


Comparison of Isothermal with Cyclic Oxidation Behavior of “Cr-Aluminide” Coating on Inconel 738LC at 900 °C

M. Salehi Doolabi¹ · B. Ghasemi¹ · S. K. Sadrnezhad²  ·
A. Feizabadi³ · A. HabibollahZadeh¹ ·
D. Salehi Doolabi² · M. AsadiZarch²

Received: 4 August 2016 / Revised: 27 September 2016
© Springer Science+Business Media New York 2016

Abstract A two-step pack cementation technique was used to cover nickel-based IN-738LC superalloy with a Cr-aluminide coating layer. The IN-738LC/Cr-aluminide samples were oxidized at 900 °C for 350 and 700 h, isothermally, and 175 and 350 h, cyclically. Each cycle lasted for 25 h. Effects of the isothermal and the cyclic oxidation on (a) morphology, (b) new-phase formation, (c) weight gain, and (d) oxidation reactions were investigated by scanning electron microscopy, electron dispersive spectroscopy, X-ray diffraction, and weight gain measurements. From results, it was concluded that the oxygen attack was more severe during the cyclic oxidation than the isothermal procedure. Kinetics of the reactions indicated a

✉ S. K. Sadrnezhad
sadrnezh@sharif.edu

M. Salehi Doolabi
mohsen_salehi1364@yahoo.com

B. Ghasemi
bghasemi@semnan.ac.ir

A. Feizabadi
alifeizabadi2@gmail.com

A. HabibollahZadeh
ahabibolahzadeh@semnan.ac.ir

D. Salehi Doolabi
d.salehi2004@yahoo.com

M. AsadiZarch
masadiz@gmail.com

¹ Faculty of Materials Science and Engineering, Semnan University, Semnan 35131-19111, Iran

² Department of Materials Science and Engineering, Sharif University of Technology, Azadi Ave., Tehran, P.O. Box 11365-9466, Iran

³ Faculty of Mining and Metallurgical Engineering, Amirkabir University of Technology, Tehran, Iran