

Table of Contents

Preface

Statistical Theory of 2-D Grain Growth Based on First Principles and its Topological Foundation

K. Lücke, G.C. Abbruzzese and I. Heckelmann 3

Synchrotron White Beam X-Ray Topographic In Situ Study of the Different Types of Grain Growth

J. Gastaldi, C. Jourdan and G. Grange 17

Modelling Grain Growth and Soap Froth Coarsening: Past, Present and Future

D. Weaire and J.A. Glazier 27

Comparison of Soap Froth and Simulation of Large-Q Potts Model

S. Ling, M.P. Anderson, G.S. Grest and J.A. Glazier 39

Scaling in a Binary Linear Bubble Model of Grain Growth

W.W. Mullins and J. Viñals 53

On the Role of Random Walk in Normal Grain Growth

N.P. Louat, M.S. Duesbery and K. Sadananda 67

Statistical Theory of Texture Effects on Grain Growth: A Basic Approach

G.C. Abbruzzese and K. Lücke 77

Deterministic and Statistic Models of Normal and Abnormal Grain Growth

O. Hunderi and N. Ryum 89

Application of Microstructural Path Concepts to Normal and Abnormal Grain Growth

R.A. Vandermeer 101

Abnormal Grain Growth during the Heat Treatment of Steel

T. Gladman 113

The Effects of Particles and Solutes on Grain Boundary Migration and Grain Growth

B. Ralph, K.B. Shim, Z. Huda, J. Furley and M.J. Edirisinghe 129

Modeling Microstructural Evolution in Two-Dimensional Two-Phase Microstructures

J.W. Cahn, E.A. Holm and D.J. Srolovitz 141

Grain Growth in Multiphase Alloys

S. Ankem 159

Kinetic Phase Transitions on Migrating Grain Boundaries

L.S. Shvindlerman 169

On the Orientation Dependence of Grain Boundary Energy and Mobility

G. Gottstein and F. Schwarzer 187

Grain Boundary Character Distribution (GBCD) Analysis of Grain Growth-Related Phenomena in Polycrystalline Materials

T. Watanabe 209

On the Mechanisms of Grain Boundary Migration

D.A. Smith 221

Experimental Aspects of the Electron Back-Scatter Diffraction Technique for Grain Boundary Characterisation

V. Randle 233

Experimental and Theoretical Aspects of Grain Growth in Thin Films

C.V. Thompson 245

Some Topological Aspects in 2-D Grain Structures

I. Heckelmann, K. Lücke and G.C. Abbruzzese 259

Main Regularities of 2-D Normal Grain Growth

V.E. Fradkov 269

The Topology of a Polycrystal in Three Dimensions

D.A. Aboav 275

Grain Growth on Curved Surfaces

D. Levine, J.E. Avron and A. Brokman 281

3-D and 2-D Stereological Parameters of Computer Simulated Grain Structures

M. Maliński, J. Cwajna and J. Chrapoński 285

Simulation and Analysis of Random Planar Mosaics H.U. Hermann and U. Lorz	295
Simulating and Modelling Grain Growth as the Motion of a Weighted Voronoi Diagram H. Telley, T.M. Liebling, A. Mocellin and F. Righetti	301
Simulation of 3-D Voronoi Polygons A. Thorvaldsen	307
Computer Simulation of Cellular Pattern Growth T. Nagai, S. Ohta and K. Kawasaki	313
Grain Growth Kinetics: The Grain Growth Exponent M.A. Fortes	319
Change in Grain Size Distribution during Grain Growth Y. Takayama, T. Tozawa, H. Kato, N. Furushiro and S. Hori	325
Effect of Grain Size Distribution on Grain Growth K. Matsuura and Y. Itoh	331
Grain Growth in one Dimension: The Mean Field Approach M.A. Fortes, V.A. Ramos and A. Soares	337
A Grain Growth Model for Evolution of Polycrystalline Surfaces A.J. Dammers and S. Radelaar	345
A Stochastic Theory of Grain Growth C.S. Pande	351
A Stochastic Field Approach to Grain Growth A. Thorvaldsen	361
A Statistical Theory of Normal Grain Growth P.A. Mulheran and J.H. Harding	367
Modelling Subgrain Growth in Two Dimensions T.O. Saetre and N. Ryum	373
A Statistical Model of Continuous Grain Growth in Textured Materials H.J. Bunge and E. Dahlem-Klein	379
Texture Development during Grain Growth - A Useful Rule-of-Thumb W.B. Hutchinson and E. Nes	385
The Role of Grain Boundary Energy in Texture Controlled Grain Growth I. Heckelmann, G.C. Abbruzzese and K. Lücke	391
Texture Evolution in the Presence of Precipitates in Fe-3% Si Alloy J. Harase and R. Shimizu	399
On the Parameters Controlling the Kinetics of Secondary Recrystallization in Grain Oriented Silicon Iron G.C. Abbruzzese, S. Fortunati and A. Campopiano	405
Modeling of Secondary Recrystallization in 3% Silicon Steels T. Nakayama and Y. Ushigami	413
Effect of Cross Rolling Reduction on the Texture Evolution by Grain Growth in Fe-3% Si Alloy J. Harase	419
Influence of Grain Orientation on some Magnetic Properties in Microcrystalline 6.5% Si-Fe Ribbons W. Ciurzynska, J. Zbroszczyk, B. Wyslocki, J.W. Moron, S. Szymura and Y. Yamashiro	425
An Etch-Pitting Technique for Statistical Analysis of Grain Size Distributions as a Function of Orientation in Fe-Si Alloys S. Fortunati, G.C. Abbruzzese and P.E. di Nunzio	431
Mechanism of {111} Texture Development in Cold Rolled Steel Sheets by Controlled Cooling on Continuous Annealing Process O. Hashimoto, K. Sakata and T. Kato	437
Influence of Cementite and Graphite on Grain Growth and Texture Development in High Carbon Sheet Steel K. Fukui, T. Kaneko and A. Okamoto	443
Texture and Grain Growth of Dynamic and Static Recrystallization in Rolled Austenitic Fe-Ni-C Alloy J.G. Joo and B.H. Hahn	449

The Development of Microstructure and Texture during the Zone-Annealing of the Mechanically Alloyed ODS Material: MA6000 M. Mujahid and J.W. Martin	455
Relationship between the Primary and Secondary Recrystallized Textures in Multi-Layer Molybdenum Crystals T. Fujii	461
Development of a X-Ray Technique for Measuring Grain Size as a Function of Orientation in Polycrystalline Materials G.C. Abbruzzese and P.E. di Nunzio	467
Connections between Grain Boundary Structure and Energy K.L. Merkle and D. Wolf	475
Twin Boundaries: Structure, Migration and Grain Growth K. Rajan	481
On the Relation between Sliding and Migration for High-Angle Grain Boundaries D. Wolf, S.R. Phillpot, J.A. Jaszczak and S.-. Yip	487
Changes of the Grain Boundary Character Distribution in Grain Growth of Pure Al T. Shibayanagi, H. Takatani and S. Hori	495
Formation of Grain Boundary Characteristics by Grain Growth in Polycrystalline Aluminium J. Kwiecinski and J.W. Wyrzykowski	501
Grain Boundary Design during Recrystallization in High Purity Metals and Semiconductors L.K. Fionova	507
Grain Growth Effects on Creep P. Gondi, R. Montanari and A. Sili	513
The Diffusion Coefficient of Vacancy-Boron Complexes during the Segregation of Boron Atoms to Grain Boundaries X. Tingdong, S. Shenhua, S. Huazhong, Y. Zhexi and W. Gust	519
Grain Growth Steps with Dislocation Emission P. Gondi and R. Montanari	525
Modelling of Grain Growth in Thin Film Strips D.T. Walton, H.J. Frost and C.V. Thompson	531
Microstructural Evolution and Texture Development in Thin Films J.A. Trogolo, R.A. Roy, J.J. Cuomo and K. Rajan	537
Abnormal Grain Growth in Thin Films due to Anisotropy of Free-Surface Energies H.J. Frost, C.V. Thompson and D.T. Walton	543
HVEM In Situ Investigation of Stress-Induced Grain Growth during Thermal Annealing of Thin Al-Alloy Films on a Si/SiO₂ Substrate D. Katzer, D. Gerth and R. Riesenber	551
Correlation between Grain Growth and Hillock Growth in Thin Thermally Annealed Al-1%Si Films on Silicon Substrates D. Gerth, D. Katzer and R. Schwarzer	557
Grain Growth in Al-2% Cu Thin Films J.E. Sanchez, D.R. Frear and J.W. Morris	563
Aspects of Grain Growth in a Rapidly Solidified Gold Alloy D.P. van Heerden and M.P. Shaw	571
Grain Growth in Titanium Disilicide and its Effect upon Reaction Kinetics A.H. King and Y.L. Corcoran	577
Analysis of Crystal Growth and Nucleation Rates in the Hot Filament Chemical Vapour Deposition of Diamond E. Molinari, R. Polini, V. Sessa, M.L. Terranova, P. Ascarelli and S. Fontana	583
Purity Effects on the Growth of Grains P. Gondi, R. Montanari and A. Sili	591
Theory of Grain Growth in the Presence of Second Phase Particles G.C. Abbruzzese and K. Lücke	597
On the Influence of the Temperature in Zener Pinning C.H. Wörner and A. Olguin	605
Anomalous Grain Growth during Decarbonization of Non Oriented Electrical Steel Sheet L. Rabet, L.A.I. Kestens, P. van Houtte and E. Aernoudt	611

Influence of Zener-Drag and Related Primary Recrystallization on Grain Growth Kinetics in N.O. 3.2% Silicon-Iron	619
S. Fortunati, S. Matera, G. Ban and G.C. Abbruzzese	
Interaction of Grain Boundary with Precipitate Particles during Aging	627
D. Hamana, A. Boutechnouchet and Z. Boumerzoug	
Secondary Recrystallization of ODS-Superalloys: The Influence of Carbide Phases	635
K. Lempenauer and E. Arzt	
Zone Annealing of a Ferritic ODS Superalloy: MA957	643
P.J. Evens and J.W. Martin	
Grain Growth in the Solid Plus Liquid Two-Phase Field: Instability of Liquid Films at Migrating Grain Boundaries	649
S. Annavarapu, J. Liu and R. Doherty	
Combined Phenomena of Grain Boundary Migration, Precipitation and Recrystallization in Cu-7.5 at% In	659
I.G. Solorzano and W. Gust	
Effects of the Austenitic Grain Size on Nonisothermal Phase Transformations in Martensitic Stainless Steels	665
C. García de Andrés, L.F. Alvarez, M. Carsí and F. Peñalba	
The Kinetics of Coupled Phase Coarsening in Two-Phase Structures	671
G.T. Higgins, S. Wiryolukito and P. Nash	
Temperature Dependence of Grain Size Distribution of Austenite in an Eutectoid Steel Containing NbC	677
J.C. Bruno and P.R. Rios	
The Effect of Temperature and Partial Substitution of V for Nb on the Grain Size of an AISI H-13 Tool Steel	683
C.N. Elias and C.S.d. Costa Viana	
Influence of Thermomechanical Parameters on the Grain Size of Microalloyed Steels with Vanadium and Titanium during Forging	689
F. Peñalba, F. Zapiráin, M. Carsí, C. García and M.P. de Andrés	
Grain Growth during Tempering of a Low Alloy Mn-Mo-Ni Pressure Vessel Steel	697
H.J. De Klerk, W.M. De Villiers and G. Pienaar	
Austenite Grain Evolution in a Carbon Steel during Reheating	703
J.G. Cabañas-Moreno, J.C. Rendón-Angeles and J.E. Araujo Osorio	
Computer Simulation of the Austenite Grain Coarsening in Microalloyed Steel Plate Using the Monte Carlo Technique	709
A. Kern, W. Reif and U. Schrieffer	
Growth during and after the Static and Metadynamic Recrystallization of Austenite	715
P. Hodgson, J.J. Jonas and S. Yue	
Grain Growth during Homogenizing of As-Cast High Purity Aluminum	723
B. Grange, C. Sigli, C. Herrström and G.M. Raynaud	
Recrystallization and Grain Growth in Aluminium and Copper Bicrystals	735
S. Kikuchi	
Directional 'Recrystallisation' in an Aluminium Alloy	741
N. Deards and H.K.D.H. Bhadeshia	
Grain Refinement in Aluminum Alloys by Rapid Solidification	747
F.H. Samuel and G. Champier	
Grain Size Control during Processing of Aluminium at Elevated Temperatures	753
R. Orsund and O. Lohne	
Effect of Strain-Induced Grain Growth on Flow Stress in Superplastic Aluminium Alloy	759
H. Iwasaki, S. Hayami, K. Higashi and S. Tanimura	
Computer-Aided Investigation of Grain Growth in Copper and Aluminium	765
H. Richter, P. Klimanek and K.-. Hensger	
Effect of Cerium Addition on Grain Size and on Recrystallization of Al-Li-Mg Alloys	771
D. Buttinelli, F. Felli, C. Lupi and F. Marani	
Grain Growth in Ice	779
O.B. Nasello, L.E. Arena and C.A. Di Prinzio	
Computer Simulation and Experimental Analysis of Anisotropic Grain Growth in Ceramics	785
U. Kunaver and D. Kolar	

Microstructure Quantification of a Superplastic Alumina F. Righetti, T.M. Liebling, G. Le Caër and A. Mocellin	791
Effect of Chromia on Grain Growth in Alumina A. Harabi and T. Davies	797
Surface Properties of Tungsten Carbide Powders and Their Influence on Grain Growth and Hardness of Hardmetals P.L. Cavallotti, L. Nobili and D. Colombo	803
Tungsten Spheroid Growth in Liquid Phase Sintered Heavy Alloys G.S. Upadhyaya and V. Srikant	811
The Alpha-Beta Transformation and Anisotropic Growth of Beta-Grains during Sintering of Si₃N₄ S. Kessler, M. Herrmann and C. Schubert	821
Formation of Silicon Carbide Grains Structure and Their Growth in Polycrystalline SiC Obtained by the Reaction-Sintering Technique A.P. Gashin and G.S. Oleinik	829
Grain Growth Control during Reaction-Sintering of Sodium-Beta"-Alumina R. Hartung and C. Koepp	839
Grain Growth and Phase Changes during Sintering of Nanocrystalline Zirconia H.Y. Lee, W. Riehemann and B.L. Mordike	849
Sintering of Doped ZnO Powders: Relationship between Grain Growth and Sintering Stress M. Ghirlanda and L.C. De Jonghe	855
The Grain Growth of Zirconia during Annealing in the Cubic/Tetragonal Two-Phase Region T. Sakuma and Y. Yoshizawa	865
Grain Growth in Yttria Doped Tetragonal Zirconia Polycrystals (Y-TZP) M. Nauer and C. Carry	871
Preferential Grain Growth and Orientation Relationships in BaTiO₃ - and ZnO Ceramics G. Kästner, R. Wagner and V. Hilarius	879
Microstructural Examination and Dielectric Properties of BaTiO₃ with Addition of CaO M. Ceh, V. Krasevec, D. Kolar and A. Meden	885
Crystal Growth in Ferroelectric Material of ABO₃ Type M.R. Todorović, L. Radonjić and J. Dumić	891
Influence of Sintering Conditions on Grain Growth of YBa₂Cu₃O_{7-x} Ceramics P. Diko, T. Litavec and K. Csach	897
Stochastic Models of Grain Growth H.J. Frost	903
Experimental and Theoretical Study of 2D Grain Growth in Succinonitrile M.E. Glicksman, K. Rajan, J. Nordberg, M. Palmer, S.P. Marsh and C.S. Pande	909