Symbols

GREEK SYMBOLS

α	Coefficient of thermal expansion
α	Enrichment factor for metal in internal oxidation zone
δ	Thickness of gas phase boundary layer
δ	Deviation from stoichiometry in oxide
η_i	Electrochemical potential of component i
η_g	Viscosity of gas
γ	Surface tension, free energy per unit surface area
γ_i	Activity coefficient of component i
λ	Interplanar distance, jump distance
λ	$x/t^{\frac{1}{2}}$, for parametric solutions to Fick's equation
μ_i	Chemical potential of component i
ν	Stoichiometric coefficient in chemical reaction or compound
ν_g	Kinematic viscosity of gas
ν_{iv}	Kinetic frequency term
ν_P	Poisson's ratio
ψ	Electrostatic potential
ρ	Density
σ	Mechanical stress
θ	Fraction of surface sites
ξ	Extent of reaction
ξ	Mole fraction of oxide BO in solid solution $A_{1-\xi}B_{\xi}O$
ε_c	Critical strain for mechanical failure of scale or scale-alloy interface
ε_{ik}	Wagner interaction coefficients for solute compounds i and k
ε_{OX}	Mechanical strain in oxide

SYMBOLS

A	Surface area of oxidising metal
a_i	Chemical activity of component i
a'_o, a''_o	Boundary values of oxygen activity at metal-scale and scale-gas interfaces
B_i	Mobility of species i
C_i	Concentration of component i
C', C''	Boundary values of concentration at metal-scale and scale-gas interfaces.
D	Diffusion coefficient
d	Grain boundary width
D_A	Intrinsic diffusion coefficient for species A
D_{A^*}	Tracer or self-diffusion coefficient of species A
D_{ij}	Diffusion coefficient relating flux of component i to concentration gradient in component j

$\widetilde{D}$	Chemical (or inter) diffusion coefficient
D_{o}	Diffusion coefficient for solute oxygen in alloy
$D_{\mathrm{o,i}}$	Diffusion coefficient for oxygen along an interface
E	Electric field
E_{OX}	Elastic modulus of oxide
E_{A}	Activation energy
e'	Free electron
F	The Faraday (96,500 C)
f	Fraction
f_{v}	Volume fraction
G	Total or molar Gibbs free energy
G_{OX}	Shear modulus of oxide
G_{v}	Free energy per unit volume
g_{BO}	Volume fraction of internally precipitated oxide, BO
H	Total or molar enthalpy
$h^{\bullet}$	Positive hole
$i\|S$	Species i adsorbed (bound) to surface site
ioz	Internal oxidation zone
J_i	Flux of component i
K	Chemical equilibrium constant
k	Rate constant
k	Boltzmann's constant
k_{c}	Parabolic rate constant for metal consumption, corrosion rate constant
k_l	Linear rate constant for scale thickening
k_{m}	Gaseous mass transfer coefficient
k_{s}	Surface area fraction of oxide spalled
$k_{\mathrm{p}}^{(i)}$	Parabolic rate constant for internal oxidation
k_{p}	Parabolic rate constant for scale thickening
k_{w}	Parabolic rate constant for scaling weight gain
k_{v}	Vaporisation rate
K_{p}	Equilibrium constant at fixed pressure
K_{sp}	Solubility product
K_{IC}	Fracture toughness, critical stress intensity factor
L_{ij}	General mobility coefficient, Onsager phenomenological coefficient
L	Length of material over which gas flows
l	Half thickness of alloy sheet
MW	Molecular weight
m_i	Molar concentration of component i
$m^{\bullet}$, m'	Number of charge units on lattice point defect species
n	Number of moles
N_i	Mole fraction of component i
N_{AV}	Avogadro's number
$N_{\mathrm{M},i}$	Mole fraction of component M at scale-alloy interface
$N_{\mathrm{M,min}}$	Minimum mole fraction of component M required to support growth of external MO scale
$N_{\mathrm{M}}^{(\mathrm{o})}$	Mole fraction of component M originally present in alloy
$N_{\mathrm{O}}^{(\mathrm{s})}$	Mole fraction of dissolved oxygen at alloy surface
P	Pressure
p	D_A/D_B, ratio of metal self-diffusion coefficients in ternary oxide
p_i	Partial pressure of component i

P_T	Total pressure of gas mixture
Q	Activation energy
q	Charge
R	General gas constant
r_i	Rate constant for indicated gas-solid reaction
S	Total or molar entropy
S	Spacing of periodic microstructure
S	Surface site
S_{M}^{X}	Species S located on crystal lattice site M, with effective charge X
T	Temperature
t	Time
t^*	Time at temperature in cyclic exposure conditions
U	Total or molar internal energy
U_i	Building unit in crystalline compound
V	Volume
v	Velocity
V_i	Molar volume of phase i
W	Weight
X	Scale thickness
x	Position coordinate
X_{M}	Metal surface recession
X_{ss}	Steady-state scale thickness when growth balanced by evaporation
$X_{(\mathrm{i})}$	Depth of internal oxidation zone
y	Position coordinate for scale-alloy interface relative to the original, unreacted surface location
y	z/z_s (or x/X), position within scale normalised to its thickness
Z	Effective charge, valence
z	Position coordinate in reference frame with origin at scale—alloy interface