

# Table of Contents

Preface

Program

## Oral Presentations

### 1st SESSION

#### Quantum Optomechanics Using Ultra Coherent Mechanical Oscillators

T. Kippenbergh 3

#### Selected Applications of Internal Friction in Materials Science

Q.F. Fang, M. Sun, X.Q. Liu, H.L. Ding, T.L. Chen, X.P. Wang and X.B. Wu 4

#### Mechanical Spectroscopy at High Temperature in New Ti-Al-W Intermetallic

M.L. No, J.P. Monchoux, A. Couret and J.M. San Juan 5

#### Internal Friction Study of the Hydrogen-Defect Interactions in Cold-Worked Steel Alloys

L. Vandewalle, M.J. Konstantinović, T. Depover and K. Verbeken 7

### 2nd SESSION

#### Internal Friction during Martensitic Transformation in Fe-Mn-Si-Co Shape Memory Alloys

M. Pérez-Cerrato, L. Del-Río, J.F. Gómez-Cortés, I. Ruiz-Larrea, M.L. No, I.S. Golovin and J.M. San Juan 11

#### Improving the Damping Capacity of NiTiHf Alloys with Nanoscale Spherical Nb Phases

S.W. Zhang, Q.A. Li, M.J. Jin, Y.T. Zhu and W.J. Lu 13

#### Ultra-High Damping during Superelastic Behavior at the Nanoscale

J.F. Gómez-Cortés, M.L. No and J.M. San Juan 15

#### Damping in Micro-Pillars Arrays: Experimental and Simulation Approaches

A. Abadín, J.F. Gómez-Cortés, M.L. No, E. Ruiz-Reina, E. González and J.M. San Juan 17

#### CO<sub>2</sub> Capture: To Address Environmental Challenges with the Development of Critical Methodologies

S.A.E. Boyer 19

#### Ultrahigh Temperature Modulus and Internal Friction Measurement Based on a Differential Electromechanical Impedance Method

Z.L. Wang, M.Y. Xie and F.X. Li 21

#### Study of the Thermoelastic Effect in GaN

I. Tkalec-Vaju, N. Grandjean and D. Mari 23

### 3rd SESSION

#### Nanoscale Biomechanical Characterisation and Recognition of Proteins

A.J. Kulik, M. Lekka, K. Mikulska-Rumińska and W. Nowak 27

#### Strain-Dependent Damping of the Fast-Growing and Sustainable Paulownia Wood at Room Temperature

J. Göken 29

#### Electro/Magneto-Elastic and Damping Effects in Ferroelectric/Ferromagnetic Materials

F.X. Li, B.F. Liu and M.Y. Xie 31

#### Mobility, Clustering and Interaction with Domain Walls of O Vacancies in (Ba,Ca)(Ti/Zr)O<sub>3</sub>

F. Cordero, F. Trequattrini, P. Galizia, E. Mercadelli, P.S. da Silva Jr. and M. Venet Zambrano 33

## 4th SESSION

|                                                                                                                                                         |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Possible Evidence of Sliding Ferroelectricity from an Elastic Anomaly in the 2D Van Der Waals <math>\text{Ti}_3\text{C}_2\text{T}_x</math> MXene</b> |    |
| F. Cordero, H. Pazniak, T. Ouisse, J. Gonzalez-Julian, A. Di Carlo, V. Soprunyuk and W. Schranz                                                         | 37 |
| <b>Magnetic Domain Wall Freezing in Spin Glass and Re-Entrant Spin Glass Transitions of Bulk Metallic Glasses</b>                                       |    |
| J. Torrens-Serra, M. Stoica and S. Kustov                                                                                                               | 39 |
| <b>Study of Thermally Activated and Transient Anelasticity due to Phase Transitions in Fe-27Ga Alloys</b>                                               |    |
| I.S. Golovin, V.V. Palacheva, A.A. Shcherbakov, J. Cifre, H. Roniger and D. Mari                                                                        | 41 |
| <b>Effect of O/N Additions on Internal Friction and Mechanical Properties of BCC NbTiVZr High-Entropy Alloys</b>                                        |    |
| M. Sun, X.G. Wang, X.Q. Liu, X.P. Wang, X.B. Wu and Q.F. Fang                                                                                           | 43 |
| <b>Dynamic Mechanical Relaxation in High-Entropy Metallic Glasses</b>                                                                                   |    |
| J.C. Qiao                                                                                                                                               | 44 |

## 5th SESSION

|                                                                                                                                                |    |
|------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Internal Friction Characterization of Tungsten-Based Nuclear Materials for Fusion Applications</b>                                          |    |
| X.B. Wu, B.L. Zhao, M. Sun, W.B. Jiang, T. Hao and Q.F. Fang                                                                                   | 49 |
| <b>Internal Friction Determination of the Atomic Diffusion Coefficients in <math>\gamma</math>-TiAl Intermetallics</b>                         |    |
| J.M. San Juan, M. Oehring, H. Clemens and M.L. No                                                                                              | 50 |
| <b>Change in Anelasticity of CrCoNi Medium Entropy Alloy by Annealing</b>                                                                      |    |
| H. Tanimoto and Y. Okayasu                                                                                                                     | 52 |
| <b>Thermomechanical Stability and Damping Mechanisms in Multifunctional 3D-Printed PCL-Based Composites</b>                                    |    |
| F.D. Lambri, F.G. Bonifacich, O.A. Lambri, B. Weidenfeller, G.I. Zelada, M.L. Lambri, V. Recarte, V. Sánchez-Alarcos and J.I. Pérez-Landazábal | 54 |
| <b>DMA/TMA Study of Relaxations in Metallic Glasses</b>                                                                                        |    |
| V. Soprunyuk and W. Schranz                                                                                                                    | 56 |

## 6th SESSION

|                                                                                       |    |
|---------------------------------------------------------------------------------------|----|
| <b>Mechanical Spectroscopy Data from Comet 67P</b>                                    |    |
| W. Arnold, M.M. Becker, H.H. Fischer, B. Ibrahim, M. Knapmeyer and H. Krüger          | 61 |
| <b>Twin and Dislocation (Micro) Plasticity: Temperature Scaling beyond Seeger Law</b> |    |
| S. Kustov                                                                             | 62 |
| <b>Anelastic Skyrmion Dynamics in a Chiral Liquid Crystal</b>                         |    |
| C. Bachmann, D. Mari and G. Gremaud                                                   | 64 |
| <b>Mechanical Spectroscopy Study of High-Purity Nickel Single Crystals</b>            |    |
| A. Nastruzzi, D. Mari, I. Tkalec-Vaju, J.C. Chen and M.A. Pouchon                     | 66 |

## 7th SESSION

|                                                                                                                            |    |
|----------------------------------------------------------------------------------------------------------------------------|----|
| <b>Loss Angle and Raman Measurements of High Index Glasses SF11 and SF66</b>                                               |    |
| V. Spagnuolo, A. Amato, J. Steinlechner, V. Martinez, H. Saint-Olive and G. Cagnoli                                        | 71 |
| <b>Optimisation of Low Mechanical Damping and Optical Loss Thin-Film Materials for Future Gravitational Wave Detectors</b> |    |
| G. McGhee, S. Hill, P.G. Murray, S. Rowan, J. Steinlechner and I.W. Martin                                                 | 73 |
| <b>Monitoring and Quantification of Ultrasonic Fatigue Damage in Metals Based on Internal Friction Measurement</b>         |    |
| B.F. Liu and F.X. Li                                                                                                       | 75 |

## Posters

|                                                                                                                                                                                                                                                                     |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Mechanical Spectroscopy Study of the Relaxation Processes in Fe-Mn-Cr-Co-Ni Cantor High Entropy Alloy</b><br>L. Del-Río, J.M. San Juan, G. Laplanche and M.L. No                                                                                                 | 79 |
| <b>Acoustic Investigation of Magnetic Viscosity and Domain Wall Fluctuations in Dysprosium Helical Antiferromagnet</b><br>A. Sedda, E. Lahderanta and S. Kustov                                                                                                     | 81 |
| <b>Internal Friction in Thermally- and Stress-Induced Martensites of Fe-Mn-Si Functional Shape Memory Alloys</b><br>B. Kustov, E. Lahderanta and J. Torrens-Serra                                                                                                   | 83 |
| <b>Magneto-Mechanical Damping and Phase Transformations in Iron-Based Alloys</b><br>I. Tkalec-Vaju, D. Mari, M. Kabchou and I.S. Golovin                                                                                                                            | 85 |
| <b>Vortex Strain Glass in Type II Superconductors Evidenced in a Torsion Pendulum</b><br>D. Mari and T. Ejikeme                                                                                                                                                     | 87 |
| <b>Anelasticity due to Point Defects and Ordering in Fe-(Ga+Al) Alloys</b><br>V.V. Palacheva, J. Cifre, H.W. Chang and I.S. Golovin                                                                                                                                 | 89 |
| <b>Single Twin Boundary Mobility in Domain-Engineered Ni-Mn-Ga Single Crystals in Acoustic and Macroscopic Experiments</b><br>A. Saren, A. Sozinov, B. Kustov, K. Ullakko and S. Kustov                                                                             | 90 |
| <b>Using a Granular Materials to Dampen Sloshing in a Rocket Fuel Tank</b><br>M.C.N. Roux, B.A.H. Meunier, L. Cordey and D. Mari                                                                                                                                    | 92 |
| <b>Influence of Polymer Matrix Stiffness on Multifunctional Composites Analysed by ROM and Halpin-Tsai Models</b><br>F.D. Lambri, F.G. Bonifacich, O.A. Lambri, B. Weidenfeller, G.I. Zelada, M.L. Lambri, V. Recarte, V. Sánchez-Alarcos and J.I. Pérez-Landazábal | 94 |
| <b>From the Maxwell's Equations of Lattice Deformations to the Description of the Universe by a «Crystalline Ether»</b><br>G. Gremaud                                                                                                                               | 96 |