

Table of Contents

Preface

The Growth of Martensite Since E.C. Bain (1924) - Some Milestones	
C.M. Wayman	1
Neutron Scattering Studies of Premartensitic Phenomena	
S.M. Shapiro	33
High-Resolution Electron Microscopy of Tweed Microstructure in Fe-Pd Alloys	
S. Muto, S. Takeda, R. Oshima and F.E. Fujita	45
Excitation of Lattice Reorientations in "Tweedy" Copper-Manganese Alloys	
J.M. Perkins, D.M. Farkas and T. Yamashita	51
HREM Study of the Premartensitic Behaviour in Ni-Rich Ni-Al	
D. Schryvers and L.E. Tanner	57
Factors Affecting the Tweed Contrast Level in "Premartensitic" Beta Alloys	
I.M. Robertson	59
Consideration of the Tweed Structure of Fe-Pd Alloys by Continuum Elasticity Theory	
S. Muto, R. Oshima and F.E. Fujita	65
Calculation of Thermal and Huang Diffuse Scattering by Tetragonal Crystals Such as 3R Ni-Al Martensite	
I.M. Robertson	71
New Premartensitic Phenomena in FePd Alloy	
H. Seto, Y. Noda and Y. Yamada	77
HREM Study of Incommensurate Modulated Structure on the Cubic-Tetragonal Transition of V-Ru Alloys	
N. Ohnishi, T. Onozuka and M. Hirabayashi	83
Mechanisms of First-Order Lattice-Distortive Transformations	
G.B. Olson	89
Theory of the Energetics and Nonclassical Nucleation for Martensitic Transformations from Partially Soft Lattice Modes	
S.-. Chan	101
An Embryo-Phonon Coupling Model for Martensitic Phase Transformation in BCC-Alloys	
Y. Yamada, K. Fuchizaki and Y. Noda	107
Dynamical Simulation of the Nucleation Process of the Martensite	
T. Suzuki, T. Mukaigaito and T. Hoshino	113
Cellular Automata and Monte-Carlo Simulation for a Mesoscopic Model of Martensitic Transformations	
D.G. Maeder and M. Droz	119
Simulation of the Growth Process of Martensite Using Cellular Automata and Measurements of Acoustic Emission	
I. Takahashi and T. Suzuki	125
The Fractal Nature of Martensite/Austenite Microstructures	
E. Hornbogen	131
Thermodynamics of Thermoelastic Martensitic Transformations	
J. Ortin and A. Planes	139
Thermodynamics of the Thermoelastic Martensitic Transformation	
T.Y. Hsu	145
Enthalpy Changes of Thermally Induced Transformations in NiTi System	
G. Airoldi, G. Riva and B. Rivolta	151
Microstructure and Mechanical Behaviour of Ferrous Martensite	
T. Maki	157
Anomalous Reflections in Low Temperature Electron Diffraction from the Thermoelastic Martensite in a Fully Ordered Fe-Pt Alloy	
T. Tadaki, Y. Nakata and K. Shimizu	169
Study of BCT Martensite of Fe-Pd Alloys	
R. Oshima, K. Tanaka, A. Taniyama and F.E. Fujita	175

Internal Friction in the Alloyed Fe-C Martensites	181
V. Dutz, V.G. Gavriljuk, J. Jagodzinsky, J. Pietikäinen, O. Söderberg and K. Ullakko	
Calculation of Fe-Atom Displacement Around an Octahedral and Tetrahedral Interstitial C Atom in BCC Lattice and the Expected X-Ray Diffuse Intensities	185
M. Hayakawa and M. Oka	
Effects of Low Temperature Deformation on the Lattice Structure and Carbon Distribution in Fe-Ni-C Martensite	191
K. Ullakko, M. Nieminen and J. Pietikäinen	
Isothermal Martensite Transformation of Fe-Ni-C Alloys as a Function of Hydrostatic Pressure	197
K. Ullakko, B. Sundqvist and J. Pietikäinen	
Effect of Interstitial Atom Concentration on the Lattice Parameters of Martensite and Retained Austenite in Fe-C-N Alloys	201
S.R. Chen and D. Tang	
Internal Friction Behaviour of Fe-Ni-C Alloys During Low Temperature Ageing	207
Y. Liu, K. Ullakko, V.G. Gavriljuk, V.M. Nadutov and J. Pietikäinen	
Effect of Carbon Content on Ageing and Tempering Processes in Fe-Ni-C Virgin Martensite	213
P. Grégoire, C. Dagbert, P. Pahuta, J. Galland and L. Hyspecka	
Microcracking During Ageing of Fe-Ni-C Martensite	219
O. Söderberg and J. Pietikäinen	
Prevention of Martensitic Transformation During Rapid Cooling	225
K. Ullakko, M. Nieminen and J. Pietikäinen	
The Effect of Ni Content on the Isothermal Character of Lath Martensitic Transformation in Fe-Ni Alloys	229
K. Tsuzaki, T. Fukiage, T. Maki and I. Tamura	
Magnetic Field-Induced Martensitic Transformation in an Fe-Ni-Co Alloy	235
K. Shimizu, N. Yamao, T. Kakeshita, M. Ono, K. Sugiyama and M. Date	
The Effect of Magnetic Field on the Martensitic Transformation of Fe Particles in a Cu-Fe Alloy	241
Y. Watanabe, M. Kato and A. Sato	
Influence of Thermodynamic and Mechanical Properties on Martensitic Transformation in Substitutional Alloys of Fe	247
B. Skrotzki	
Some Aspects of the Use of High Strength Quenched and Tempered Steels in Structures	253
J.E. Croll	
Influence of Micro-Titanium Additions on Weld Heat Affected Zone Hardness in Structural Steels	255
G. Bowie, C.R. Killmore and J.G. Williams	
Strengthening and Toughening by Lath Martensite in a Medium Carbon Alloy Steel	257
A.H. Feng	
Kinetics of the Bainite Transformation	263
H.K.D.H. Bhadeshia	
Reviewed Concept on the Microstructural Identification and Terminology of Low Carbon Ferrous Bainites	275
T. Araki, K. Shibata and M. Enomoto	
The Crystallography of Lower Bainite in Hypereutectoid Steels	281
M. Oka, H. Okamoto and K. Ishida	
Structure of Upper Bainite in Hypereutectoid Steels	287
H. Okamoto and M. Oka	
Properties of Martensite/Bainite Structure in a Medium Carbon Steel	293
A.H. Feng	
Structure Analysis of NiAl Martensite	299
Y. Noda, S.M. Shapiro, G. Shirane, Y. Yamada, K. Fuchizaki and L.E. Tanner	
Composition Dependence of the Effect of Low Temperature Heating on Martensitic Transformations in Quenched Au-Cd Alloys	305
H. Sakamoto, H. Tsuzuki and K. Shimizu	
Thermal Expansion of a Martensitic In-Tl Alloy	311
M. Liu, T.R. Finlayson and T.F. Smith	

Study of Rubber-Like Behaviour in a Au-47.5at% Cd Alloy by Synchrotron-Orbital Radiation	317
T. Ohba, K. Otsuka and S. Sasaki	
Deformation of Polycrystalline Dilute Uranium Alloys	323
B.A. Jenkins and D.V. Edmonds	
High Resolution Electron Microscopy Observations of Athermal Omega Phase in Ti-Mo Alloys	329
D. Schryvers and L.E. Tanner	
Martensitic Transformations in Ceramics	335
P.M. Kelly	
Martensitic Transformations in Ceramics	347
W.M. Kriven	
Application of a Non-Classical Nucleation Theory to the Monoclinic/Tetragonal Martensitic Transformations of Zirconia	349
R.C. Garvie and S.-. Chan	
Phase Determination in Partially Stabilized Zirconia Creep Specimens	351
E.H. Kisi, T.R. Finlayson and J.R. Griffiths	
The Tetragonal to Monoclinic Transformation in Ceria-Zirconia	357
G.R. Hugo and B.C. Muddle	
Crystallographic Studies on the t-m Transformation in an Isothermally Aged ZrO₂-2mol% Y₂O₃ Alloy	363
M. Hayakawa, N. Kuntani and M. Oka	
Investigation of the Monoclinic (B) to Cubic (C) Transformation in the Lanthanide Sesquioxides	369
W.M. Kriven, P.D. Jero, O. Sudre and K.R. Venkatachari	
Reversal of the Tetragonal-Monoclinic Transformation in Ceria-Zirconia	371
R.H.J. Hannink, G.R. Hugo and B.C. Muddle	
Martensitic Phase Transitions in ZrO₂-Y₂O₃ Thin Films Produced by RF Co-Sputtering Method	377
T. Shigematsu, M. Narita, N. Nakanishi and T. Saburi	
Strain Analysis of the Herringbone Structures Observed in ZrO₂ Alloys	383
M. Hayakawa and M. Oka	
Martensitic Nucleation and Transformation in $\beta - \gamma$ Dicalcium Silicate	389
W.M. Kriven, C.J. Chan and E.A. Barinek	
The Crystal Structure of Orthorhombic Zirconia in Partially Stabilized Zirconia	391
E.H. Kisi, C.J. Howard and R.J. Hill	
Crystallography of Martensitic Transformations and Lattice Invariant Shears	393
K. Otsuka	
Shape Memory Behaviour	405
J. Van Humbeeck and R. Stalmans	
Study of Martensitic Transformations by Static and Dynamic NMR Measurements	417
R. Gotthardt, S. Rubini and C. Dimitropoulos	
Numerical Simulation of Mechanical Stability in Beta – Cu-Zn-Al	423
M. De Graef and L. Delaey	
Determination of the Atom Location of Ni in Cu-Al-Ni Alloys by the Channelling Enhanced Microanalysis Method	429
Y. Nakata, T. Tadaki and K. Shimizu	
Shape Strains Associated with Forward and Reverse Martensitic Transformation in a Cu-Al-Ni Shape Memory Alloy	435
M. Ferry, N.F. Kennon and D.P. Dunne	
Further Study on the Crystallography of $\beta_1 - \gamma_1$ Stress-Induced Martensitic Transformation in a Cu-Al-Ni Alloy	441
K. Morii and K. Otsuka	
Study of Strain-Induced Martensites Obtained in the β-Cu-Zn-Al System	447
V. Agafonov, B. Legendre, A. Kahn, G. Guénin and B. Dubois	
The Dependence of the Cu-Al Shape Memory Alloy on Stacking Faults and on the Order Disorder Transition	451
A. Lodini, M.-. Perrin, G. André and L. Rimlinger	

Influence of Order, Grain Size and Pre-Strain on Shape Memory Effect in Cu-Zn-Al Alloys	457
J. Bohong and T.Y. Hsu	
Effect of Quenching Rate on the Structure and Transformation Characteristics of a Cu-Al-Ni-Mn-Ti Shape Memory Alloy	463
D.P. Dunne, J. Van Humbeeck and M. Chandrasekaran	
The Effects of Ageing on the Martensitic Transformation Temperature in Cu-Al-Ni-Mn-Ti Shape Memory Alloys	469
Y. Itsumi, Y. Miyamoto, T. Takashima, K. Kamei and K. Sugimoto	
The Effect of Thermomechanical Treatment of the Beta Phase on the Structure of the Martensite in Cu-Al-Ni-Based Shape Memory Alloys	475
A.J. Heycott, D.P. Dunne and N.F. Kennon	
Reordering in the β-Phase of Cu-Zn-Al Shape Memory Alloys	481
T. Suzuki, Y. Fujii and A. Nagasawa	
The Effect of Textures on Shape Memory Behaviour	487
S. Eucken and J. Hirsch	
The Influence of γ Phase Precipitates on the Martensitic Transformation in Cu-Zn-Al Alloys	493
F.C. Lovey, E. Cesari, C. Auguet, L. Mañosa and R. Rapacioli	
Study of the Pinning of the Martensite Interfaces in a Cu-Zn-Al Alloy by Internal Friction Measurements	499
M. Morin and G. Guénin	
Hysteresis Effects During Martensitic Transformation in Cu-Zn-Al Studied by Internal Friction Measurements	505
J. Stoiber, J. Van Humbeeck and R. Gotthardt	
A Thermodynamic Evaluation of Superelasticity in Cu-27.6 at % Al-3.8 at % Ni	511
C.M. Friend and C.P.A. Weston	
Phenomenological Description of the Hysteresis Cycle in (Cu-Based SMA): Global Transformations	517
C. Picornell, C. Seguí and V. Torra	
Phenomenological Description of the Hysteresis Cycle (in Cu-Based SMA): Local Study of the Hysteresis Loops	523
A. Amengual, F.C. Lovey, C. Seguí and V. Torra	
The Two Way Memory Effect in a Cu-Zn-Al Alloy: The Behaviour during the Training Process	529
L. Contardo and G. Guénin	
Experimental Determination of the Hysteretic Properties in Shape Memory Alloys	535
A. Tourabi, B. Wack and D. Favier	
Stability of the Two Way Memory Effect during Thermal Cycling of a High M_S Temperature Cu-Al-Ni Alloy	541
P. Rodriguez and G. Guénin	
Two Stage Shape Memory Associated with the Bainite Transformation in a Cu-Zn-Al Alloy	547
M. Reyhani and P.G. McCormick	
Isothermal Ageing of Martensite in a Cu-Zn-Al Shape Memory Alloy	553
M.H. Wu and C.M. Wayman	
Thermomechanics of Hysteresis Effects in Shape Memory Alloys	559
D. Favier, P. Guélin and P. Pegon	
The Effect of Cold Work and Heat Treatment on the Phase Transformations of Near Equiatomic NiTi Shape Memory Alloy	565
D.N. Abujudom, P.E. Thoma and S. Fariabi	
The Effect of Ageing Treatment on the Spontaneous Shape Change of the Ni-Rich TiNi Alloy	571
M. Matsumoto, T. Fujii and A. Ohkawa	
Restoration Effects on the Transformation Behaviour of Neutron Irradiated Ti-Ni Shape Memory Alloys	577
T. Hoshiya, F. Takada and Y. Ichihashi	
A New Martensitic Phase Transformation in TiNi Alloy	583
J.X. Zhang and Z.C. Lin	
Two-Way Shape Memory Effect in NiTi	585
Y. Liu and P.G. McCormick	

Effects of Thermocycle with Load on Transformations and Properties in NiTi Alloy	591
G.M. Lin, G. Fu and J.X. Zhang	
Control of the Transformation Temperatures of TiNi Shape Memory Alloys by Ternary Additions	
P.M. Kleinherenbrink, J.H. Maas and J. Beyer	593
Phase Transformations in $Ti_{40}Ni_{60-x}Cu_x$ Alloys	
M. Nishida, T. Ueda, Y. Toyama and A. Chiba	599
Twainless Martensite in TiNiCu Shape Memory Alloys	
W.J. Moberly, J.L. Proft, T.W. Duerig and R. Sinclair	605
Self-Accommodation of R-Phase in Ti-Ni-Fe and T-Ni-Al Alloys	
T. Saburi, K. Doi and S. Nenno	611
The Martensite Transformation in a $Ni_{47}Ti_{44}Nb_9$ Shape Memory Alloy	
L.C. Zhao, T.W. Duerig and C.M. Wayman	617
The Effects of Thermal Ageing on a $Ti_{50}Ni_{10}Au_{40}$ Alloy	
S.K. Wu and Y.C. Lo	619
In Situ X-Ray Diffraction Observations of Phase Transitions in $Ti_{49}Ni_{51}$, $Ti_{49}Ni_{48}Fe_3$ and $Ti_{47}Ni_{51}Zr_2$ as a Function of Temperature and Tensile Stress	
V. Agafonov, B. Legendre, A. Dubertret, G. Rizzo and B. Dubois	625
Effects of Heat Treatment and Oxygen Content on Martensitic Transformation Temperature in Near Equiatomic TiPd Alloys	
Y. Shugo	631
Combustion Synthesis and Its Application in Producing Intermetallic Shape Memory Alloys	
J.J. Moore and H.C. Yi	637
In-Situ Observation of $\gamma=\epsilon$ Transformation in Fe-Mn-Si Shape Memory Alloys	
Y. Hoshino, S. Nakamura, N. Ishikawa and A. Sato	643
Shape Memory in an Fe-Mn-Si Alloy	
J.S. Robinson and P.G. McCormick	649
Shape Memory Effect in Fe-Mn-Si-Cr-Ni Polycrystalline Alloys	
H. Otsuka, H. Yamada, H. Tanahashi and T. Maruyama	655
Reversible Martensite Transformation and Shape Memory Effect in Fe-Ni-Co-Al-C Alloys	
H. Ohtsuka and S. Kajiwara	661
Reversible Transformation and Shape Memory Effects due to Thermomechanical Treatments of Fe-Ni-Co-Based Austenites	
N. Jost	667
In Situ Observation of the Interface Movement in Reverse Martensitic Transformation in Fe-Ni-C Alloys	
S. Kajiwara and H. Ohtsuka	673
Applications of Shape Memory	
T.W. Duerig	679
Shape Memory NiTi Alloys - Applications in Dentistry	
R. Sachdeva, S. Fukuyo, K. Suzuki, Y. Oshida and S. Miyazaki	693
Comparison of Medical Device Design Alternatives Using the Mechanical Properties of NiTi Alloys	
J.D. Stice and T.J. Ley	699
Biological and Chemical Evaluation of TiNi Alloys	
Y. Oshida, R. Sachdeva, S. Miyazaki and S. Fukuyo	705
Static Rock Breaker Using TiNi Shape Memory Alloy	
M. Nishida, K. Kaneko, T. Inaba, A. Hirata and K. Yamauchi	711
Design Concept of Snap-Acting Two Way Shape Memory Devices	
G.M. Lin, X.Y. Chen, J.X. Zhang and S.R. Wang	717
The Shape Memory Effect in Meltspun Ribbons	
P. Donner and S. Eucken	723
Development of Shape Memory Properties in Sputter Deposited Films of Nickel - Titanium Alloys	
J.D. Busch, A.D. Johnson, D.E. Hodgson, C.H. Lee and D.A. Stevenson	729
Combustion Synthesis of Ti-Pd and Ti-Ni-Pd High Transition Temperature Shape Memory Alloys	
H.C. Yi and J.J. Moore	735

Calorimetric Measurements Applied to Fatigue in Cu-Zn-Al Single Crystals	
C. Picornell, E. Cesari and M. Sade	741
Transformation Characteristics of a Two Way Shape Memory Spring Constrained by Stress	
G.M. Lin, Y.S. Huang and J.X. Zhang	747
Mechanical Characterization of Ti-50.1% Ni after Various Heat Treatment Using a Statistically Aided Testing Program	
S. Fariaibi, B.L. McKinney and D.E. Hodgson	753
Mechanical Twinning and Plasticity in Ti-Ni-Fe (3%)	
W.J. Moberly, T.W. Duerig, J.L. Proft and R. Sinclair	759
Effects of Several Factors on the Ductility of the Ti-Ni Alloy	
S. Miyazaki, Y. Kohiyama, K. Otsuka and T.W. Duerig	765
Fatigue Properties of the Cold Worked and Annealed Superelastic Ni-Ti	
G.R. Zadno, W. Yu and T.W. Duerig	771
Fatigue Properties of a Ti-Ni-6%Cu Shape Memory Alloy	
J. Beyer, B. Koopman, P.A. Besselink and P.F. Willemse	773