

Table of Contents

Preface and Committees

Chapter 1: Remembrance Talks

A Tribute to Piero Giorgio Bordoni	
F.M. Mazzolai	3
Arthur Stanley Nowick, an Intellectual Appreciation	
D.N. Beshers	7

Chapter 2: Invited Talks

Studies of Condensed Matter at Low Temperatures by Ultrasonic and other Mechanical Spectroscopies	
C. Elbaum	17
Release of Tetrahydrofuran, Structural Phase Transitions and Dynamic Relaxation Processes in Ca (BH₄)₂	
A. Paolone, O. Palumbo, P. Rispoli, R. Cantelli, E. Rönnebro, A. Luedtke and D. Chandra	24
Recent Investigations on Grain Boundary Relaxation	
Q.P. Kong, W.B. Jiang, P. Cui and Q.F. Fang	33
Mechanical Spectroscopy of Nanocrystalline Metals and Nanometer-Thick Films: Characteristic Properties Originated in Nanostructures	
H. Tanimoto	42
Mechanical Relaxation Studies of Sub-Rouse Modes in Amorphous Polymers	
X.B. Wu, H.G. Wang, C.S. Liu and Z.G. Zhu	52

Chapter 3: Point Defect Relaxations and Diffusion

Ab Initio Based O-O Investigation and the Snoek Relaxation in Nb-O	
M.S. Blanter, V.V. Dmitriev and A.V. Ruban	63
Application of Density Functional Theory to Point Defect Anelasticity of Carbon-Containing Austenitic Alloys	
R. Gibala, W.A. Counts and C. Wolverton	69
Effects of Alloying Elements on the Oxygen Snoek-Type Relaxation in Ti-Nb Alloys	
H. Lu, C.X. Li, F.X. Yin, Q.F. Fang and O. Umezawa	75
Internal Friction Study of Vacancy Hardening in B2 Fe Al Alloys	
Y. Nishino, K. Ogawa and H. Tanaka	81
Quantitative Analysis of Carbon in Ferrite in Dual-Phase Steels by Mechanical Loss Measurements	
K. Honda, K. Nakano, H. Numakura, T. Yokoi, D. Maeda, N. Yoshinaga and K. Ushioda	87
Anelastic Relaxation Measurements in Nb-46wt%Ti Alloys with Interstitial Solutes in Solid Solution	
C.R. Grandini, O. Florêncio and W.J.B. Filho	92
Oxygen Vacancy Relaxation in Ca₃Co₄O_{9+δ} Ceramics	
G.C. Lin, H. Liu and J.X. Zhang	98
High Temperature Mechanical Spectrum and Interstitial Oxygen in YBaCuFeO_{5+δ}	
Y.H. Yuan, X.N. Ying and J.S. Zhu	104
1-Xr_xX)₂Mo₂O₉ (Re=Nd, Gd)	
X.P. Wang, J. Hu, Z. Zhuang, T. Zhang and Q.F. Fang	110
Relaxation Model of Lithium Ions in the Garnet-Like Li₅La₃Bi₂O₁₂Lithium-Ion Conductor	
Y.X. Gao, Z. Zhuang, H. Lu, X.P. Wang and Q.F. Fang	116
Hydrogen-Induced Mechanical Losses in Oxygen-Free Copper	
M. Ivanchenko, Y. Yagodzinskyy and H. Hänninen	122

Chapter 4: Dislocation Dynamics

Interaction Potential between a Dislocation and a Pinning Atom in FCC Metals	131
T. Kosugi, Y. Kogure, Y. Nishino, N. Ide and I. Nakamichi	
Temperature Dependence of the Flow Stress of Body-Centered-Cubic Metals	137
M.J. Konstantinović	
Influence of Strain Hardening 1% by Torsion on the Behavior of a Single Crystal Alloy (Cu-at.9% Al) in Internal Friction at High Temperature	143
C. Belamri, S. Belhas, S. Derdour and A. Rivière	
Low Frequency Relaxation Effect Observed in Al-Mg Alloy	149
N. Benyahia, M. Gerland, C. Belamri and A. Rivière	
Investigation of Defect Dynamics in Al-Si-Mg Polycrystals by Simultaneous Measurements of Internal Friction and Acustoplastic Effect	155
K. Sapozhnikov, S. Golyandin and S. Kustov	
Elasticity, Anelasticity and Yield Strength of Al-Si Alloys Obtained by Directional Crystallization	161
S.P. Nikanorov, B.K. Kardashev, B.N. Korchunov and V.N. Osipov	
Eutectoid Al-51at%Zn Alloy Studied by Isothermal Mechanical Spectroscopy	167
A. Rivière, V. Pelosin and M. Gerland	
Mechanical Spectroscopic Study of Equal-Channel Angular Pressed Al-Ni Eutectic Alloy	173
Y. Watanabe, Z.G. Zhang, H. Sato, T. Inamura and H. Hosoda	
Amplitude Dependent Internal Friction of Magnesium Alloy AZ31 at Room Temperature	179
D. Blažek, P. Palček, Z. Trojanová and J. Porubčan	
Fatigue Behavior of Magnesium Alloy AJ91 Studied by Amplitude Dependent Damping Measurements	185
W. Riehemann and Z. Trojanová	
Ultrasonic Study of Elastic and Anelastic Properties of C/Mg-2wt.%Si Composite	191
S. Golyandin, K. Sapozhnikov and S. Kustov	
Internal Friction in Extruded Aluminium Alloy	197
J. Porubčan, P. Palček, D. Blažek and Z. Trojanová	
Static Strain Aging in Fe-Mn-N Alloys Investigated by Impulse Excitation Internal Friction Analysis	203
J.H. Jung, E. Kozeschnik, S.H. Han and B.C. De Cooman	
The IF Spectrum of Fe-C-N and Fe-17%Cr-C-N Alloys Measured by the Impulse Excitation Technique	209
I. Jung and B.C. De Cooman	
Internal Friction and Magnetic After-Effect Study of Dislocation Dynamics in Thermally Aged Fe-1%Cu-C Alloys	215
B. Minov, L. Dupré and M.J. Konstantinović	
Anelastic Effects on Martensitic Carbon Steels during First Stage of Tempering	221
J.J. Hoyos, A.A. Ghilarducchi, H.R. Salva and J.M. Vélez	
Hydrogen-Dislocation Interaction in Austenitic Stainless Steel Studied with Mechanical Loss Spectroscopy	227
Y. Yagodzinsky, M. Ivanchenko and H. Hänninen	
Characterization of Defects in Severely Deformed Iron by Mechanical Spectroscopy	233
T. Akaki, H. Morimoto, H. Numakura, D. Terada and N. Tsuji	
Internal Friction Study of the Influence of Deep Cryogenic Treatment on the Microstructure of a Bainitic Steel	239
N. Min, T.Y. Ji, L.J. Zhu, X.C. Wu and H.B. Wang	
Stress Relaxation Behavior of Cu-Ni-P Alloys Evaluated from Amplitude-Dependent Internal Friction	245
Y. Aruga, Y. Morikawa, S. Tamaoka and Y. Nishino	
Isothermal Mechanical Spectroscopy in Equiatomic CuZr Alloy	251
D. Belamri, V. Pelosin, S. Belhas and A. Rivière	
Micro- and Macro-Plastic Properties of Be Polycrystals	257
B.K. Kardashev and I.B. Kupriyanov	

Chapter 5: Grain Boundaries, Nanocrystalline Structures and Thin Films

High Temperature Mechanical Spectroscopy Study of 3 mol% Yttria Stabilized Tetragonal Zirconia Reinforced with Carbon Nanotubes	265
M. Mazaheri, D. Mari, R. Schaller and G. Fantozzi	
High Temperature Internal Friction in Fine Grain and Nano-Crystalline Zirconia	271
P. Simas, M. Castillo-Rodríguez, M.L. Nô, S. De-Bernardi, D. Gómez, A. Domínguez-Rodríguez and J. San Juan	
Anelastic Effects of Phase Decomposition in 14-Carat AuAgCu Alloy	277
I. Tkalcec, D. Mari and R. Schaller	
Grain Boundary Relaxation in 18-Carat Yellow Gold	283
A.K. Maier, I. Tkalcec, D. Mari and R. Schaller	
The Effect of Annealing on the Internal Friction in ECAP-Modified Ultrafine Grained Copper	289
I.S. Golovin, P. Pal-Val, L.N. Pal-Val, E.N. Vatazhuk and Y. Estrin	
Mechanical Spectroscopy of Annealing Effects in Electrodeposited Nickel/Ceramic Nanocomposites	295
H.R. Sinning, G. Vidrich and W. Riehemann	
Simulation of Mechanical Response in Nanoparticles	301
Y. Kogure, T. Kosugi and T. Nozaki	
Amplitude Dependent Damping of Aluminum-Matrix-Nanoparticle-Composites	307
A. Kazakewitsch and W. Riehemann	
Analysis of Microstructural Changes with Temperature of Thermally Sprayed WC-Co Coatings by Mechanical Spectroscopy	313
D. Mari, L.M. Berger and S. Stahr	
Internal Friction and Shear Modulus of Graphene Films	319
X. Liu, T.H. Metcalf, J.T. Robinson, F.K. Perkins and B.H. Houston	
An Ultra-High <i>Q</i> Silicon Cantilever Resonator for Thin Film Internal Friction and Young's Modulus Measurements	325
T.H. Metcalf and X. Liu	

Chapter 6: Phase Transformations

Rhombohedral and Monoclinic Phases of PZT near the Antiferroelectric and the Morphotropic Boundaries	333
F. Cordero, F. Trequattrini, F. Craciun and C. Galassi	
Phase Diagram of the Ferroelectric Perovskite $(\text{Na}_{0.5}\text{Bi}_{0.5})_{1-x}\text{Ba}_x\text{TiO}_3$ by Anelastic and Dielectric Relaxation Measurements	339
F. Trequattrini, F. Cordero, F. Craciun, E. Mercadelli and C. Galassi	
Ultrasonic Relaxation in Phase Transition Region in Ferroelectric Semiconductors of $\text{Sn}_2\text{P}_2\text{S}_6$ Family	345
V. Samulionis, J. Banys and Y. Vysochanskii	
Phase Transitions in Polymers for Lithium Batteries	351
A. Paolone, O. Palumbo, F. Teocoli, R. Cantelli and J. Hassoun	
Mechanical Spectroscopy of Hyperstabilized Martensites	355
S. Kustov, R. Santamarta, E. Cesari, K. Sapozhnikov, V. Nikolaev, V. Fedorov, V. Krymov and J. Van Humbeeck	
A Strain-Glass Transition Observed in $\text{Au}_7\text{Cu}_5\text{Al}_4$ Ternary Alloys	361
X.J. Jin, M.J. Jin, J.Y. Liu and G.L. Fan	
Effects of Pinning and Atomic Ordering on Damping Properties and Martensitic Transformation of Copper-Based Shape Memory Alloys	366
S. Kustov, E. Cesari and J. Van Humbeeck	
Magnetomechanical and Structural Internal Friction in Ni-Mn-In-Co Metamagnetic Shape Memory Alloy	372
D. Salas, E. Cesari, I. Golovin and S. Kustov	

Chapter 7: Amorphous Materials

Non-Affine Deformations at a Concentration Transition in Cross-Linked Elastomers in the Light of the 3D XY Spin Glass Model

L.V. Elnikova 387

Mechanical Response of Bulk Metallic Glasses: Investigation by Mechanical Spectroscopy and Compression Tests - Elastic, Viscoelastic and Viscoplastic Components

J.M. Pelletier, C. Gauthier, J.J. Blandin and S. Gravier 393

Mechanical Spectroscopy, a Tool to Characterize Cement Latex Composites

G. Foray, S. Cardinal, A. Malchere and J.M. Pelletier 399

Alpha (Vitreous) Transition in Vulcanized Natural Rubber/Styrene Butadiene Rubber Blends Prepared by Mechanical and Solution Mixing

M.A. Mansilla, A.A. Ghilarducci, H.R. Salva and A.J. Marzocca 405

Investigation of Local Shear Transformation in a Metallic Glass by Means of High Amplitude Internal Friction Measurements

A. Nakamura, Y. Kamimura, K. Edagawa and S. Takeuchi 411

Mechanical Spectroscopy Study on the Light Soaking Effect on Hydrogenated Amorphous Silicon

H. Mizubayashi, I. Sakata and H. Tanimoto 416

Fluidized States of Vibrated Granular Media Studied by Mechanical Spectroscopy

A.L. Sellerio, D. Mari and G. Gremaud 422

Nd₆₀Fe₃₀Al₁₀ Glass Forming Magnetic Alloys: A Mechanical Spectroscopy Study at the 300-560 K Temperature Range

H.R. Salva, A.A. Ghilarducci, S.E. Urreta, L.M. Fabietti and J.M. Livingston 428

Mechanical Spectroscopy Investigation of Liquid Pb-Bi Alloys

R. Montanari and A. Varone 434

Chapter 8: Miscellanea, High and Low Damping, Techniques

Mechanical Spectroscopy of Silicon as a Low Loss Material for High Precision Mechanical and Optical Experiments

C. Schwarz, D. Heinert, K. Haughian, G. Hofmann, J. Komma, I.W. Martin, P. Murray, S. Rowan, P. Seidel and R. Nawrodt 443

Magnetic Field Dependent Damping of Magnetic Particle Filled Polypropylene

O.A. Lambri, D. Gargicevich, F. Tarditti, F.G. Bonifacich, W. Riehemann, M. Anhalt and B. Weidenfeller 449

Anelastic Phenomena in Human Dentin below Room Temperature

S. Amadori, E. Bonetti, I. Cappelloni and R. Montanari 455

Determination of Residual Stresses by Means of Dynamic Resonant Method

P. Gadaud and S. Pautrot 461

Toward High-Resolution Mechanical Spectroscopy HRMS - Logarithmic Decrement

L.B. Magalas and M. Majewski 467

Toward High-Resolution Mechanical Spectroscopy HRMS - Resonant Frequency -Young's Modulus

L.B. Magalas and M. Majewski 473