

# Table of Contents

## Introduction

### **Role of Fast Diffusion Paths in the Initial Stages of Oxidation of High Temperature Chromium-Steels**

Z. Tökei, H. Viefhaus, K. Hennesen and H.J. Grabke 3

### **Coupling between Diffusion, Stress Field and Chemical Reaction in a Metal-Gas Oxidation**

I. Sallès-Desvignes, G. Bertrand, T. Montesin and J. Favergeon 9

### **Formation of Extremely Protective Diffusion-Barrier Scales on Novel Al-Refractory Metal Alloys during High Temperature Sulfidation**

H. Habazaki, K. Hon-yashiki, K. Hashimoto and S. Mrowec 17

### **Interdiffusion in Oxidized Multicomponent Alloys**

M. Danielewski, R. Filipek and A. Milewska 23

### **On the Defect Mobility in Niobium Disulphide**

Z. Grzesik, S. Mrowec and J. Dąbek 29

### **Chemical Transport of Mg and Al in Thin Foils of Nickel Alloys**

F. Poret, P. Dufour, B. De Rosa, J.M. Roquais and A. Steinbrunn 35

### **Transport of Oxygen in the Scales Growing on Nickel and Cobalt in SO<sub>2</sub> Atmosphere**

A. Bernasik, J. Gilewicz-Wolter and K. Kowalski 41

### **New Microthermogravimetric Apparatus for Studying the Kinetics of Chemical Diffusion in Nonstoichiometric Metal Sulphides**

Z. Grzesik and S. Mrowec 47

### **Computer Simulations of Heterogeneous Reactions Controlled by Diffusion in Modified Aluminide Coatings on a Nickel-Based Superalloy**

R. Bachorczyk Nagy, M. Danielewski, P.K. Datta, R. Filipek and G. Fisher 53

### **Thermal Stability of Multicomponent Layers Created with the Hybrid Method on Aluminium Base**

W. Serbiński 59

### **Oxygen Diffusion in TiC at High Temperatures**

E.M. Fryt 63

### **Nonstoichiometry and Self-Diffusion in $\alpha$ -MnS**

S. Mrowec and Z. Grzesik 69

### **XPS Determination of Diffusion Coefficients of Cations in Thin Passive Films on Alloys**

K. Asami, E. Akiyama and K. Hashimoto 79

### **Diffusion of Chromium in Low-Carbon Steel during Vacuum Chromizing Process**

E. Kasprzycka 85

### **Modelling Kinetics of Diffusion Controlled Reactive Wetting: The Role of Reaction behind the Triple Line**

F. Hodaj, J.N. Barbier, A. Mortensen, O. Dezellus and N. Eustathopoulos 91

### **An Analysis for Interdiffusion Coefficients and Thermotransport Coefficients in Isothermal and Nonisothermal Ternary Diffusion**

M.A. Dayananda and Y.H. Sohn 99

### **Interdiffusion Microstructure Maps for Two Phase Diffusion Couples**

J. Morral, H.M. Chen and F. Meisenkothen 105

### **The Kirkendall Effect in Multiphase Systems**

M.J.H. van Dal, A.A. Kodentsov and F.J.J. van Loo 111

### **Interdiffusion and Kirkendall-Effect in the Fe-Ni-Cu System**

Ü. Ugaste, A.A. Kodentsov and F.J.J. van Loo 117

### **Diffusion Structures and Diffusion Paths in Ternary Systems - Selected Unusual Observations**

M.A. Dayananda 123

### **Interdiffusion and Instabilities in Ternary Systems - Models and Software**

Y.A. Lyashenko and S. Kornienko 135

### **Generalized Darken's Method; From Diffusional Structures to Nonparabolic Diffusion**

M. Danielewski, W. Krzyżański and R. Bachorczyk Nagy 141

<b>Kirkendall Shift in Multicomponent Systems</b> R. Bachorczyk Nagy, M. Danielewski and R. Filipek	153
<b>The Problem of Experimental Investigation of Interdiffusion in Multicomponent Systems</b> Ü. Ugaste	157
<b>Interdiffusion in Multi-Component Systems Showing Variable Intrinsic Diffusivities</b> R. Filipek	165
<b>Analysis of Basic Kinetic Equations Solutions for Accelerated Diffusional Processes in Metals</b> E.A. Smirnov and A.A. Shmakov	171
<b>An Experimental Study of Zirconium-Neptunium Diffusion Interaction</b> O.A. Alexeev, A.A. Shmakov and E.A. Smirnov	179
<b>Stress Effects on the Sequence of Phase Formation</b> W.C. Johnson	185
<b>Initial Stage of Reactive Diffusion - Theory and Simulation</b> A. Gusak, A.O. Bogatyrev and G.V. Lucenko	191
<b>Kinetics of Ordering in Alloys Close to Equilibrium</b> A.O. Kovalchuk	197
<b>The Ni Self-Diffusion in NiAl: An Experimental Investigation of the Temperature and Composition Dependencies and Atomistic Simulation of Diffusion Mechanisms</b> S.V. Divinski, S. Frank, C. Herzog and U. Södervall	203
<b>Monte Carlo Simulation of Atomic Migration in L1<sub>2</sub> Superstructure</b> P. Oramus, R. Abdank-Kozubski, M.C. Cadeville, V. Pierron-Bohnes and W. Pfeiler	209
<b>Simulation of the Defect Complex Migration and the Comparison of the Different Diffusion Mechanisms in the Ordered Structures</b> M.G. Ganchenkova and A.V. Nazarov	215
<b>Diffusivity of Grain-Boundaries in Aluminium Bi-Crystals</b> K. Przybyłowicz and I. Suliga	229
<b>Calculation of the Mass Transport Parameters for the Nanocrystalline Chromium Coatings on Aluminium</b> N.P. Deyneka and L.N. Larikov	235
<b>Unusual Solid Gallium Penetration in Polycrystalline Aluminum</b> B.S. Bokstein, V.E. Banin, E. Kletskina, A. Petelin and S. Petelin	245
<b>Grain Boundary Diffusion Parameters Determination Using A-Kinetics of Intermetallic Layer Formation</b> M.V. Yarmolenko	251
<b>Diffusion in a Composite Medium for Arbitrary Initial Distribution of Concentration</b> R.S. Malkovich	255