

Table of Contents

FOREWORD

The Future for High Temperature Materials and Coatings in the New Millennium	1
J. Stringer and I.G. Wright	
Impurity Segregation to Scale/Alloy Interfaces and its Effect on Interfacial Properties	23
P.Y. Hou	
High-Temperature Oxidation Kinetics of Non-Oxide Monolithic and Particulate Composite Ceramics	39
J. Desmaison and M. Desmaison-Brut	
Carbon-Induced Corrosion of Metals and Alloys	55
T.A. Ramanarayanan, C.M. Chun and J.D. Mumford	
Practical Aspects of the Reactive Element Effect	77
J. Quadakkers and L. Singheiser	
Kinetic and Morphological Development of Internal Precipitates in Iron-Chromium Alloys	93
D.J. Young and O. Ahmed	
Mechanisms and Prevention of Corrosion in Carbonaceous Gases	101
H.J. Grabke	
Thin Film Hot Corrosion Studies of Oxidised and Carburised 304 Stainless Steel	109
T.R. Griffiths and N.J. Phillips	
Air Oxidation of a Cu-30Ni-25Fe Alloy at 700-900°C	117
Y.S. Li, Y. Niu and F. Gesmundo	
Initial Oxidation Stages of Nickel	125
J. Balmain, C. Savall, R. Molins, C. Séverac, C. Haut and A.M. Huntz	
The Surface Kinetics of the Initial Oxidation Stages of Copper as Investigated by In Situ Ultra-High Vacuum Transmission Electron Microscopy	133
J.C. Yang, M.D. Bhardwaj, L. Tropia and J.M. Gibson	
Microstructure Evolution of Alloy 600 during Dry Oxidation	141
J. Panter, B. Viguier and E. Andrieu	
Study of the Influence of an Applied Stress on the Oxidation at 550°C of Ni (100) and Ni (111) Single Crystals	149
L. Gaillet, M. Viennot, P. Berger and G. Moulin	
High Temperature Air Oxidation of Co-Ta Alloys	157
M.d. Castro-Rebello, J.A.S. Tenório and S. Wolynec	
Influence of Composition and Phase Distribution on the Oxidation Behaviour of NiCoCrAlY Alloys	165
R. Muñoz-Arroyo, D. Clemens, F. Tietz, R. Anton, J. Quadakkers and L. Singheiser	
Evidence for Suppression of the Oxidation of a Fe 2.25Cr 1 Mo Steel by Traces of SO₂	173
A. Järdnäs, J.E. Svensson and L.G. Johansson	
Short-Term High Temperature Oxidation of Lamellar Cast Iron	181
R. Durham, J. Lacaze, D. Monceau and B. Pieraggi	
Evolution of Scale Microstructure as a Function of Scale Oxide Thickness during Oxidation of Nickel at 700°C	189
R. Peraldi, D. Monceau and B. Pieraggi	
High-Temperature Corrosion of Cast Irons and Cast Steels in Dry Air	197
F. Tholence and M. Norell	
Microstructure of Oxidised 304L Steel and the Effects of Surface Roughness on Oxidation Behaviour	205
J.E. Tang, M. Halvarsson, H. Asteman and J.E. Svensson	
Influence of Additives on Characterisation and High Temperature Corrosion of Electrodeposited Copper and Nickel	215
C. Bertrand, A. Daltin, J. Douglade and S. Toesca	
Kinetic Study of the Oxidation by Water Vapour of a Zirconium-Based Alloy: Recrystallised Zircaloy-4	223
F. Ledoux, F. Valdivieso, M. Pijolat, M. Soustelle, A. Frichet and P. Barbéris	

The Kinetic Behaviour of Metals in Water Vapour at High Temperatures: Can General Rules Be Proposed?	
A. Galerie, Y. Wouters and M. Caillet	231
High Temperature Corrosion Behaviour of some Boiler Steels in Pure Water Vapour	
V. Lépingle, G. Louis, D. Petelot, B. Lefebvre and J.C. Vaillant	239
Thermal Oxidation of a Soft Magnetic Alloy Co - 10Fe - 5Cu	
C. Dubarry, A. Galerie and G. Poupon	247
Corrosion of Zirconium Alloys: Link between the Metal/Oxide Interface Roughness, the Degradation of the Protective Oxide Layer and the Corrosion Kinetics	
P. Bossis, F. Lefebvre, P. Barbéris and A. Galerie	255
Corrosion Mechanism at the Gas-Solid-Liquid Triple Line for Aluminium Droplets on Alumina Substrates under Vacuum	
C. Chatillon, L. Coudurier and N. Eustathopoulos	263
Long Term Oxidation of FeCrAl ODS Alloys at High Temperature	
G. Merceron, R. Molins, J.L. Strudel, I. Alliat and L. Menneron	269
The Influence of Water Vapor on the Corrosion of Chromia-Forming Steels	
H. Asteman, K. Segerdahl, J.E. Svensson and L.G. Johansson	277
Microstructural Changes in the Sub-Surface Area of Ni-Base Superalloys as a Consequence of Oxide Scale Failure	
U. Krupp, S.Y. Chang and H.J. Christ	287
Oxidation Behaviour of β-FeAlCr Coating Produced by Close-Field Unbalanced Magnetron Sputter Deposition	
Z.Y. Liu, W. Gao and F.H. Wang	295
TEM Observation of Phase Transformations of Alumina Scales Formed on Al-Deposited Fe-Cr-Al Foils	
A. Andoh, S. Taniguchi and T. Shibata	303
The Effect of Yttrium on the Oxidation of a Commercial Fe-Cr-Al Alloy at 1173 K	
R. Cueff, H. Buscail, E. Caudron and F. Riffard	311
Surface Treatment and Cold Working as Tools to Improve Oxidation Behaviour of Chromium Steels	
C. Piehl, Z. Tökei and H.J. Grabke	319
Mechanisms Involved by Reactive Elements upon High Temperature Chromia Scale Growth	
S. Chevalier, G. Bonnet, G. Borchardt, J.C. Colson and J.P. Larpin	327
Oxide Defects and Damage Processes in Iron-Based Alumina-Formers	
P.F. Tortorelli, B.A. Pint, E.A. Kenik, K.L. More and I.G. Wright	337
Comparison of the Cyclic-Oxidation Behavior between AISI 304 and Low-Nickel Austenitic Stainless Steels	
L. Antoni	345
Abnormal Oxidation of Stabilized Ferritic Stainless Steels in Water Vapor	
S. Henry, A. Galerie and L. Antoni	353
Isothermal Oxidation of β-NiAl Alloys and Sputtered Coating at 1000°C in Air	
S.L. Yang, F.H. Wang, Y. Niu and W.T. Wu	361
Transport Phenomena in the Scale Formed on Cr in SO_2 at 3×10^4 Pa and 10^5 Pa	
J. Gilewicz-Wolter and Z. Żurek	369
Formation and Mechanism of Carbon-Containing Oxide Scales by Oxidation of Carbides (ZrC, HfC, TiC)	
S. Shimada	377
Effects of High Water Vapor Pressures on Oxidation of SiC-Based Fiber-Reinforced Composites	
K.L. More, P.F. Tortorelli and L.R. Walker	385
Effect of Ion Implantation of High Melting Point Elements on the Oxidation Behavior of TiAl	
M. Yoshihara, S. Taniguchi and Y. Zhu	395
A Phenomenological Model for High Temperature Oxidation of Si_3N_4-TiN Composites	
F. Deschaux-Beaume, N. Fréty, T. Cutard and C. Colin	403
Optimizing the Imperfect Oxidation Performance of Iron Aluminides	
B.A. Pint, K.L. More, P.F. Tortorelli, W.D. Porter and I.G. Wright	411

The Influence of Water Vapor on the Oxidation of MoSi₂ AT 450°C	419
K. Hansson, J.E. Svensson, M. Halvarsson, J.E. Tang, M. Sundberg and R. Pompe	
Creep and Oxidation Behaviour of a TiN-TiB₂ Composite Material	427
E. Fénard, J.L. Besson and M. Desmaison-Brut	
Influence of the Oxidation Conditions of the Fibres on the Mechanical Properties of Al Matrix Composites Reinforced with Ni-Based Fibres	435
C. Salmon, D. Tiberghien, R. Molins, C. Colin and F. Delannay	
The Effectiveness of Hard Coatings in Protecting Steels against Erosion-Corrosion in Oxidizing Environments at High Temperature	443
F.H. Stott, M.P. Jordan and S.D. Barson	
Mechanical Stresses: Inhibitor of Catalyst of High Temperature Oxidation?	451
I. Sallès-Desvignes, T. Montesin, J. Favergeon and G. Bertrand	
Optimizing Scale Adhesion on Single Crystal Superalloys	459
J.L. Smialek and B.A. Pint	
Coupling between Oxidation and Mechanical Stresses. Application to the Oxidation of Ni-20Cr Foils	467
G. Calvarin-Amiri, R. Molins and A.M. Huntz	
High-Temperature Erosion-Corrosion of Superheater Materials and Coatings in Chlorine-Containing Environments	475
M.A. Uusitalo, M. Kaipiainen, P.M.J. Vuoristo and T.A. Mäntylä	
Reactive Element (Y,Ce) Effect on Stresses Determined In-Situ during Iron Oxidation at 800°C	483
H. Buscail, J.P. Larpin, E. Caudron, R. Cueff, F. Riffard, F. Rabaste and M.F. Stroosnijder	
Cracking and Spallation of Chromia and Alumina Scales during Thermal Cycling	491
S. Osgerby, H.E. Evans and S.R.J. Saunders	
A Microscopy Study of Spalling and Growth Mechanism of the Oxide Scale Formed on Pd Modified Nickel Aluminum	499
D. Oquab and D. Monceau	
Erosion Corrosion of Thermally Sprayed Fe12Cr and Cr₃C₂-NiCr Coatings	507
A. Hjörnede and I. Olefjord	
Erosion-Corrosion of 304 Tubes in Bubbling Fluidised Beds at 550°C	515
R. Norling and I. Olefjord	
Mechanical, Kinetic and Morphological Correlations during the Scale Growth of Niobium and Zirconium Oxides	523
D. Ciosmak, C. Valot, M. Lallement and G. Bertrand	
A Mechanism for the Erosion of EB PVD TBCS	531
R. Wellman and J.R. Nicholls	
Investigation of the Spallation of Oxides Grown on Thermally Cycled Heat Resistant Cast Steels	539
S. Baleix, G. Bernhart and P. Lours	
In Situ Measurement of Stresses in Alumina Scales by High Temperature X-Ray Diffraction	547
V. Kolarik, H. Fietzek, M. Juez-Lorenzo and M. Gross	
Deformation of FeO Oxide Scales upon Tensile Tests at 600-1200°C	555
Y. Hidaka, T. Anraku and N. Otsuka	
Investigation of Oxide Film Growth Stresses by Finite Element Modeling and Deflection Tests	563
A.M. Huntz, G. Calvarin-Amiri, L. Maréchal, A. Piant, F. Di Rienzo and G. Cailletaud	
Hot Corrosion of Nickel-Base Alloys by Alkali-Containing Sulfate Deposits	571
C. Leyens, I.G. Wright and B.A. Pint	
High Temperature Oxidation Resistant Coatings Produced by Electro-Spark Deposition	579
W. Gao, Z.W. Li and Y.D. He	
Technological Aspects of Forming TBC-EB Ceramic Layers	587
Y.A. Tamarin and S.V. Zherzdev	
Low Thermal Conductivity EB-PVD Thermal Barrier Coatings	595
J.R. Nicholls, K.J. Lawson, A. Johnstone and D. Rickerby	
Effects of Bond-Coat Preoxidation and Surface Finish on Isothermal and Cyclic Oxidation, High Temperature Corrosion and Thermal Shock Resistance of TBC Systems	607
D. Monceau, F. Crabos, A. Malié and B. Pieraggi	

High Temperature Oxidation of Thermal Barrier Coating Systems on RR3000 Substrates: Pt Aluminide Bond Coats	
K. Bouhanek, O.A. Adesanya, F.H. Stott, P. Skeldon, D.G. Lees and G.C. Wood	615
Degradation and Life Prediction of Gas-Turbine Duplex Coatings	
K.S. Chan, N.S. Cheruvu and G.R. Leverant	623
A Study of the Corrosion Behaviour of Magnetron-Sputter Deposited Coatings in a Reducing-Sulphidising Atmosphere at 600°C	
J.F. Norton, M. Maier, Z.Y. Liu and W. Gao	631
Cyclic Oxidation of Two Bond Coats in Thermal Barrier Coating Systems on CMSX-4 Substrates	
O.A. Adesanya, K. Bouhanek, F.H. Stott, P. Skeldon, D.G. Lees and G.C. Wood	639
Thermal Fatigue of Protective Coatings on CMSX-4 Superalloy	
Y.A. Tamarin and H.C. Low	647
Effect of Aluminum Thermal Spray Coating on the Corrosion Resistance of a Steel Under Oxidant Atmosphere in a Fluid Catalytic Cracking Regenerator	
I.M.V. Caminha, C. Zeng, M. Piza, M.J. Monteiro, M. Lopes and F.C. Rizzo	655
Isothermal Oxidation of Conventional and Pt Modified Aluminide Diffusion Coatings on a Ni Based Superalloy	
J. Angenete, E. Bakchinova and K. Stiller	663
Metallic Precipitate Formation during Alumina Growth in a FeCrAl-Based Thermal Barrier Coating Model System	
E. Sommer, S.G. Terry, W. Sigle, C. Mennicke, T. Gemming, G.H. Meier, C.G. Levi and M. Rühle	671
Effects of Platinum Additions on the Adherence of Alumina Scales to CVD Aluminide Bond Coatings	
J.A. Haynes, K.L. More, B.A. Pint, I.G. Wright, K. Cooley and Y. Zhang	679
Microstructural Characterization of the Oxide Scale Grown at the Interface between PSZ Top Coat and MCrAIY Bond Coat	
B. Rhouta and B. Pieraggi	687
An Exploratory Evaluation of the Elaboration and Protection Properties of Chromium- or Aluminum-Containing Laser-Surfaced Coatings on Titanium	
F. Passier, D. Sibuet, A. Galerie and M. Caillat	695
Why do EB-PVD NiCoCrAlY Coatings Oxidize Faster than their LPPS Counterparts?	
K. Fritscher, C. Leyens and U. Schulz	703
The Influence of Bond Coat Surface Roughness and Structure on the Oxidation of a Thermal Barrier Coating System	
M.P. Taylor and H.E. Evans	711
Degradation of Advanced MCrAIY Coatings by Oxidation and Interdiffusion	
R. Anton, J. Birkner, N. Czech and W. Stamm	719
Silicide Coatings for Niobium: Mechanisms of Chromium and Silicon Codeposition by Pack Cementation	
B. Gaillard-Allemand, M. Vilasi, T. Belmonte and J. Steinmetz	727
Passivation of Nickel-Base Superalloy Inconel 690 by Pack-Cementation Chromium Coatings	
B. Gaillard-Allemand, M. Vilasi, T. Belmonte, C. Rives, T. Czerwic, F. Belnet, O. Kerrec and H. Michel	735
Effect of Enamel Coating on the Corrosion of Ti60 Alloy	
Y.M. Xiong, F.H. Wang, W.T. Wu and Y. Niu	743
Cyclic Oxidation Performance of a CVD-FBR Aluminised 18Cr-8Ni Stainless Steel	
F.J. Pérez, F. Pedraza-Díaz, M.P. Hierro, M.C. Carpintero and C. Gómez	751
Al Slurry Coatings for Molten Carbonate Fuel Cell Separator Plates	
A. Agüero, M.C. García, R. Muelas, A. Sánchez, F.J. Pérez, D. Duday, M.P. Hierro and C. Gómez	759
Critical Issues in Laser Surface Alloying to Form High Temperature Corrosion Resistant Alloys and Near Net Shape Components	
A.S. Khanna and R. Streiff	767
An Evaluation of Tests for the Adhesion of Thermal Barrier Coatings	
S.R.J. Saunders, J.P. Banks, S. Osgerby, D. Rickerby and C.J. Chunnillall	775

Investigation of a New Methodology in High Temperature Oxidation Application to Commercial Austenitic Steels	785
P.S. Vangeli and B. Ivarsson	
Role of the Microstructure on the High Temperature Oxidation Properties of the Intermetallic Compound NbAl₃	793
V. Gauthier, J.P. Larpin, M. Vilasi, F. Bernard and E. Gaffet	
A Pre-Normative Study on the Cyclic Oxidation Behaviour of PM Chromium: The Effect of Experimental Parameters	801
Y.P. Jacob, V.A.C. Haanappel, E. Caudron, H. Buscail and M.F. Stroosnijder	
Electrochemical Impedance Study of the Corrosion of Fe-Cr Alloys in Molten (Li,K)₂CO₃ Eutectic Mixture	809
C.L. Zeng, W. Wang, Y. Niu and W.T. Wu	
In Situ High Temperature X-Ray Characterization of Yttrium Implantation Effect on Pure Iron Oxidation at 700°C	817
E. Caudron, H. Buscail, R. Cueff, V.A.C. Haanappel, Y.P. Jacob, F. Riffard and M.F. Stroosnijder	
Microstructural and Oxidation Study of Chromia Forming Molybdenum-Tungsten Based Alloys	825
S. Diliberto, C. Rapin, P. Steinmetz and P. Berthod	
Materials for Solid Fuel Fired Gas Turbines: Burner Rig and Laboratory Studies	833
N.J. Simms, J.R. Nicholls and J.E. Oakey	
Raman Spectroscopy Determination of Residual Stresses at Room Temperature in Chromia Scales Grown on Pure Chromium in Oxygen and in Water Vapour	841
J. Mougin, A. Galerie, G. Lucazeau and C.B. Bracho-Troconis	
In-Situ Impedance Spectroscopy Measurements of Fe-Cr-Al Alloys in a Flame Plasma	849
J. Pan, B. Jönsson and P. Lundström	
Effects of Fuel Composition and Combustion Parameters on Furnace Wall Fireside Corrosion in Pulverised Coal-Fired Boilers	857
C.J. Davis, P.J. James, L.W. Pinder and A.K. Mehta	
Corrosion of High Temperature Alloys by Molten Glass	865
P. Steinmetz and C. Rapin	
Corrosion Resistance of Alloys in IGCC Environment	873
K. Weulersse, B. Regad, P. Dillmann, G. Moulin, S. Deprot, P. Billard and L. Lelait	
Exploitation of Data of Alloy Corrosion in High Temperature Gases	881
R.C. John	
Thermodynamic Stability Calculations in Predicting Corrosion Behaviour at Elevated Temperature	923
B.O. Skrifvars and R. Backman	
Superheater Materials Testing for USC Boilers: Steam Side Oxidation Rate of 9 Advanced Materials in Industrial Conditions	931
J. Gabrel, C. Coussement, L. Verelst, R. Blum, Q. Chen and C. Testani	
Steam Oxidation Resistant Coatings for Steam Turbine Components: A Feasibility Study	939
A. Aguero, J. García de Blas, R. Muelas, A. Sánchez and S. Tsipas	
Materials Performance in Solid Fuel Gasification Systems	947
N.J. Simms, J.R. Nicholls and J.E. Oakey	
Metal Dusting Exposures of Modified Stainless Steels	955
E.M. Müller-Lorenz and H.J. Grabke	
Influence of Surface Preparation on the Corrosion of Steels in Simulated Waste Incineration Environments	963
N. Sämann, M. Spiegel and H.J. Grabke	
Corrosion Mechanisms and Failure Cases in Waste Incineration Plants	971
M. Spiegel	
Interactions between Oxidation and Deformation at High Temperature	979
E. Andrieu	
Protection of Materials at High Temperature. What's Beyond Coatings?	980
R. Streiff	
Oxidation by Oxygen of Liquid Al-Mg Alloys during Elaboration Process	981
K. Surla, F. Valdivieso, M. Pijolat, M. Soustelle and M. Prin	

