

Table of Contents

Preface

The Random Walk Calculation of Diffusion Rates: A Generalisation

A.D. Le Claire and A. Rabinovitch 3

Behaviour and Properties of Thermal and Irradiation Induced Point Defects in Concentrated Alloys

A. Bartels, K. Lücke and B. Mais 11

Vacancy Concentration in fcc Alloys

T. Hehenkamp 31

Diffusion in bcc Metals and Alloys and Its Relation to Lattice Dynamics

C. Herzig and U. Köhler 33

Tracer Atom Motions in Lead-Indium Alloys

H.B. Huntington, J. Shi and M. Pacek 35

Diffusion Mechanisms in Metals

G. Neumann 43

Diffusion Kinetics and Isotope Effect in Ordered Alloys

M. Koiwa, M. Arita and S. Ishioka 65

Diffusion and Isotope Effects for Diffusion in Transition Metals

S.M. Klotsman 85

Mass Effect of Diffusion; Recent Experimental Advances

A. Lodding, H. Odelius and U. Södervall 103

Simulation of Diffusion in Solids

Y. Adda, N.V. Doan and V. Pontikis 105

Theoretical Background of Empirical Laws for Diffusion

D.L. Beke 127

On the Diffusion Mechanism in the bcc Phase of the Group 4 Metals

W. Petry, A. Heiming, J. Trampenau and G. Vogl 157

Diffusion under High Pressure

F.J. Kedves and G. Erdélyi 175

Diffusion in Amorphous Alloys

H. Mehrer and W. Dörner 189

Diffusion in Nanocrystalline Materials

J. Horváth 207

Diffusion in Ceramic Oxides

A.S. Nowick 229

Diffusion in Transition Metal Sulphides

M. Danielewski 257

Diffusion in Covalent Solids

W. Frank 259

The Problem of "Identical" Particles and Description of Homodiffusion in the Onsager's Theory of Irreversible Processes

R. Dvorsky 263

Diffusion and Disorder in Solids

Y. Limoge and J.L. Bocquet 269

Jump Frequency Analysis of Impurity Diffusion in a Computer Experiment

I.E. Podchinenov and I.S. Trakhtenberg 275

Non-Equilibrium Constant Temperature Molecular Dynamics Study of the Atomic Diffusion in Glasses

C. Massobrio, V. Pontikis and G. Ciccotti 281

The Correlation Factor for Self-Diffusion in Square and Cubic Lattices with First, Second and Third Neighbour Jumps

C. Tuijn, G. de Vries, H. Bakker and G. Neumann 289

Diffusion in Liquid Alloys under Microgravity

G. Froberg, K.H. Kraatz, H. Wever, A. Lodding and H. Odelius 295

Theory of Incoherent Hydrogen Diffusion in bcc Metals Y.A. Kashlev	301
Statistical Mechanical Theory of Interstitial Diffusion Quantum Isotope Effect for Hydrogen Diffusion in Metals S. Fujita and A. García	307
Vacancies, Interstitials and Crowdions W. Schüle	313
Hydrogen Absorption and Diffusion in Pd and Pd₈₀Cu₂₀ E. Salomons, U. Ljungblad and R. Griessen	327
Diffusion and Trapping of Hydrogen in Vacancies in Platinum Studied by PAC G.S. Collins, S.L. Shropshire and H. Jang	335
Nuclear Microanalysis and Progress in the Research of the Interstitial Atom Diffusion in Metals V.B. Vykhodets, S.M. Klotsman, T.E. Kurennykh and A.D. Levin	341
Search for Anomalous Fast Diffusion in α-Ti and α-Zr with Mössbauer Spectroscopy Y. Yoshida, M. Sugimoto, D. Tuppinger and G. Vogl	347
Anomalous Fast Diffusion of Fe in β-ZrNb Alloy Y. Yoshida, P. Fratzl, W. Miekeley and G. Vogl	353
The Regularities of the Diffusion Processes in the Close Packed Phases of the Anomalous Metals E.A. Smirnov, K.E. Smirnov, I.L. Krylov and Y.A. Shevchuk	359
High Temperature Diffusion Mechanism in bcc Metals R.P. Agarwala and D.D. Pruthi	365
Massive Out-Diffusion of Fe from Dilute Zr(Fe) Alloys G.M. Hood and R.J. Schultz	371
Calculation of the Temperature Dependence of the Vacancy Migration Energy in Tungsten M.J. Sabochick	377
Volume Diffusion of Ag-110m in α-Zr Single Crystals G. Tobar and S. Balart	381
The Mechanism of Self-Diffusion in α-Zirconium W. Frank	387
Fast Impurity Diffusion in Single Crystal α-Titanium H. Nakajima and M. Koiwa	395
The Constant Magnetic Field Diffusion of Aluminium and Nickel in α-Iron A.V. Pokojev and V.M. Mironov	401
Diffusion of Au, Fe and Zn in Aluminium under Hydrostatic Pressure C. Becker, G. Erdélyi, G.M. Hood and H. Mehrer	409
Activation Volumes of Impurity Diffusion in Silicon U. Södervall, A. Lodding and W. Gust	415
Effect of Hydrostatic Pressure on the Diffusion of Gold in Copper in the Low-Temperature Regime S. Fujikawa, M. Werner, H. Mehrer and A. Seeger	421
Isotope Effect for Iron Diffusion in Aluminium D.L. Beke, I. Gödény, G. Erdélyi, F.J. Kedves and J. Félserfalvi	427
Isotope Effect for Diffusion of Cobalt in an Iron-12 at.% Cobalt Alloy C.G. Lee, Y. Iijima and K. Hirano	433
Diffusion and the Isotope Effect for Diffusion of Homovalent Impurities - Molybdenum and Chromium - in Tungsten Single Crystals S.M. Klotsman, V.M. Koloskov, S.V. Osetrov, I.P. Polikarpova, G.N. Tatarinova and A.N. Timofeyev	439
Impurity-Diffusion of Copper in Aluminum S. Fujikawa and K. Hirano	447
Diffusion of Implanted Te and Se in Noble Metals G. Rummel and H. Mehrer	453
Determination of Vacancy Jump Frequency Ratios in Dilute AuSn Alloys H. Hagenschulte and T. Heumann	459

Fe Diffusion in Zr-Phase Transformation Effects G.M. Hood and R.J. Schultz	465
Diffusion in Random Concentrated Alloys: An Effective Field Approach J.L. Bocquet	471
Kinetics of Local Ordering and Self-Diffusion in Concentrated Ni-Al Alloys B. Sitaud and O. Dimitrov	477
Diffusion and Disorder in Intermetallic Compounds J. Hünecke, G. Frohberg and H. Wever	483
Short Range Order Kinetics and Vacancy Behaviour in Au₂₅ at.%Ag B. Mais, B. Fröhlich and K. Lücke	491
SRO-Effects in α-Ag₃Sn, Investigated by Resistivity Measurement W. Garlipp, W. Pfeiler and T. Doppler	497
Short-Range Ordering Kinetics and Point Defect Properties in γ-FeNiCr Solid Solutions S.A. Berroudji and J. Hillairet	503
Self-Diffusion and Isotope Effect of Cobalt in Intermetallic Compound Co₃Ti T. Itoh, H. Nakajima, Y. Nakamura, M. Koiwa and S. Yamaguchi	509
Ni⁶³ Bulk Diffusion in Zr-20%Nb M.J. Iribarren and F. Dymont	515
Non-Linear Arrhenius Behaviour of Diffusion Coefficients in Irradiated Nickel and Copper M.P. Macht, A. Müller and V. Naundorf	521
Kinetics of Short Range Order Formation in Au-Pd under 3 MeV Electron Irradiation A. Bartels, D. Bartusel, K. Lücke and F. Schwarzer	527
Contribution of Interstitials and Vacancies to Atomic Diffusion in Electron-Irradiated Austenitic Fe₉Cr₁₆Ni₇₅ Alloys C. Dimitrov, V. Naundorf, R. Poerschke and O. Dimitrov	533
Element Redistribution in Electron-Irradiated Austenitic Alloys F. Rotman, D. Gilbon and O. Dimitrov	539
Diffusion in Metal-Metalloid Glasses B.S. Bokstein, I.V. Karpov, L. Klinger and G.S. Nikolskij	545
Atomic Transport in Nanocrystalline Materials H.T. Hahn, J.H. Höfler and R.S. Averbach	549
Diffusion in Nanocrystalline Copper M.J. Sabochick and J.A. Lupo	555
Diffusion of Ti Atoms in Ni-Si-B Metallic Glass V. Bohác, S. Luby, E. Majková and M. Vesely	561
Diffusion of Au Atoms in Ni-Si-B Metallic Glass V. Bohác, E. Majková, S. Luby, R. Sandrik and M. Vesely	567
Diffusion and Vacancy Impurity Interaction in Dilute fcc Alloys F. Faupel, D. Hentrich, J.-. Kluin, J. Wolff, A. Sager and T. Hehenkamp	573
Tracer Grain-Boundary Diffusion in Polycrystals D.L. Beke, I. Gődény, G. Erdélyi, W. Łojkowski, C. Cserhádi and F.J. Kedves	581
Self-Diffusion along Dislocations and in the Lattice of α-Iron H. Mehrer and M. Lübbehusen	591
Diffusion Processes and Their Modifications in Some Pb-Sn-Cu Alloy Solders D. Gupta and J. Oberschmidt	605
High-Resolution Autoradiography. Diffusion Study along Intercrystalline Boundaries S.Z. Bokstein	625
Individual Grain Boundary and Phase Boundary Diffusion B.S. Bokstein	631
Grain Boundary Diffusion and Grain Boundary Phase Transformations L.S. Shvindlerman and B.B. Straumal	649
Solute Grain Boundary Segregation Effect on Grain Boundary Diffusion J. Bernardini	667
A Gamma Resonance Spectroscopy Study of the Structure, Electronic and Dynamic Properties of Grain Boundaries in Metals V.N. Kaigorodov, S.M. Klotsman, V.M. Koloskov and S.N. Shlyapnikov	679

Dislocation Spreading and Grain Boundary Diffusion W. Łojkowski, J.W. Wyrzykowski, J. Kwiecinski, D.L. Beke and I. Gödény	701
Point Defect Diffusion Enhanced by the Stress Field of Moving Dislocations G. Gremaud and B. Quenet	713
Diffusion Induced Grain-Boundary Migration-DIGM P. Shewmon	727
Diffusion Induced Recrystallization in Nickel-Copper Diffusion Couples D. Liu, W.A. Miller and K.T. Aust	735
Mechanisms for Grain Boundary Migration C.L. Bauer	749
Diffusion along Migrating and Stationary Boundaries I. Kaur and W. Gust	765
Grain Boundary Diffusion Data: Some General Problems I. Kaur and W. Gust	789
Intercrystalline Diffusion of Gold in Silver A.B. Vladimirov, V.N. Kaigorodov, S.M. Klotsman and I.S. Trakhtenberg	795
Grain Boundary Self- and Impurity (In, Sn, Sb, Te) Diffusion in Nickel over Large Temperature Ranges P. Neuhaus and C. Herzig	799
Grain Boundary Diffusion of "Fast Diffusing" Solutes in Lead J. Bernardini, S. Bennis and G. Moya	805
Super Fast Impurity Grain Boundary Diffusion in alpha-Zirconium K. Vieregge and C. Herzig	811
Critical Behaviour of Grain Boundary Diffusion Near the Curie Point in Iron-Silicon Alloy E. Rabkin, V.N. Semenov, L.S. Shvindlerman and B.B. Straumal	819
The Mechanism of Grain Boundary Diffusion in Condition of Nonequilibrium State of Structure K. Przybyłowicz and I. Suliga	829
Diffusion of Helium along Grain Boundaries during Irradiation A.J.E. Foreman and B.N. Singh	837
Grain Boundary Self-Diffusion in Silver Bicrystals J. Sommer, C. Herzig, S. Mayer and W. Gust	843
Zink Diffusion along Individual Grain Boundaries <110> in Aluminium B.S. Bokstein, L. Klinger and S.N. Kholodov	849
Calculation of the Correlation Factor for Pipe Diffusion via Vacancy Mechanism I.A. Szabó, D.L. Beke and F.J. Kedves	855
Diffusion Parameters, Grain Boundary Structure and Diffusion Mechanism in the Vicinity of the Σ 5 Coincidence Misorientation in Copper A.N. Aleshin, S.I. Prokofjev and L.S. Shvindlerman	861
Properties of Tilt Boundaries <001> in Tin and Tin-Sodium Alloys in the Vicinity of the Special Boundary-General Boundary Transformation E.L. Maksimova, E. Rabkin, L.S. Shvindlerman and B.B. Straumal	869
Zr⁹⁵ Diffusion along alpha/beta Interphase Boundaries in Zr 2.5 % Nb M.J. Iribarren and F. Dymant	875
On the Influence of Dislocations on Diffusion and Solubility of Impurities in Metals Y.S. Nechaev	881
Low Temperature Volume and Dislocation Diffusion of Homovalent Impurities in Tungsten S.M. Klotsman, S.V. Osetrov, I.P. Polikarpova, G.N. Tatarinova and A.N. Timofeyev	889
Interaction Mechanisms Between Diffusing Intrinsic Point Defects and Moving Dislocations B. Quenet and G. Gremaud	895
Grain Boundary Atomic Diffusion in the Model of Structurally Inhomogeneous Boundaries V.V. Kondratyev and I.S. Trakhtenberg	901
Limited Effect of Gibbs Segregation in G.B. Diffusion Process from Diffusion and Segregation Measurements in Ag(Ni) Alloys P. Gas, S. Poize, J. Bernardini, F. Cabané and J. Cabané	905
Kinetics of Impurity Segregation on Crystalline Boundaries E.P. Feldman and V.M. Yurchenko	911

Bicrystal Studies of Diffusion Induced Grain Boundary Migration in Cu/Zn A.H. King, F. Chen, G. Dixit and A.J. Aldykiewicz Jr.	919
DIGM in Dispersion Strengthened Tungsten? L. Lipták and I. Gaál	925
Grain Growth Texture Development in Ni Coated Fe3%Si as Effect of Grain Boundary Diffusion P. Gangli and K. Lücke	931
Grain Boundary Role in Phase Formation Caused by Diffusion from Surface E.P. Daneliya, M.I. Doperchuk and A.S. Steinberg	939
The Evaluation of the Diffusion Activity of Migrating Grain Boundaries by the Discontinuous Decay Kinetics in the Nickel Superalloy R. Valiev, V.I. Sergeev and E.V. Shvetsova	951
On the Effect of High Pressure on the Grain Boundary Structures Formed during Recovery of Aluminium W. Łojkowski, J. Kwiecinski, J.W. Wyrzykowski and T. Łada	957
Diffusion Accelerated Grain Boundary Sliding in Zinc Bicrystals R. Valiev and V.G. Khairullin	961
Mutual Diffusion in Multicomponent Systems A. Mokrov	971
Effect of Low Pressures on Interdiffusion L.N. Paritskaya	987
Reactive Diffusion J. Philibert	995
Short-Range Ordering in Relation to Point Defects and Phase Transitions J. Hillairet	1015
Effect of Magnetic Transition on Diffusion K. Hirano and Y. Iijima	1039
Diffusion Controlled Brittle Fracture at Elevated Temperatures M. Menyhard, E. Barrerra and C.J. McMahon	1059
Diffusion in Highly Defected Solids J.N. Mundy	1061
Oxygen Diffusion in High-T_c Superconductors S.J. Rothman, J.L. Routbort, L.J. Nowicki, K.C. Goretta, L.J. Thompson, J.N. Mundy and J.E. Baker	1081
The Structure-Dependence of Diffusion Barriers in Oxides and in NiO Grain Boundaries M. Ronay and P. Nordlander	1097
An Example of the Dependence of Diffusional Boundary Conditions on Stress: Two-Particle Ostwald Ripening W.C. Johnson, T.A. Abinandanan and P.W. Voorhees	1115
Reaction Kinetics and Electromigration Threshold in Aluminium Thin Films E.E. Glickman, N.A. Osipov and E.D. Ivanov	1129
Electromigration in Thin Films C.L. Bauer and P.F. Tang	1143
Self-Organization by Diffusion-Controlled Reactions in Irradiated Materials C. Abromeit	1153
Solid State Amorphizing and Other Structural Transformations by High Energy Ball Milling the Role of Diffusion H. Bakker, P.I. Loeff and A.W. Weeber	1169
Diffusional Creep G.W. Greenwood	1187
Diffusion Creep in Ceramics: A Comparison with Metals A.H. Chokshi and T.G. Langdon	1205
Basic Questions of Sintering I. Gaál	1227
Interdiffusion in Binary Aluminium Alloys and Atom Size Effects Y. Minamino, T. Yasuda, H. Araki and T. Yamane	1251
Interdiffusion in the alpha Solid Solution of Al-Cu-Mg System T. Takahashi, M. Katoh, Y. Minamino and T. Yamane	1257

Observations of the Continuous Kirkendall Effect J. Klatte and V. Ruth	1263
Solid Solubility Changes in Aluminium Base Binary Alloys under High Pressure Measured by Diffusion Couple Method T. Yamane, Y. Minamino, T. Sato, E. Itaya, Y. Miyamoto and M. Koizumi	1269
Multicomponent Effects in Alloy Diffusion J. Morral, M.K. Stalker and M.S. Thompson	1275
Measurement of the Kirkendall Marker Shift by the Parallel Inert Foil Method T. Shimozaki, N. Saita, Y. Wakamatsu and M. Onishi	1281
Lateral Mass Flows during Binary Diffusion R. Busch and V. Ruth	1287
Interdiffusion of Mn and Mo in Austenitic Stainless Steels M.T. Malik, D. Bergner and A. Kühl	1293
Interdiffusion in the V₃Si-Cr₃Si-System M. Jurisch, D. Bergner and H. Mai	1299
Layer Growth of beta-Ti Phase in Binary Reaction Diffusion Couples of Ti with Other Metals O. Taguchi, Y. Iijima and K. Hirano	1305
Diffusion Phenomena in Thin Films of High Temperature Superconductors of the Y-Ba-Cu-O System O.M. Bakunin, V.B. Vykhodets, S.M. Klotsman, A.D. Levin, S.A. Matveev and K.A. Stephanov	1311
Thermal Stability of a Ni(Cr,Al)-TiC "In Situ" Composite A. Maciejny, G. Smolka and A. Dytkowicz	1319
Ionic Transport in Mixed Sodium Rubidium Aluminogermanate Glass J.N. Mundy and G.L. Jin	1325
The Study of the Structural Relaxation of an Amorphous Ni-P Alloy with the X-Rays Small Angle Scattering Method S.C. Krysova and V.I. Krysov	1331
Preparation of Micro-Heterogenized Glasses by Sintering Fine-Grained Glass Powder J. Hopfe, M. Busch, V. Schmidt and S. Gleditzsch	1337
Synthesis of Amorphous Co-Nb Alloy Powders by Mechanical Alloying M. Perret, H. Mehrer and N. Stolwijk	1343
Simultaneous Diffusion of Charged Impurities in Semiconductors under Consideration of the Built-In Field V.A. Pokojeva	1349
Effect of Stress and Macroscopic Deformation Caused by Interdiffusion on the Growth of Intermetallic Layers D.L. Beke, L. Kozéky, I. Gődény and F.J. Kedves	1357
Creep and Bulk Diffusion in Equiatomic beta Ag-Zn and beta Ag-Cd C. LExcellent, S. Benlemlih, G. Moya and J. Bernardini	1365
Interdiffusion between Y-Ba-Cu-O Thin Films and Substrate Materials H. Nakajima and S. Yamaguchi	1371
Lattice and Grain Boundary Diffusion in Bulk Silicides: Case of Ni₂Si J.C. Ciccariello, N. Guelton, P. Gas and S. Poize	1377
Oxidation and Decarburization of Fe-Cr-C Steels at High Temperatures M. Haiduga and J. Kucera	1383
Carbon Redistribution in Austenitic Steel Weldments - General Solution J. Kucera, B. Million and K. Stránský	1389
The Influence of Ni-Barrier on Carbon Redistribution in the Steel Weldments J. Kucera, J. Vrestál and K. Stránský	1395
Computer Simulation of Carbon Distribution in the Carburization Process S. Gut and K. Przybyłowicz	1401
Diffusion of Si in bcc- and fcc-Fe D. Bergner, Y. Khaddour and S. Lörx	1407
Activation Energy of Superplastic Deformation Processes in Aluminium Alloys A. Juhász, N.Q. Chinh, P. Tasnádi, I. Kovács, T. Torma, T. Turmezey and E. Kovács-Csetényi	1413
The Mechanism of Superplastic Deformation with High Activation Energy A. Juhász, P. Tasnádi, N.Q. Chinh and I. Kovács	1421

The Influence of some Alloying Elements on the Grain Boundary Relaxation of Aluminium S. Kiss, I.Z. Harangozó, Z. Cseresnyés and F.J. Kedves	1425
Diffusion Processes in Low-Frequency Internal Friction of Crystalline Argon, Neon and Hydrogen A.V. Leonteva, G.A. Marinin, A.Y. Prokhorov and T.N. Anisimova	1431
The Mechanism and Kinetics of Diffusion in Process of Discontinuous Precipitation and Dissolution in Aged AlZn Alloys A. Pawłowski, R. Ciach and P. Zięba	1435
Utilization of Diffusion Parameters for the Optimization of Heat-Treatment Processes of Aluminium Alloys E. Cyrener and D. Bergner	1441
SRO Relaxation in NiAl Alloys M. Afyouni, M.C. Cadeville, V. Pierron-Bohnes and P. Vennéguès	1449
Anisothermal Resistometric Studies of the Phase Transformations in the Al-39%Zn Alloy J.M. Holender and J. Sołtys	1455
The Studies of the Eutectoidal Decomposition of Al-59at.%Zn at the Temperatures Close to the Critical Temperature J.M. Holender and J. Sołtys	1461
Resistometric Studies of the Short Range Order in Ni-10at.%Mo J. Sołtys, A. Michałek, R. Kokoszka and R. Abdank-Kozubski	1467
Temperature Dependence of Electrical Resistivity of Ni₃Mn due to Short Range Ordering Process G.J. Stanisiz, J. Sołtys and J.M. Holender	1473
Decomposition of the Supersaturated Solid Solution in Dilute AlSc Alloys T. Torma, E. Kovács-Csetényi and T. Turmezey	1479
The Diffusion of Carbon in Non-Stoichiometric Carbides W. Wakelkamp, F.J.J. van Loo, B. Boelen, G.F. Bastin and R. Metselaar	1485
Possible Connection of Thermal Expansion and Luminescence of GaP:N, S Epilayers with Sulphur Diffusion to Dislocations J. Bak-Misiuk, W. Paszkowicz and W. Strupiński	1491
The Interaction between SiC and Ni or Fe R.C.J. Schiepers, F.J.J. van Loo and G. de With	1497
Diffusion of Elements in Heat-Resisting Steels during Annealing in Molten Barium Chloride S. Golec, S. Gut and K. Przybyłowicz	1503
Diffusion and Phase Transformations in Transition Metal Oxides S.M. Klotsman, M.L. Klebanov, V.G. Puschin, R.R. Romanova, K.A. Stephanov and A.N. Timofeyev	1509
X-Ray Diffraction Studies of Interdiffusion in InP-GaP Powder Blends U. Volland, R. Cerný, P. Deus, D. Bergner and G. Fenninger	1513
Interdiffusion of Alkaline Earth Cations in Their Titanates E.P. Butler, H. Jain and D.M. Smyth	1519
Diffusional Growth of Scales with Variable Composition M. Danielewski	1525
The Theory of Multiphase Scale Formation on Metal M. Danielewski	1531
On the Effect of Oxide Particles Redistribution during the High Temperature Oxidation of Dispersion-Strengthened Alloys M.G. Isakov and V.K. Tolpygo	1539