

Accepted Manuscript

High temperature molten salt corrosion behavior of aluminide and nickel-aluminide coatings for heat storage in concentrated solar power plants

P. Audigié, V. Encinas-Sánchez, M. Juez-Lorenzo, S. Rodríguez, M. Gutiérrez, F.J. Pérez, A. Agüero



PII: S0257-8972(18)30652-2
DOI: doi:[10.1016/j.surfcoat.2018.05.081](https://doi.org/10.1016/j.surfcoat.2018.05.081)
Reference: SCT 23528
To appear in: *Surface & Coatings Technology*
Received date: 23 March 2018
Revised date: 24 May 2018
Accepted date: 26 May 2018

Please cite this article as: P. Audigié, V. Encinas-Sánchez, M. Juez-Lorenzo, S. Rodríguez, M. Gutiérrez, F.J. Pérez, A. Agüero , High temperature molten salt corrosion behavior of aluminide and nickel-aluminide coatings for heat storage in concentrated solar power plants. Sct (2018), doi:[10.1016/j.surfcoat.2018.05.081](https://doi.org/10.1016/j.surfcoat.2018.05.081)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

High temperature molten salt corrosion behavior of aluminide and nickel-aluminide coatings for heat storage in concentrated solar power plants

P. Audigié (^{1,*}), V. Encinas-Sánchez (²), M. Juez-Lorenzo (³), S. Rodríguez (¹), M. Gutiérrez (¹), F.J. Pérez (²) and A. Agüero (¹)

(1) *Instituto Nacional de Técnica Aeroespacial, Área de Materiales Metálicos, Ctra. Ajalvir Km 4, 28850, Torrejón de Ardoz, Spain*

(2) *Surface Engineering and Nanostructured Materials Research Group, Complutense University, Av. Complutense s/n, Madrid, Spain*

(3) *Fraunhofer Institute Chemische Technologie Energetic Systems, Joseph-von-Fraunhofer-Str.7, D-76327 Pfinztal, Germany.*

(*) *corresponding author: audigiep@inta.es*

Abstract

Sprayed slurry aluminide and nickel-aluminide coatings deposited by means of electrodeposition and slurry application to 9 wt.% Cr P91 alloy were studied to mitigate molten salt corrosion in concentrated solar power plants. Both coatings were tested isothermally at 580°C in contact with the Solar Salt (60% wt.% NaNO₃, 40 wt.% KNO₃) under static and dynamic conditions. Uncoated P91 showed considerable mass gains in both conditions and there was evidence of extensive spallation on both cases. Mass loss was therefore also measured after removing the corrosion products by chemical etching so that the corrosion rate could be better estimated. P91 developed a complex, fast growing multilayered oxide scale which included Fe₂O₃, Fe₃O₄ and NaFeO₂ in molten nitrates whatever the test conditions. All the coated systems and in particular the nickel-aluminide coating in contact with the Solar Salt up to 1000 h performed much better than the uncoated material as they exhibited lower weight variations and no evidence of significant spallation. The aluminide coating developed a thin Na ferrite scale as shown by SEM-EDS and XRD after testing under static conditions. On the tested nickel-aluminide coating NiAl₂O₄ was detected only by XRD, so it is not possible to establish

Download English Version:

<https://daneshyari.com/en/article/8023379>

Download Persian Version:

<https://daneshyari.com/article/8023379>

[Daneshyari.com](https://daneshyari.com)