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(2004/1/17 2003/9/23)

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(321)

1000C^oAl₂O₃

NiO

The Effect of Nickel Concentration on Cyclic Oxidation Resistance of Austainitic Stainless Steel Alloy 321

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ABSTRACT

Experimental studies have been made to determine the oxidation behavior of several coatings system on commercial stainless steel alloy (S.S. 321). The oxidation kinetics of a single stage coating such as Aluminized and Nickel - Aluminized alloy have been under atmospheric studies pressure at 1000C^o using a thermal cyclic oxidation. X-ray technique was used to identify the coating structure and oxide scale.

Most coating use to enhance the formation of protective oxid scale, the results showed that non of the coating was totally resistant to cyclic oxidation. But Nickel–Aluminized coating, exhibited the greatest resistance to oxidation . The superiority protection of Nickel – Aluminized coating can be due to the formation of NiO and Al₂O₃.

7-18 (Shankar and Ali ,1994)

low activity process

Ni-Al 50 wt 1273 K

1 2 () %

NiAl

(2 hr)

(Shahrour, 1994)

NiAl, Ni₃Al Ni₂Al₃

.Co

Ni-Cr

(Seal and Roy, 2000)

(Isothermal oxidation)

CeO₂ (304 , 321 , 316)

321

TiO₂ ,FeTiO₃ 321

.Ti 321

...

(Ni-Cr)

(Fe-Cr)

.(Vossen, 1995)

(321)

(2×1) (321) ()

(2)

.(1) (321)

.(321)

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Alloy Type oR321	C %	MN %	NI %	CR %	S %	FE %
Stainless steal	0.0544	1.477	18.636	8.962	0.604	Balance

:

(NH₄Cl)

(1000-950 C°)

(2)

:2

M	AL₂O₃ %	NH₄CL %	AL %	NI %
X	72	3	12.5	12.5

.(1000 C°)

(160 hr)

(Thermal Cyclic Oxidation)

(4 3) (1)

- (1)

150 (0.2 mg / cm²)(12 mg/ cm²)

+

(XRD)

(3)

(Ni₃Al, NiAl)

(x)

:3

HKL			D A ^o	2 θ
110	Ni ₃ Al	VS	1.17	40.5
110	NiAl	VS	2.87	31
102	Ni ₃ Al	W	2.01	45.2
018	NiAl	W	1.61	55

(NiO, Al₂O₃)

+

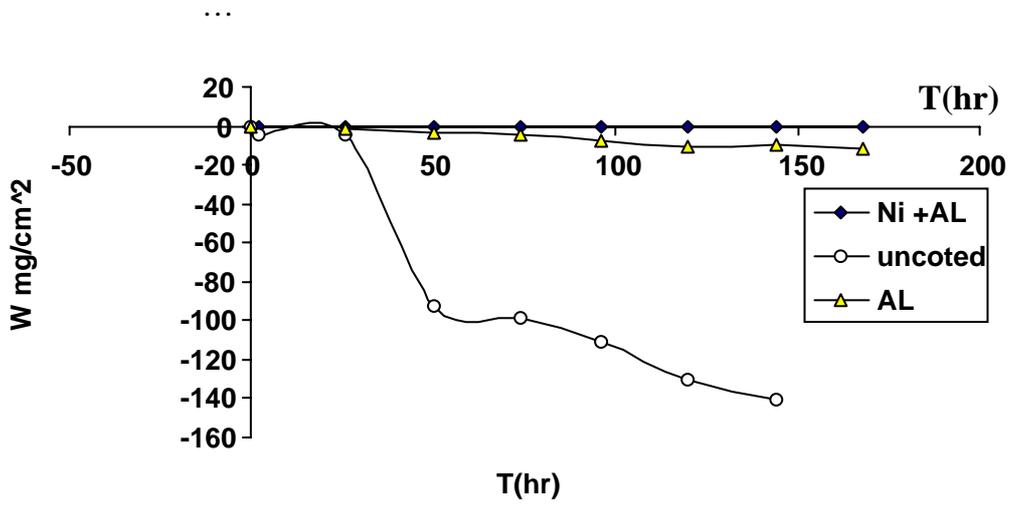
(4)

(NiAl)

(x)

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HKL			D A ^o	2 θ
111	NiO	S	2.41	47
200	NiO	VS	2.09	55
006	Al ₂ O ₃	Vw	3.78	29.8
111	NiAl	S	1.5	1.60
114	Al ₂ O ₃	S	2.51	45.1



:1

Cr₂O₃

(SS.321)

18 %

(FeCr)₂O₄

Fe₃O₄

(Cracking)

Cr₂O₃

(Internal oxidation)

(1)

140 mg /cm²

150

.(12 mg/cm²)

(α -Al₂O₃)

(α- Al₂O₃)

(Procayo,1999)

(γ - Al₂O₃)

.(α- Al₂O₃)

(thermal cyclic)

(Isothermal)

(1998)

(1) (Al_2O_3) 150 $(12\text{mg}/\text{cm}^2)$
 1000C° -
 (3) $(0.2\text{mg}/\text{cm}^2)$
 (Ni_3Al)

NiAl
 (Ni_2Al_3) (Salvatore, 1972)

(NiAl) (1000)
 (NiAl) (Ni_2Al_3)
 Al_2O_3 (4)
 Al_2O_3 NiO
 1000 C° -

NiO

.1998

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