta A, Saraf S, Skierski P, Seal S, Sobczak N, Purgert R, Steam oxidation resistance and performance of newly developed coatings for Haynes[®] 282[®] Ni-based alloy, *Corrosion Science* (2010), <https://doi.org/10.1016/j.corsci.2018.04.005>

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Steam oxidation resistance and performance of newly developed coatings for Haynes® 282® Ni-based alloy

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Highlights

- Steam oxidation study on bare and ceramic coated Haynes® 282® alloy at 800 °C for 2000 hours performed
- Nano CeO₂, Al₂O₃, YSZ and Al₂O₃-Graphene oxide coatings with/out bond coat (Ni-5wt.% Al) deposited on Haynes® 282® alloy using air plasma spray
- High degree of internal oxidation observed in Haynes® 282® alloy
- Plasma sprayed nano CeO₂ coating with no bond coat reduced internal oxidation process extensively
- Al₂O₃ based coatings showed poor adhesion and detached from the substrate after 250 hours

Abstract

Steam oxidation test was carried out at 800°C for 2000 hours on nine plasma sprayed coatings on gamma-prime (γ') strengthened Haynes® 282® Ni-based alloy. The lowest oxidation kinetics and extensive reduction in internal oxidation process was observed in the sample coated with nano CeO₂ with no bond coat. This is due to the oxygen deficiency in CeO_x that facilitates the inward movement of oxygen **arising from** the presence of Ce³⁺ oxidation state and ensures the quick formation of protective, impermeable and adherent layer of Cr₂O₃.

Keywords: A. nickel alloy; ceramic; B. SEM; XRD; C. oxide coatings; oxidation,

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