

Laboratory of Mechanics and Materials (LMM)

Polytechnic School, Aristotle University of Thessaloniki

Director: Professor Elias Aifantis

SUMMARY OF ACTIVITIES

Curriculum Vitae : ELIAS C. AIFANTIS/ECA

Professor of Mechanics, Civil Engineering, Aristotle University, Thessaloniki, GR-54124, Greece
[Director, Laboratory of Mechanics and Materials, School of Engineering ; mom@mom.gen.auth.gr;
http://users.auth.gr/users/0/3/022730/public_html/index3.htm]

■ Personal Data

Date/Place of Birth: 10 October 1950, Greece; *Citizenship:* Hellenic/US

Private address: 2 Olympiados Str., N. Krini, GR-55132, Thessaloniki, Greece. Tel.: +30-2310-444386
1010 College Avenue, MI-49931, Houghton, USA. Tel.: +1-906-482-3483

■ Academic Degrees

- National Technical University of Athens, Mining and Metallurgy (Diploma/BS-MS, 1973)
- University of Minnesota, Chemical Engineering and Materials Science-Mechanics (Ph.D, 1975)

■ Academic Posts

- University of Minnesota (Instructor 1975-76)
- University of Illinois at Urbana-Champaign (Assistant Professor 1976-80)
- University of Minnesota (Visiting Professor 1980-82)
- Michigan Tech Univ (Professor 1982-2000); Distinguished Research Professor 2000-2010; Emeritus 2010-)
- Aristotle University of Thessaloniki (Professor after special honorary invitation/metaklisi, 1990-)
- King Abdulaziz University, Jeddah (Distinguished Adjunct Professor 2011- 2014)
- ITMO Univ/Int Lab of Modern Functional Materials, St. Petersburg (Distinguished Visiting Professor 2014, 2015)
- BUCEA/Beijing Univ. of Civil Engineering and Architecture, Beijing (Distinguished Visiting Professor 2015, 2016)

■ Academic Distinctions

- Fellowship Award for 1 mo Visit to USSR/US Academy of Sciences, 1986
- MTU Research Award, Michigan Tech Univ, Houghton/MI, 1993
- Fellowship Award for 1 mo Visit to Japan/Japanese Government, 1996
- Selected for ASME's Koiter Award, 2000
- ASME/ASCE/SES Symposium honoring his 55th birthday, 1-3 June 2005, Baton Rouge/USA
- Selected for ASM's Author Award, 2011
- Acknowledged in G.A. Maugin's *Continuum Mechanics Through the 20th Century: A Coincise Historical Perspective*, Springer, 2013. [Chapter 10.6.3/Greece: P.S. Theocaris, P.D. Panagiotopoulos, E.C. Aifantis, G.M. Lianis.]
- Listed in ISI Web of most highly cited authors in the world: ENGINEERING (3rd entry. A0086-2010-N out of 262)
- KACST Award/King Abdulaziz University, Jeddah-Saudi Arabia, 2013
- Distinguished Foreign Scientist Fellowship Award/Southwest Jiaotong University, Chengdu-China, 2014
- Aifantis International Symposium honoring his 65th birthday, 4-9 October, 2015, Antalya/Turkey
- Fray International Sustainability Award (along with Nobel Laureate Ei-Ichi Negishi)/Flogen Star Outreach, 2015
- ZiF Cooperation Group "Multiscale Modeling of Tumor Initiation, Growth and Progression: From Gene Regulation to Evolutionary Dynamics", September-October 2016.

■ Teaching and Research

- *Undergraduate Courses* in Statics and Dynamics; Strength and Mechanics of Materials; Elasticity and Viscoelasticity; Plasticity and Damage; Creep and Fracture
- *Graduate Courses* in Continuum Mechanics and Thermodynamics; Mechanical Behavior: Metals – Rocks/Soils – Polymers – Biomaterials; Materials Science: Dislocations – Diffusion – Phase Transformations; Micromechanics and Nanomechanics; Nanosciences and Nanotechnologies
- *Training Seminars/Course Modules* on the above topics in Summer Schools and Multi-University Curricula
- *Interdisciplinary Research* on Macro/Micro/Nano Mechanics of Materials and Structures; Diffusion and Flow through Deformable Porous Media; Stress Corrosion Cracking and Environmental Damage; Phase Transitions and Interfaces; Material Instabilities: Dislocation Patterning/Shear Banding/Damage Localization; Coupled Continuum Mechanics of Structured Natural Materials: Soils/Rocks/Wood/Biomaterials; Thermo-electro-chemo-mechanics of Engineering Materials: Metals/Polymers/Concrete/Composites; Novel Nanostructured Materials/Structures and Devices: Nanoparticles/Nanotubes/Nanowires, Nanofibers/Nanobeams/Nanoplates, MEMS/NEMS, Li-ion Batteries (LiBs), Light Emitting Diodes (LEDs), Medical Implants, Nano-decorated tissues and cells
- *Coined in his publications* the terms Double Diffusivity/Porosity, Chemomechanics, Material Instabilities, Dislocation Patterning, Gradient Plasticity, Nanomechanics, NanoNeuroMechanics

■ Funding I (Last 10 years)

- *PI*: Hellenic Foundation for Research and Innovation(HFRI): “Material Instabilities, Size Effects, and Morphogenesis: Nanomaterials and Brain” & “Nano-chemo-mechanics in Deformation and Fracture: Theory and Applications in LiBs and SGS”, 2018-2019, 130 kEuros
- *PI*: Ministry of Education and Science of Russian Federation: *Mega Grant Project No. 14.Z50.31.0039*, “Fabrication and study of advanced multi-functional metallic materials with extremely high density of defects”, 2017-2019, 90 mil. Rubbles
- *Co-PI*: Multi-investigator EU project H2020-MSCA-RISE-2016 No. 734485: “Fracture Across Scales and Materials, Professes and Disciplines/FRAMED”, 2017-2021, 400 kEuros.
- *PI*: Greek National Strategic Reference Framework (NSRF): “Funding of Research Projects Positively Reviewed in the 5th ERC Grant Schemes Call: Internal Length Gradient Mechanics Across Scales and Materials: Theory, Experiments and Applications/*IL-GradMech-ASM*”, 2013-2015, 797 kEuros
- *PI*: General Secretariat of Research and Technology (GSRT): “ARISTEIA II: Size Effects in Deformation and Electromechanical Problems/*SEDEMP*”, 2014-2015, 283 kEuros
- *Co-PI*: Multi-investigator EU project: ERANET-RUS “STProjects-219/NanoPhase: Shift of the phase equilibria in nanograined materials”, 2012-2015, 207 kEuros
- *Co-PI*: Multi-investigator project from the Greek Ministry of Education: “*THALES INTERMONU: Conservation and Restoration of Monuments of Cultural Heritage*”, 2012-2015, 600 kEuros
- *Host*: *K.E. Aifantis* – the youngest recipient ever with an ERC Starting Grant (MINATRAN 211166, 2008-2013, 1.130k Euros); *A.E. Romanov* - an international expert on defects in solids with a IIF Marie - Curie Senior Fellowship Grant (PIIF-GA-2008-220419, 2009-2011, 200 kEuros)

■ Funding II (15 years; 1992-2007)

- *Director/Co-Director* of Human Capital and Research Training Network projects (HCM/TMR/RTN), INTAS projects, Euratom projects (REVISA, LISSAC), as well as the General Secretariat of Research and Technology (GSRT) projects (PENED, PYTHAGORAS), as follows: *Coordinator* of 3 European Research Training Networks: *HCM Fellowships in Mechanics of Materials /ERBCHBGCT 920041*, 1992-1996, 240 kEuros; *TMR Network on Spatiotemporal Instabilities in Deformation and Fracture/ERBFMRXCT 960062*, 1996-2002, 1760 kEuros; *RTN Network on Deformation and Fracture Instabilities in Novel*

Materials and Processes/HPRNCT-2002-00198, 2002-2007, 1500 kEuros; Partner of RTN Network on Degradation and Instabilities in Geomaterials with Application to Hazard Mitigation/HPRNCT-2002-00220, 2002-2006, 1600 kEuros. Coordinator of 3 INTAS Projects (INTAS-93-3213; INTAS-93-3213 – extension; INTAS-94-4380) in addition to PENED and PYTHAGORAS Grants from the Greek Government. Partner of 2 European projects on Nuclear Reactor Safety (REVISA/FI4S-CT96-0024, 1997-2000, and LISSAC/FIKS-CT1999-00012, 2000-2002, coordinated by J. Devos/France and R. Krieg/Germany respectively) by focusing on size effects and component failure using ECA's theory of gradient thermoplasticity and damage. The total amount of the INTAS/PENED/PYTHAGORAS and REVISA/LISSAC projects for ECA's Lab was about 1 million Euros.

- *PI/Co-PI of a number of US projects supported by NSF, ARMY, ARO/NATO and other International Organizations (China, Japan, Saudi Arabia) totalling ~12 million USD. The most recent grant from US/NSF (Novel Experiments and Models for the Nanomechanics of Polymeric and Biological Nanofibers, NSF NIRT Grant DMI #0532320, 2004-2008, 1.3M USD) was carried out in collaboration with Michigan Tech, U. of Illinois (I. Chasiotis), U. of Virginia (L. Zhigilei), U. of Minnesota (R. Ballarini), and Case Western (S. Eppel).*
- *Co-Founder of a Degree Awarding Graduate Program on Nanosciences and Technologies, at Aristotle University in Greece (<http://nn.physics.auth.gr/>) and of similar programs in US: NUE – Undergraduate Exploration of Nano-Science, Applications, and Societal Implications; Enterprise/Minor in Nanoscale Science and Engineering at Michigan Tech (<http://nano.mtu.edu/nueindex.htm>; <http://nano.mtu.edu/nanominor.htm>).*

■ PhD Students/Postdocs

- *Advisor/Co-advisor of ~20 PhDs and supervisor of ~30 postdocs. Many of these hold university positions in the US, EU, Russia and China. Examples include former PhDs Doug Bammann (Professor at Mississippi State), Hussein Zbib (Professor and former Chair at Washington State) and David Unger (Professor, Univ of Evansville); former postdocs/visiting scholars Andrzej Neimitz (Professor at Kielce University of Technology), Oleg Naimark (Professor at Perm State Univ), Chongqing Ru (Professor at University of Alberta), Alexey Romanov (Professor and Director at ITMO University), Harm Askes (Professor and Head at Univ of Sheffield), Michael Zaiser (Professor at the Univ of Erlangen-Nürnberg) and Kaiyu Xu (Professor at Shanghai Univ). Four of his more recent PhD students at Aristotle Univ - A. Konstantinidis/ M. Avlonitis/G. Efremidis and I. Mastorakos - are assistant professors at greek universities (Thessaloniki/Corfu/Volos) and at Clarkson/US, respectively. Two of his recent postdocs K. Moutsopoulos and A. Kalampakas are associate professor (Democritus Univ of Thrace) and assistant professor (American Univ of the Middle East), respectively. Former PhD students in the US (R. Wilson, P. Taylor, T. Webb, X. Zhu, J. Huang) hold key positions in National Labs and Research Government Organizations.*

■ Diploma/Masters Students and Visiting Scientists

- *Supervisor of ~15 Diploma/Master theses and of ~20 young researchers/visiting scientists in joint university projects. Examples of those holding academic positions in US include I. Chasiotis (Professor at Univ of Illinois at Urbana-Champaign) and K. Kalaitzidou (associate professor at Georgia Tech). Other examples of former postdocs and short-term (3-9 mo) visitors supported by the TMR/RTN/INTAS programs, and currently holding academic positions, include M. Gutkin/St. Petersburg, M. Seefeldt/Leuven, M. Lazar/Darmstadt, X. Zhang/Chengdu, G. Ferro/Torino, P. Cornetti/Torino, C. di Prisco/Milano, N. Pugno/Trento, G. Ribarik/Budapest, J.V. Andersen/Paris.*
- *Other young scientists/short-term visitors who spent time in his Lab and currently hold academic positions include A. Nikitas (Univ of Huddersfield), N. Nikitas (Univ of Leeds), N.-H. Zhang (Univ of Shanghai), H. Xu (Shanghai Jiaotong Univ), Y. Chen/R. Yang (CAS/LNM – Beijing), A. Chattopadhyay (Aston Univ), M. Mousavi (Aalto Univ).*

■ Collaborators/Distinguished Visitors

- *Senior long-term collaborators* who conducted joint projects or research visits in his Lab include *J. Kratochvil* (Prague), *P. Perzyna* (Warsaw), *Z. Mroz* (Warsaw), *D. Beskos* (Minnesota/Patras), *N. Triantafyllidis* (Ann Arbor/Paris), *E. Gdoutos* (Xanthi/Northwestern), *I. Vardoulakis* (Minnesota/Athens), *Y. Dafalias* (Davis), *N. Aravas* (Pennsylvania/Volos), *H. Mühlhaus* (CSIRO/Queensland), *G. Frantziskonis* (Arizona), *G. Voyiadjis* (Louisiana), *A. Varias* (Malmö), *I. Groma* (Budapest), *J. Willis/N. Fleck* (Cambridge), *G. Maugin* (Paris), *A. Carpinteri* (Torino), *R. de Borst* (Delft/Glasgow/Sheffield), *R. Ballarini* (Case Western/Minnesota/Houston), *S. Forest* (Paris), *P. Steinmann* (Kaiserslautern/Erlangen-Nürnberg).
- *World-known contributors* who were hosted in his Lab in US include *Clifford Truesdell*, *Dan Drucker*, *Cemal Eringen*, *Jerry Ericksen*, *Jim Serrin*, *Frank Nabarro*, as well as the Chemistry Nobel Laureate *Ilya Prigogine*. At Aristotle University he hosted, among others, *A. Ngan* (Hong Kong), *J. Goddard* (San Diego), *Yilong Bai* (Beijing), *Gerard Maugin* (Paris) and *Constantino Tsallis* (Rio).

■ Seminars/Lectures and Conferences

- *Invited in ~500 occasions* to speak in conferences, universities, and research laboratories in the US, Europe, Former Soviet Union, Russia, Australia, Japan, South Africa, Brazil, Saudi Arabia, China. The majority of his lectures in conferences and symposia/workshops were invited, keynote and plenary. Examples of plenary lectures in the last 10 years include: *Plenary Lecture* in the *16th European Conference on Fracture/ECF16*, 2-8 July 2006, Alexandroupolis/Greece; *Plenary Lecture* in the *6th South African Conference on Computational and Applied Mechanics/SACA-2008*, 26-28 March 2008, Cape Town/South Africa; *Plenary Lecture* in the *10th Asia-Pacific Conference on Engineering Plasticity and its Applications/AEPA-2010*, 15-17 November 2010 Wuhan/China; *Plenary Lecture* in the *5th International Conference on Materials Science and Condensed Matter Physics/MSCMP- 2010*, 13-17 September 2010, Chisinau/Moldova; *Plenary Lecture* in the *7th WSEAS International Conference on Continuum Mechanics*, 14-17 July 2012, Kos/Greece; *Plenary Lecture* in the *2nd Global Conference on Materials Science and Engineering*, 20-22 November 2013, Xianning, China; *Plenary Lecture* in the *7th Int. Conference on Materials Science and Condensed Matter Physics*, 16-19 September 2014, Chisinau, Moldova; *Plenary Lecture* in the *12th International Conference of Numerical Analysis and Applied Mathematics/INCAAM-2014*, 22-28 September 2014, Rhodes/Greece; *Plenary Lecture in the Shechtman International Symposium*, 29 June – 4 July 2014, Cancun/Mexico; *Plenary Lecture in the 1st Sino-Russian-Belarusian Joint Scientific-Technical Forum*, 15-17 September 2015, Beijing/China; *Plenary Lecture in the XLIV International Conference in Advanced Problems in Mechanics*, June 27-July 2 2016, St. Petersburg.
- *Organizer/Co-organizer* of ~20 International Conferences/Symposia/Workshops and Member of Organizing Committees of ~50 Scientific Meetings. Examples include: E.C. Aifantis and J.P. Hirth, *International Symposium on the Mechanics of Dislocations, 50 years since the Discovery of Dislocations with a Tribute to J.D. Eshelby*, 28-31 August 1983, Houghton, Michigan/USA; E.C. Aifantis, *International Conference on Mechanics, Physics and Structure of Materials: A Celebration of Aristotle's 23 Centuries*, 19-24 August 1990, Thessaloniki/Greece; E.C. Aifantis, *2nd Euroconference and International Symposium on Materials Instabilities in Deformation and Fracture*, 31 August – 4 September 1997, Thessaloniki/Greece; E.C. Aifantis, *5th EuroMech Solid Mechanics Conference (ESMC-5)*, 17-22 August 2003, Thessaloniki/Greece; E.C. Aifantis, *1st World Symposium on Multiscale Material Mechanics and Engineering Sciences, Dedicated to the Memory of Frank Nabarro, Edward Hart and Ronald Rivlin*, 29 April – 3 May 2007, Thessaloniki/Greece; E. Meletis, E.C. Aifantis and E. Kaxiras, *1st International Conference: From Nanoparticles and Nanomaterials to Nanodevices and Nanosystems (1st IC4N-2008)*, 16-18 June 2008, Halkidiki Peninsula/Greece; Y. Dafalias, E.C. Aifantis and L. Toth, *Symposium on Generalized Granular Mechanics, 2016 EMI International Conference, 25-27 October 2016, Metz/France*;

F. Kongoli, E.C. Aifantis, H. Wang and T. Zhu, *YANG International Symposium on Multiscale Material Mechanics and Multiphysics and Sustainable Applications (in honor of Life-time Achievements of Prof. Wei Yang – President of Natural Science Foundation of China)*, 6-10 November 2016, Hainan Island/China.

- *Symposia Honoring ECA's Contributions: Joint ASME/ASCE/SES Symposium* honoring his 55th birthday, 1-3 June 2005, Baton Rouge, USA [Organizers: D.J. Bammann, H.M. Zbib, P. Sofronis]; *Flogen Star Outreach Symposium* honoring his 65th birthday, 4-9 October 2015, Antalya, Turkey [Organizers: F. Kongoli, S. Bordas, Y. Estrin.]

■ Editorships and Editorial Boards

- *Editor/Co-Editor*: 12 Books/Special Journal Issues and Conference Proceedings. Examples include: E.C. Aifantis and L. Davison, *Media with Microstructures and Wave Propagation*, Special Issue of Int. J. Engng. Science 212, 961-1224, 1984; E.C. Aifantis and J.P. Hirth, *The Mechanics of Dislocations* [248 pages], ASM, Metals Park, 1985; E.C. Aifantis and J. Gittus, *Phase Transformations* [302 pages], Elsevier Appl. Sci. Publ., London-New York, 1986.
- *Editor-in-Chief*: *J. Mechanical Behavior of Materials* (ISSN 0334-8938); *Honorary Editor of Computer and Experimental Simulations in Engineering and Science* (ISSN 1791-3829).
- *Advisory/Editorial Board Member*: *Nanomechanics Science and Technology: An International Journal* (ISSN 1947-5748); *Reviews on Advanced Materials Science* (ISSN 1605-8127); *Materials Physics and Mechanics* (ISSN 1605-8119); *Acta Mechanica Solida Sinica* (ISSN 0894-9166); *Mechanical Sciences* (ISSN 2191-9151); *J. Control Engineering and Technology* (ISSN 2223-2036); *Open Mechanics Journal* (ISSN 1874-1584), *J. Adv. Microelectronic Engng.* (ISSN 2327-7599); *Open Conf. Proc. J.* (ISSN 2210-2892); *Scientific and Technical Journal of Information Technologies, Mechanics and Optics* (ISSN 2226-1494).
- *Former Editorial Boards*: *Acta Mechanica* (ISSN 0001-5970), *J. Nano Research* (ISSN 1662-5250); *Mechanics of Cohesive-Frictional Materials* (ISSN 1099-1484); *Numerical and Analytical Methods in Geomechanics* (ISSN 106-222).

■ Publications/Citations

- *Published over 600* articles in scientific journals, book chapters/proceedings, and technical reports
- *Cited: ~9820* times/50 h-index (ISI); *~10370* times/50 h-index (Scopus); *~16470* times/63 h-index (Google Scholar)
- *3 most Highly Cited single authorship articles*:
E.C. Aifantis, On the microstructural origin of certain inelastic models, ASME J. Engng. Mat. Tech. 106, 326-330 (1984). [ISI: 711, Scopus: 848; Google Scholar: 1284; 4th most cited article of the Journal];
E.C. Aifantis, The physics of plastic deformation, Int. J. Plasticity 3, 211-247 (1987). [ISI: 567, Scopus: 607; Google Scholar: 898; 7th most cited article of the Journal];
E.C. Aifantis, On the role of gradients in the localization of deformation and fracture, Int. J. Engrg. Sci. 30, 1279-1299 (1992). [ISI: 444, Scopus: 478; Google Scholar: 726; 7th most cited article of the Journal.]
- *12 Most Cited Articles*
 1. E.C. Aifantis, On the microstructural origin of certain inelastic models, Transactions of ASME, J. Engng. Mat. Tech. 106, 326-330 (1984). [Citations: 848/Scopus, 711/ISI, 1284/Google Scholar]
 2. E.C. Aifantis, The physics of plastic deformation, Int. J. Plasticity 3, 211-247 (1987). [Citations: 607/Scopus, 567/ISI, 898/Google Scholar]
 3. E.C. Aifantis, On the role of gradients in the localization of deformation and fracture, Int. J. Engrg. Sci. 30, 1279-1299 (1992). [Citations: 478/Scopus, 444/ISI, 726/Google Scholar]
 4. H.B. Muhlhaus and E.C. Aifantis, A variational principle for gradient plasticity, Int. J. Solids Struct. 28, 845-857 (1991). [Citations: Scopus not listed, 454/ISI, Google Scholar not listed]

5. *E.C. Aifantis*, Update on a class of gradient theories, *Mechanics of Materials* 35, 259-280 (2003). [Citations: 266/Scopus, 248/ISI, 338/Google Scholar]
 6. *E.C. Aifantis*, Strain gradient interpretation of size effects, *Int. J. Fract.* 95, 299-314 (1999). [Citations: 283/Scopus, 221/ISI, 400/Google Scholar]
 7. *H.M. Zbib* and *E.C. Aifantis*, On the localization and postlocalization behavior of plastic deformation - I: On the initiation of shear bands, *Res Mechanica* 23, 261-277 (1988). [Citations: 204/Scopus, 183/ISI, 289/Google Scholar]
 8. *N. Triantafyllidis* and *E.C. Aifantis*, A gradient approach to localization of deformation - I. Hyperelastic materials, *J. of Elasticity* 16, 225-238 (1986). [Citations: 228/Scopus, 211/ISI, 322/Google Scholar]
 9. *M. Ke*, *S.A. Hackney*, *W.W. Milligan*, and *E.C. Aifantis*, Observation and measurement of grain rotation and plastic strain in nanostructured metal thin films, *Nanostructured Materials* 5, 689-698 (1995). [Citations: 197/Scopus, 194/ISI, 257/Google Scholar]
 10. *C.Q. Ru* and *E.C. Aifantis*, A simple approach to solve boundary value problems in gradient elasticity, *Acta Mechanica* 101, 59-68 (1993). [Citations: 216/Scopus, 217/ISI, 312/Google Scholar]
 11. *E.C. Aifantis*, On the problem of diffusion in solids, *Acta Mechanica* 37, 265-296, 1980. [Citations: 205/Scopus, 177/ISI, 332/Google Scholar]
 12. *H. Askes* and *E.C. Aifantis*, Gradient elasticity in statics and dynamics: An overview of formulations, length scale identification procedures, finite element implementations and new results, *Int. J. Solids Struct.* 48, 1962-1990, 2011. [Citations: 236/Scopus, 215/ISI, 312/Google Scholar]
- *Research Topics Pioneered by ECA and Discussed in Books Published by Other Distinguished Authors:* Over the past three decades, ECA's research has stimulated the organization of various specialized workshops/conferences and the publication of journal special issues and book chapters. *Chapter 89* of the book by *M. Gurtin/E. Fried/L. Anand* (*The Mechanics and Thermodynamics of Continua*, Cambridge Univ Press, UK, 2010) is dedicated to his theory of "gradient plasticity" and *Chapter 6* of the book by Nobel Laureate *I. Prigogine and G. Nicolis* (*Exploring Complexity*, Freeman, New York, 1989) is dedicated to his approach (with *D. Walgraef*) on "dislocation patterning". A discussion of the Walgraef-Aifantis (W-A) model on PSBs formation is also provided in *Chapter 2.6* of a book by *S. Suresh* (*Fatigue of Materials*, Cambridge Univ Press, UK, 1991) and in *Chapter 2.7.3* of the 2nd Edition, 2001. His theory on "gradient elasticity" as applied to elimination of singularities from dislocation lines is the subject of *Chapter 3.1.1* of another recent book by *M.Yu. Gutkin and I.A. Ovid'ko* (*Plastic Deformation in Nanocrystalline Materials*, Springer-Verlag, Berlin-Heidelberg-New York, 2004). The W-A model (as well as the role of gradients in plastic instabilities) is also discussed extensively in a recent book by *N. Ghoniem and D. Walgraef* (*Instabilities and Self-Organization in Materials*, Oxford Univ Press, UK, 2008). Finally, a brief discussion of his research contributions was included in Chapter 10.6.3 in a book by *G.A. Maugin* (*Continuum Mechanics Through the 20th Century: A Concise Historical Perspective*, Springer, 2013).



**2005 Joint ASCE/ASME/SES Conference on
Mechanics and Materials**

**June 1 – 3, 2005
Baton Rouge, Louisiana**

McMat 2005

MECHANICS & MATERIALS CONFERENCE

Symposium Honoring the Contributions of Elias Aifantis

Organizers: Douglas J. Bammann, Hussein M. Zbib, Petros Sofronis

Every four years, the engineering mechanics and materials communities of the American Society of Civil Engineers (ASCE), the American Society of Mechanical Engineers (ASME), and the Society of Engineering Science (SES) hold a joint conference. In 1997, it was held at Northwestern University in Evanston, Illinois, and in 2001, it was held at University of California in San Diego, La Jolla, California. The 2005 Joint ASME/ASCE/SES Conference on Mechanics and Materials (McMat2005) will be held in Baton Rouge, Louisiana, on June 1-3, 2005. Activities will be hosted by Louisiana State University with Professor George Z. Voyiadjis as the Conference Chair. This important conference offers an exciting exchange of information that comes about through the congress of three major engineering mechanics and materials communities.

This special symposium within the McMat2005 conference is organized to recognize the contributions of Professor Elias Aifantis in the fields of mechanics and materials. In particular, the areas associated with diffusion-reaction theory, gradient theory, mixture theory and hydrogen embrittlement, plasticity and material instability.

Conference Location and Organization

McMat2005 will be held at the Holiday Inn Select located adjacent to Interstate I-10 in the middle of a new bustling area of Baton Rouge. Activities will be hosted by Louisiana State University, and many faculty and students are heavily involved with organizing the conference.

For more information, visit the conference web site at www.McMat2005.eng.lsu.edu. The full program and registration information should be available soon.



Current National and International Research Awards

1. Hellenic Foundation for Research and Innovation (HFRI)

Title: a) *Material Instabilities, Size Effects, and Morphogenesis: Nanomaterials and Brain*
b) *Nano-chemo-mechanics in Deformation and Fracture: Theory and Applications in LiBs and SGS*

Principal Investigator: Professor Elias Aifantis

Duration: 1.2 years

Funding: 130 kEuros

2. EU Horizon 2020 RISE

Title: *Fracture Across Scales and Materials, Processes and Disciplines/FRAMED*

Principal Investigator: Professor Elias Aifantis

Duration: 4 years

Funding: 130 kEuros

3. Ministry of Education and Science of Russian Federation: Mega Grant

Title: *Fabrication and study of advanced multi-functional metallic materials with extremely high density of defects*

Principal Investigator: Professor Elias Aifantis

Duration: 4 years

Funding: 90 mil Rubbles

Former National and EU Research Awards

1. Greek National Strategic Reference Framework (NSRF): “Funding of Research Projects Positively Reviewed in the 5th ERC Grant Schemes Call”

Title: Internal Length Gradient Mechanics Across Scales and Materials: Theory, Experiments and Applications/*IL-GradMech-ASM*

Principal Investigator: Professor Elias Aifantis

Duration: 2.5 years

Funding: 880 kEuros

2. Greek Secretariat of Research and Technology: “ARISTEIA”

Title: Size Effects in Deformation and Electromechanical Problems/*SEDEMP*

Principal Investigator: Professor Elias Aifantis

Duration: 1.5 years

Funding: 320 kEuros

3. Greek Ministry of Education: “THALES”

Title: Conservation and Restoration of Monuments of Cultural Heritage/*INTERMONU*

AUT PI: Professor Elias Aifantis (Multi-investigator project)

Duration: 4 years

Funding: 600 kEuros

4. ERA-NET RUS: “Pilot Joint Call for S&T projects”

Title: Shift of the phase equilibria in nanograined materials/*NanoPhase*

AUT PI: Professor Elias Aifantis (Multi-investigator project)

Duration: 2 years

Funding: 25 kEuros

5. FP7-IDEAS-2007 “ERC Starting Grant” *

Title: Probing the Micro-Nano Transition: Theoretical and Experimental Foundations, Simulations and Applications/*MINATRAN*

Principal Investigator: Dr. Katerina E. Aifantis (Aristotle University, Greece)

Duration: 5 years

Funding: 1.13 MEuros

Remarks: Highly competitive call (only 300 out of 9000 were funded); Dr. Katerina Aifantis is the **youngest** grantee (see attached interviews of BBC and VIMA)

***Note:** The funds have been allocated exclusively for the development of the scientist awarded, the transfer of knowledge/technology to the Host Institution and the performance of high quality doctoral/postdoctoral on the provision that the Host Institutions provide the necessary facilities and infrastructure.

Doctoral Graduates / Postdoctoral Associates with Recently Awarded Academic Positions

1. Doctoral Graduates

- Name:** Markos Avlonitis
Thesis: PhD Thesis (2002)
Current position: Lecturer, Ionian University – Greece
- Name:** Ioannis Chasiotis
Thesis: Diploma Thesis (1996) / MS-PhD US (2002)
Current position: Associate Professor, University of Illinois at Urbana-Champaign – USA
- Name:** George Efremidis
Thesis: PhD Thesis (2002)
Current position: Lecturer, University of Volos – Greece
- Name:** Kyriaki Kalaitzidou
Thesis: Diploma Thesis (1998) / MS-PhD US (2006)
Current position: Assistant Professor, Georgia Tech – USA
- Name:** Avraam Konstantinidis
Thesis: PhD Thesis (2000)
Current position: Lecturer, Aristotle University of Thessaloniki – Greece
- Name:** Ioannis Mastorakos
Thesis: PhD Thesis (2002)
Current position: Research Professor, Washington State University – USA
- Name:** Ioannis Tsagrakis
Thesis: Diploma Thesis (1996) / PhD Thesis (2001)
Current position: Lecturer (PD 407), University Crete – Greece
- Name:** Iordanis Eleftheriadis
Thesis: Diploma Thesis (1996) / PhD Thesis (2001)
Current position: Lecturer (PD 407), TEI Kilkis – Greece

2. Postdoctoral Associates

- Name:** Harm Askes
Current position: Professor, University of Sheffield – UK
- Name:** Pietro Cornetti
Current position: Assistant Professor, Politecnico di Torino – Italy
- Name:** Marc Seefeldt
Current position: Assistant Professor, Katholieke Universiteit Leuven - Belgium
- Name:** Claudio di Prisco
Current position: Professor, Politecnico di Milano – Italy
- Name:** Michael Zaiser
Current position: Professor, University of Edinburgh – UK

FORMER ACTIVITIES

1. EDUCATIONAL / PERSONEL

1. *Dissertations*

PhD Theses

| | | |
|----------------|----------------|----------------------|
| • O. Akintayo | • Th. Biros | • J. Konstantopoulos |
| • N. Moschakis | • E. Georgalis | |

Postdoctoral Fellows

| | |
|---|---|
| • A. Romanov (LMM – Ioffe Physicotechnical Institute) | • A. Ngan (LMM – University of Hong Kong) |
|---|---|

Postdoctoral Associates

| | |
|---|--|
| • L. Teneketzis / LMM | • I. Kioseoglou (PYTHAGORAS) / Physics |
| • G. Petsos (RTN DEFINO) / LMM-Brussels | • G. Dimitrakopoulos (PYTHAGORAS) / Physics |
| • I. Georgiou / LMM-Imperial | • I. Karapanagiotis (PYTHAGORAS) / LMM-Ormylia |

Senior Scientists Visits

| | |
|--|---|
| • M. Zaiser (University of Edinburgh-UK) | • V. Koutsos (University of Edinburgh-UK) |
| • H. Askes (University of Sheffield-UK) | • I. Gitman (University of Sheffield-UK) |
| • D. Mijuca (Univ. Union Belgrade-Serbia) | • W.M. Keck (California Inst. Technol.-USA) |
| • S. Forest (Ecole de Mines Paris-France) | • J.R. Willis (Univ. of Cambridge-UK) |
| • J. Goddard (Univ. of California.-USA) | • P. Podio-Guidugli (Univ. of Roma-Italy) |
| • D. Bammann (Mississippi State Univ.-USA) | • Q. Sun (Univ. of Hong Kong-China) |
| • G. Odegard (Michigan Tech. Univ.-USA) | • H. Dai (City Univ. Hong Kong-China) |

ERC Senior Scientists

| | |
|---|--|
| • S. Hackney (Michigan Tech-USA) | • Th. Sarakonsri (Chiangmai University-Thailand) |
| • A. Romanov (LMM – Ioffe Physicotechnical Institute) | • M. Zaiser (University of Edinburgh-UK) |
| • A. Konstantinidis (Aristotle University-Greece) | • S. Shrivastava (Witts University-S. Africa) |
| • A. Ngan (LMM – University of Hong Kong) | • B. Tang (University of Hong Kong) |
| • A. Yu (Shanghai University-China) | • N. Zhang (Shanghai University-China) |
| • T. Huang (Shanghai University-China) | |

ERC Students

| | |
|----------------------------|---------------------|
| • N. Ntagrakarn (Thailand) | • S. Brutti (Italy) |
| • X. Zhang (China) | • K. Cole (USA) |

2. RESEARCH / FUNDING

2A. *Coordination of Funded Research Programs*

European Research Council

- ERC Starting Grant: FP7-IDEAS-2007 "Probing the Micro-Nano Transition: Theoretical and Experimental Foundations, Simulations and Applications (MINATRAN)", Principal Investigator : K.E. Aifantis, 1.130.000 EUROS

European Commission

- IIF: FP7-PEOPLE-2007-4-2-IIF "Nanomechanics of defects in solids with applications to thin films, nanoparticles, nanocrystals and biomaterials (Materials Nanomech)", Principal Investigator : A. Romanov, 200.000 EUROS
- IIF: FP7-PEOPLE-2007-4-2-IIF "Generalization of the Gibbs statistical mechanics to canonical ensembles of dislocation patterns (GibbsDis)", Principal Investigator : A. Ngan, 200.000 EUROS (?)

2B. *Participation in Joint Research Programs*

Hellenic General Secretariat of Research and Technology/YPEPTH

- DPMS Interdepartmental Post-Graduate Program, "Nanoscience and Nanotechnology", Coordinator: S. Logothetidis
- Post-Graduate Program, "Physics of Materials", Director Karakostas Theodoros

3. CONFERENCES / SYMPOSIA ORGANIZED

- 2nd World Symposium on Multiscale Material Mechanics & Engineering Sciences, 21-22 May 2009, AUT, Greece

A. RECENT ACTIVITIES

A1. EDUCATIONAL / PERSONEL

*Dissertations**

PhD Theses

- D. Tragoudaras (PENED 01)
- G. Mokios (PENED 01)
- J. Konstantopoulos (PYTHAGORAS)
- O. Akintayo
- E. Georgalis

Predoctoral Fellows

- F. Hagemann (RTN DEFINO)
- V. Grützun (RTN DEFINO)
- B. Fyffe (RTN DEFINO)
- J. Schwerdtfeger (RTN DEFINO)

Postdoctoral Fellows

- M. Avlonitis (PYTHAGORAS)
- M. Lazar (RTN DEFINO)
- I. Tsagrakis (PYTHAGORAS)
- G. Rambert (RTN DIGA)
- B. Bako (RTN DEFINO)
- Frederick Madani (RTN DEFINO)

Postdoctoral Associates

- L. Teneketzis / LMM
- I. Kioseoglou (PYTHAGORAS) / Physics
- G. Petsos (RTN DEFINO) / LMM–Brussels
- G. Dimitrakopoulos (PYTHAGORAS) / Physics
- G. Efremidis / LMM
- I. Karapanagiotis (PYTHAGORAS) / LMM–Ormylia
- I. Georgiou / LMM–Imperial

Senior Scientists Visits

- D. Walgraef (ULB–Brussels)
- J. Pontes (Federal University of Rio de Janeiro–Brazil)
- I. Groma (Eotvos University–Budapest)
- P. Steinmann (University of Kaiserslautern)
- A. Varias (Malmo University–Sweden)
- A. Markaki (Cambridge University)

A2. RESEARCH / FUNDING

1. Coordination of Funded Research Programs

European Commission

- RTN:No.HPRN-CT-2002-00198, "Deformation and Fracture Instabilities in Novel Materials and Processes (DEFINO)", Coordinator : E.C. Aifantis, 1.500.000 EUROS (AUT funding 352.000 EUROS)

Hellenic General Secretariat of Research and Technology

- PENED 01: "Nanomechanics, Nanoindenter and Nanocoatings", Coordinator : E.C. Aifantis, 42.000.000 DRS
- PYTHAGORAS: "Pattern formation and self-organization in macro/meso/microscale and nanoscale: Bridging the length scales with applications to nanomechanics and nanotechnology", Coordinator : E.C. Aifantis, 50.000 EUROS

2. Participation in Joint Research Programs*

European Commission

- RTN: No. HPRN-CT-2002-00220, "Degradation and Instabilities in Geomaterials with Application to Hazard Mitigation (DIGA)", (AUT Scientist in charge: E.C. Aifantis, AUT funding 175.000 EUROS)

Hellenic General Secretariat of Research and Technology/YPEPTH

- DPMS Interdepartmental Post-Graduate Program, "Nanoscience and Nanotechnology", Coordinator: S. Logothetidis
- Post-Graduate Program, "Physics of Materials", Director Karakostas Theodoros

US National Science Foundation

- DMI #0532320, NIRT: "Novel Experiments and Models for the Nanomechanics of Polymeric and Biological Nanofibers", Coordinator: I. Chasiotis, co-PI: E.C. Aifantis (Total Funding: \$1.900k)

A3. CONFERENCES / SYMPOSIA ORGANIZED

- 5th Euromech Solid Mechanics Conference (ESMC–5), August 17–23, 2003, AUT, Thessaloniki, Greece, Coordinator E.C. Aifantis
- DEformation and Fracture Instabilities of NOvel materials and processes (RTN DEFINO) 1st Annual Meeting, April 17–18, 2004, Thessaloniki, Greece
- Physical Aspects of Multiscale Modeling Workshop, September 13–15, 2004, Bled, Slovenia, Coordinator L. Dorfmann (ARO), "Solid Mechanics" and "Micro and Nano–structures" co-organiser E.C. Aifantis
- 19th Panhellenic Conference and Summer School on Non-linear Science and Complexity, 10-22 July 2006, Thessaloniki, Greece.

B. PAST ACTIVITIES

B1. EDUCATIONAL / PERSONEL

*Dissertations**

PhD Theses

- A. Konstantinidis (2000)
- I. Eleftheriadis (2002)
- I. Tsagrakis (2001)
- M. Avlonitis (2003)
- G. Efremidis (2002)
- I. Mastorakos (2004)

Diploma/MSc Theses

- D. Konstantinidis (1995)
- M. Avlonitis (1998)
- P. Sapalidis (1999)
- I. Chasiotis (1996)
- N. Liosatos (1998)
- K. Kosmidis (2002)
- I. Tsagrakis (1996)
- K. Kalaitzidou (1998)
- M. Tsalkatidou (2002)
- I. Eleftheriadis (1996)
- S. Marras (1998)

* Parenthesis indicates year of graduation.

Postdoctoral Fellows-Visitors/European Networks 1995-2003

- F. Tzschichholz (1995)
- E. Rizzi (1996)
- M. Seefeldt (1998,2001)
- E. Meletlidou (1999)
- A. Romanov (1995–2000)
- H. Askes (2000,2003)
- J. Andersen (1995)
- G. Ferro (1996,2002)
- C. di Prisco (1998,2002)
- L. Teneketzis (2000)
- M. Gutkin (1995–2000)
- G. Rambert (2003)
- G. Tsolakides (1995)
- K. Moutsopoulos (1997)
- M. Brocato (1998,2002)
- P. Cornetti (2000,2001)
- D. Walgraef (1995–2000)
- P. Grammenoudis (2003)
- N. Hatzitrifon (1996)
- H.-P. Gänser (1998)
- Th. Ioannidou (1999)
- M. Lazar (2002)
- M. Zaiser (1997–2003)
- I. Groma (2001–2003)

B2. RESEARCH / FUNDING

1. Coordination of Funded Research Programs

European Commission

- HCM Contract Nr. ERBCHBGCT 920041 “Fellowships in Mechanics of Materials”, Coordinator : E.C. Aifantis, 240.000 ECU
- HCM Contract Nr. ERBCHCCCT 920061, “Euroconferences in Mechanics of Materials”, Coordinator : E.C. Aifantis, 60.000 ECU
- INTAS-93-3213 “Physics and Mechanics of Plastic Instabilities in Novel Materials”, Coordinator : E.C. Aifantis, 30.000 ECU
- INTAS-93-3213 - extension “Physics and Mechanics of Plastic Instabilities in Novel Materials”, Coordinator : E.C. Aifantis, 40.000 ECU
- INTAS-94-4380 “Structure, Deformation and Fracture of Nanophase Materials”, Coordinator : E.C. Aifantis, 24.000 ECU
- TMR-Network ERBFMRXCT960062 “Spatio-Temporal Instabilities in Deformation and Fracture”, Coordinator : E.C. Aifantis, 1.760.000 ECU

Hellenic General Secretariat of Research and Technology

- EE 7675, “Water Protection Methods for Byzantine Monuments”, Coordinator : E.C. Aifantis, 800.000 DRS
- PENED 96, “Development, Structure, Mechanical Properties of Films at the Nanoscale”, Coordinator : E.C. Aifantis, 8.000.000 DRS
- PENED 99: 2000-2001, “Gradient Theory, Stochasticity and Self-Organization: Applications in Nanomaterials, Industrial Materials and Biocompatible Epilayers”, Coordinator : E.C. Aifantis, 57.000.000 DRS

2. Participation in Joint Research Programs*

European Commission

- REVISA Project, PL 960292, “Reactor Vessel Integrity in Severe Accidents”, Coordinator: J. Devos, (AUT Scientist in charge: E.C. Aifantis, AUT funding 240.000 EUROS)
- LISSAC: FIKS-CT1999-00012, 2000-2002, “Limit Strains for Severe Accident Conditions”, Coordinator: R. Krieg, (AUT Scientist in charge: E.C. Aifantis, AUT funding 90.000 EUROS)

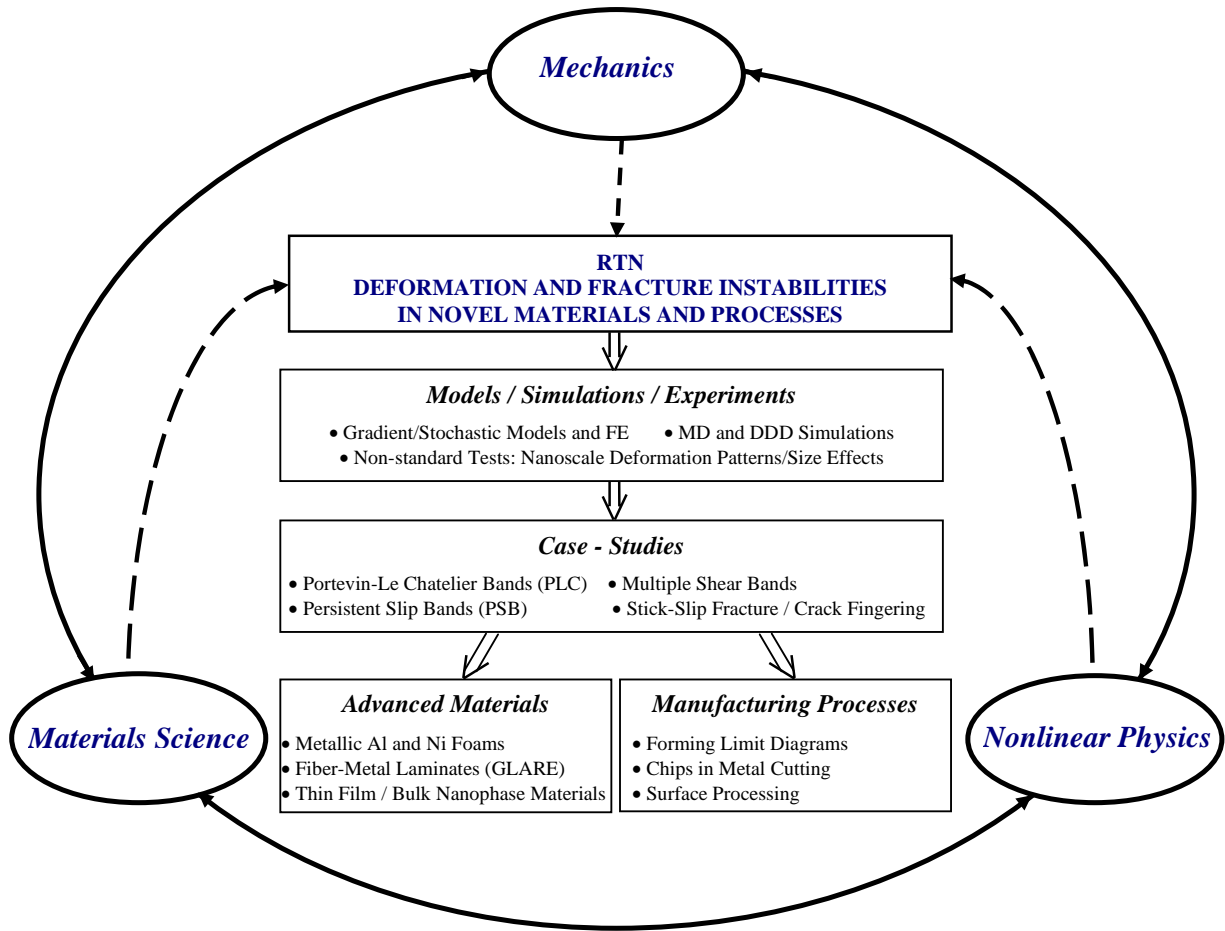
Hellenic General Secretariat of Research and Technology/YPEPTH

- PENED 96, “Degradation of Underground Double Porosity Aquifers”, Coordinator : Ch. Tzimoploulos

*Note: The Laboratory of Mechanics and Materials has also participated to a lesser extent in the following Research Programs: 1) EPET II 333, “Coatings for Optics – Electronics – Chemical Industry”, Coordinator: S. Logothetidis, 2) PENED 96, “Research for Restoration and Preservation of Historic Monuments”, Coordinator: N. Charalambakis, 3) PENED 96, “Dynamic Stress Field around Cracks in Materials Exhibiting Inelastic Behavior”, Coordinator: D. Beskos, 4) BRITE-EURAM 1997-2000, “Deployment of In-Situ Optical Monitoring Techniques for Tailoring Thin Film Properties for Specific Advanced Industrial Applications (ISOTECH)”, Coordinator: S. Logothetidis. In addition, the Laboratory met with the approval of the YPEPTH to coordinate an Interuniversity (AUTH/DUTH) *Post-graduate Program* on “Mechanics of Materials and Processes”, no. 2511/19-9-1997 (approved but not started due to administrative difficulties with DUTH)

B3. CONFERENCES / SYMPOSIA ORGANIZED

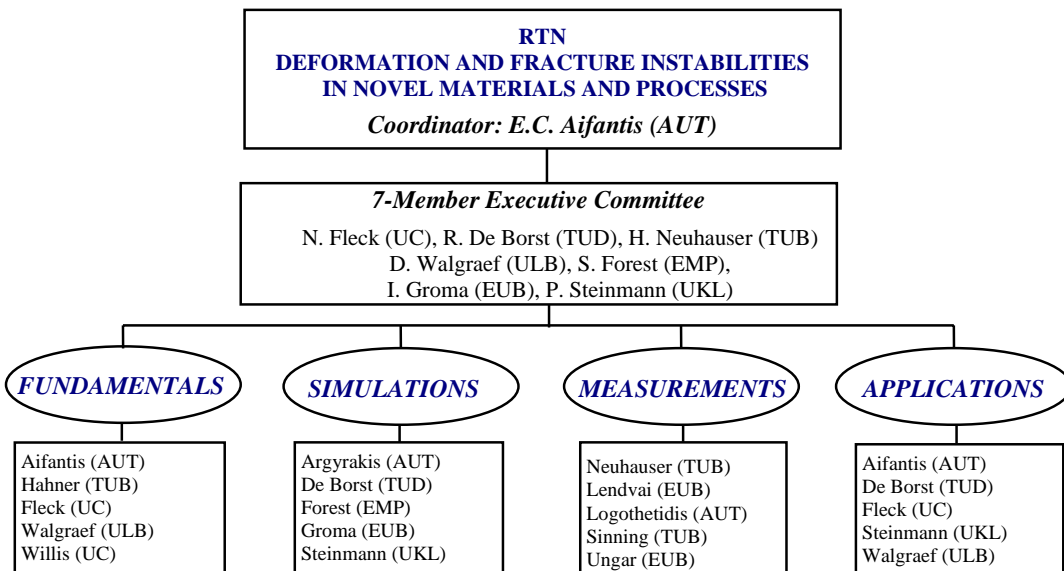
- International Conference on Mechanics, Physics and Structure of Materials—A celebration of Aristotle’s 23 centuries, August 19–24, 1990, Thessaloniki, Greece
- Novel Materials, Processes and Microstructures, Symposium in honor of Professor Theodoros Skoulikides, December 20–22, 1993, Thessaloniki, Greece
- First Euroconference and International Symposium on Material Instabilities in Deformation and Fracture, September 1–4, 1996, Porto Karras, Halkidiki, Greece
- Second Euroconference and International Symposium on Material Instabilities in Deformation and Fracture, August 31–September 4, 1997, AUT, Thessaloniki, Greece



Scientific Interaction Between Different Thrusts and Protect Objectives

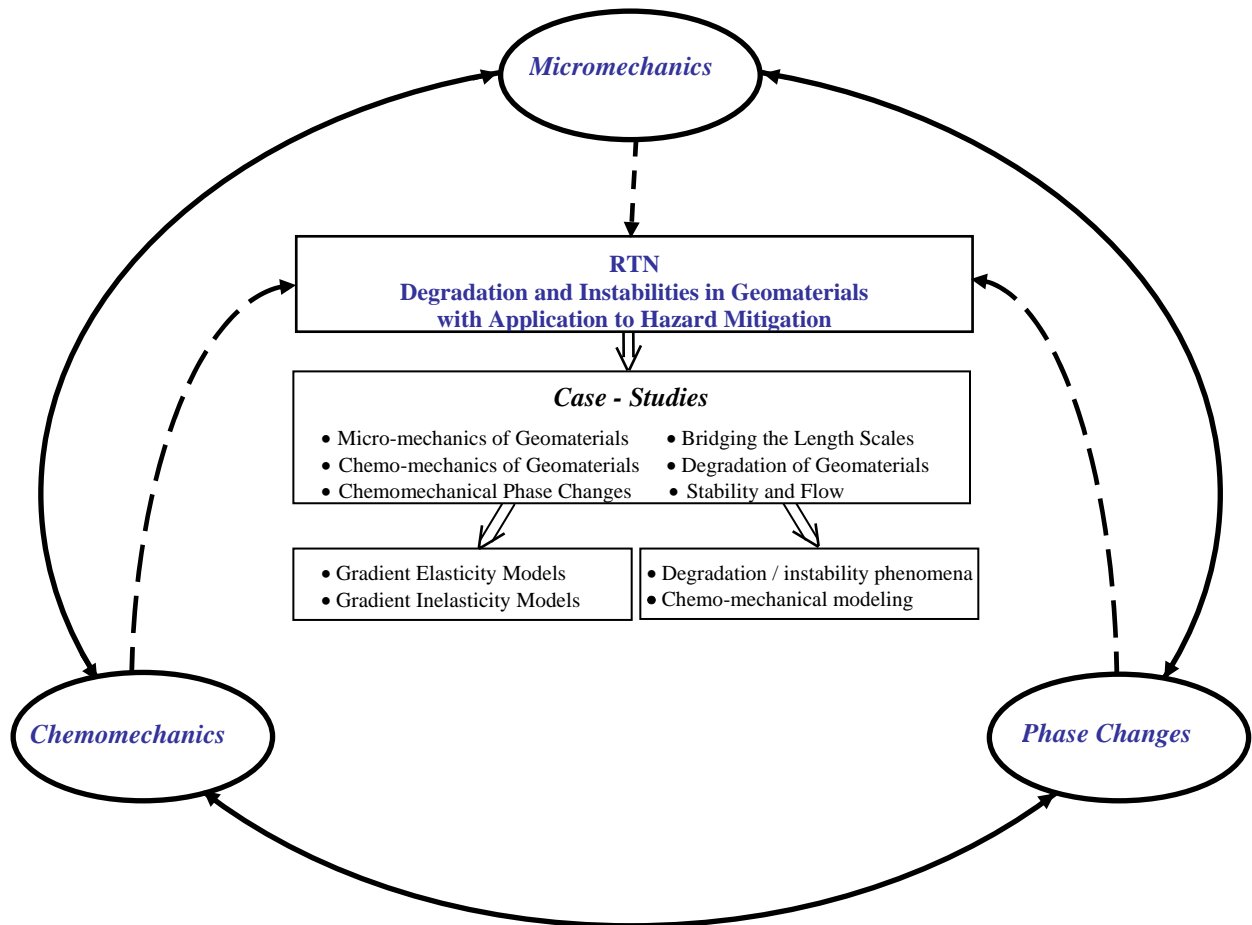
PARTNERS

- ♦ Aristotle University Thessaloniki (AUT)
- ♦ University Cambridge (UC)
- ♦ Technical University Delft (TUD)
- ♦ Technical University Braunschweig (TUB)
- ♦ University Libre Brussels (ULB)
- ♦ Ecole Mines Paris (EMP)
- ♦ Eotvos University Budapest (EUB)
- ♦ University Kaiserslautern (UKL)



Network Organization and Principal Scientists Participation

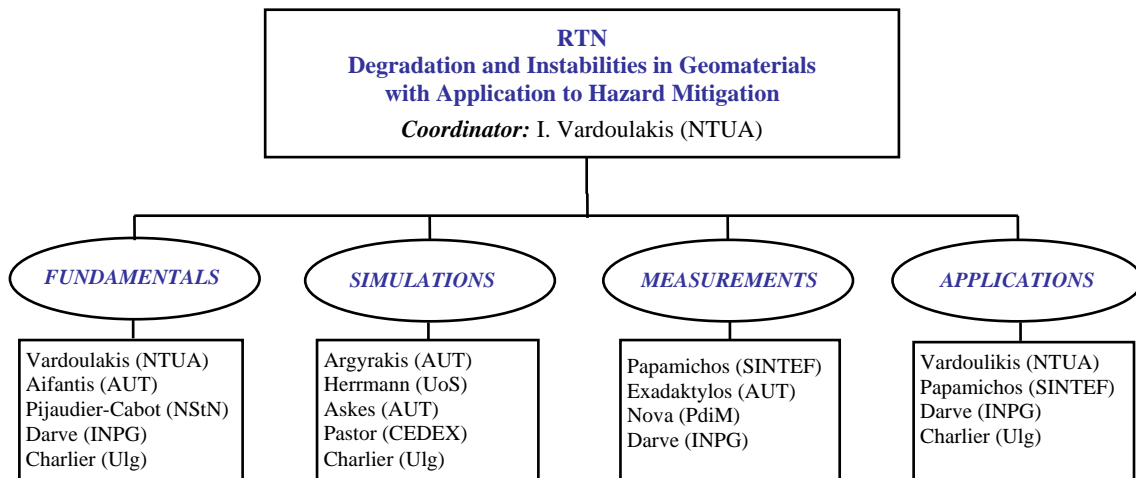
RTN / DIGA, 1.3M EUROS, OCT. 2002 – SEP. 2006



Scientific Interaction Between Different Thrusts and Protect Objectives

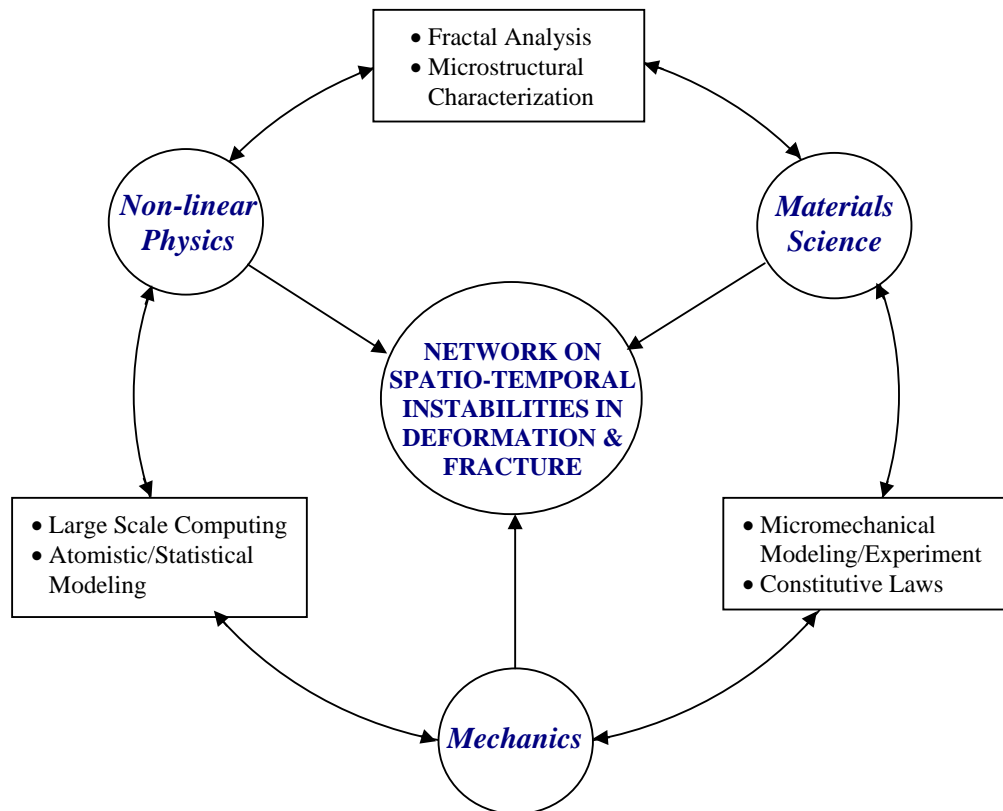
PARTNERS

- ◆ Nat. Tech. Univ. of Athens (NTUA)
- ◆ Aristotle Univ. of Thessaloniki (AUT)
- ◆ Politecnico di Milano (PdiM)
- ◆ SINTEF/NTNU
- ◆ Centro Estudios Experim. Obras Publ. (CEDEX)
- ◆ University of Stuttgart (UoS)
- ◆ Inst. Nat. Polyt. Grenoble (INPG)
- ◆ University of Liege (Ulg)
- ◆ Génie Civil Nantes – St. Nazaire



Network Organization and Principal Scientists Participation

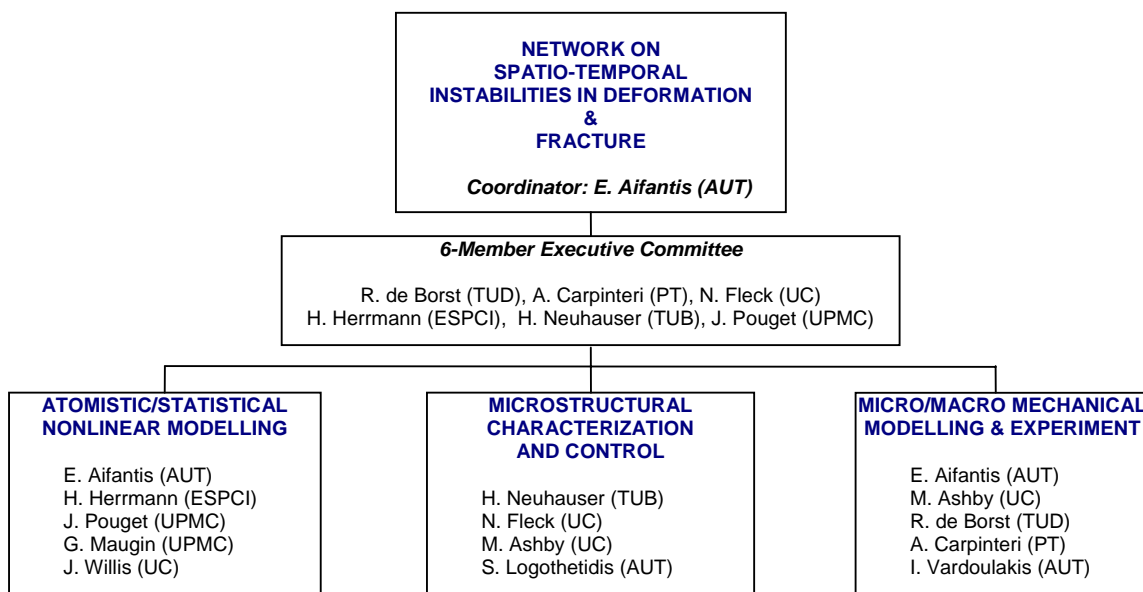
TMR NETWORK, 1.7M ECU, NOV. 1996-MAY 2002



Scientific Interactions Between Different Thrusts

PARTNERS

- *Aristotle University of Thessaloniki (AUT) *University of Cambridge (UC)
- *Ecole Supérieure Phys Chim Ind (ESPCI) *Université Pierre et Marie Curie (UPMC)
- *Technical University Braunschweig (TUB) *Polytecnico di Torino (PT)
- *Technical University Delft (TUD)

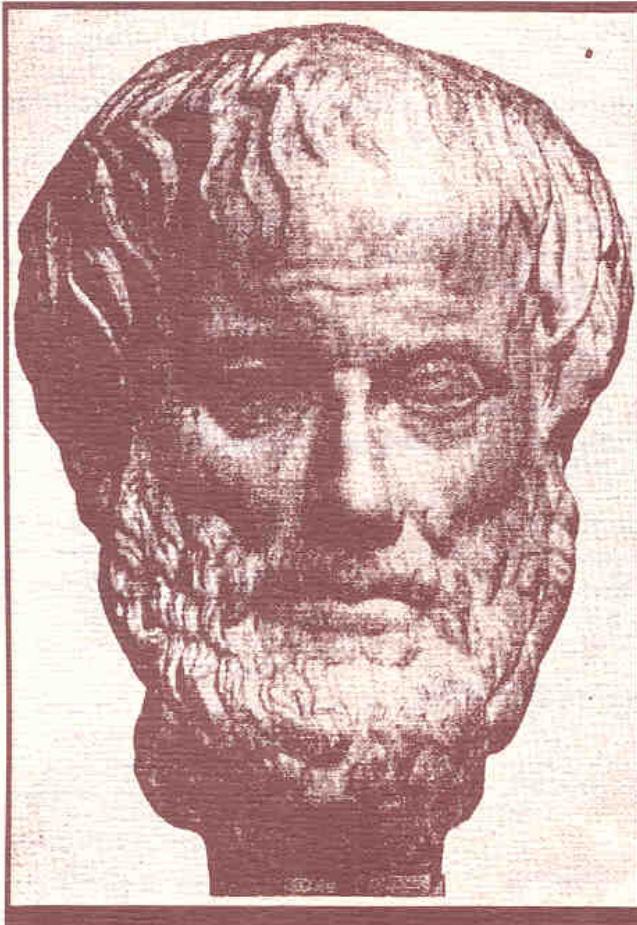


Network Organization and Principal Scientists Participation in Terms of Major Research Interests

International Conference on Mechanics,



Physics and Structure of Materials



"A Celebration of Aristotle's 23 Centuries"

Location

Aristotle University of Thessaloniki; Thessaloniki, Greece; August 19-24, 1990

Organizers

Michigan Technological University (USA) • Aristotle University of Thessaloniki (Greece)

Sponsors

National Science Foundation (USA) • Commission of European Communities (EEC)

Local Contributors

Secretariat General of Research and Technology
Ministry of Education
Democritus University of Thrace
Chemical Process Engineering Research Institute
EKO-Refining and Chemicals

Delegates

| | | | |
|-----------|----------------|--------------|---------------|
| Argentina | Czechoslovakia | India | Soviet Union |
| Australia | Denmark | Italy | Spain |
| Austria | England | Japan | Sweden |
| Belgium | France | Netherlands | Switzerland |
| Bulgaria | Germany | Poland | Turkey |
| Canada | Greece | Romania | United States |
| China | Hungary | South Africa | Yugoslavia |

Endorsements

International Union of Theoretical and Applied
Mechanics (IUTAM)
American Physical Society (APS)
American Society of Civil Engineers (ASCE)
International Chapter of American Society of Metals (ASM)
Society of Engineering Science (SES)
Hellenic Society of Theoretical and Applied
Mechanics (EEΘEM)
Hellenic Airforce Industry (EAB)

Themes

- Elasticity of Microstructures
- Phenomenological and Crystal Plasticity
- Material Instabilities
- Organization of Dislocations
- Deformation Patterning
- Damage and Fracture
- Geomaterials
- Composites and Interfaces
- Symposium on Nonlinearity and Patterning
- Workshop on Novel Materials and Processes

Coordinators

- Department of Mechanical Engineering-Engineering Mechanics, Michigan Technological University, Houghton, MI 49931, USA
- Division of Mechanics and Physics, School of Technology, Aristotle University of Thessaloniki, GR-540 06 Thessaloniki, Greece



FIRST EUROCONFERENCE AND U.S. WORKSHOP ON MATERIAL INSTABILITIES IN DEFORMATION AND FRACTURE

September 4-7, 1996
Porto Carras, Chalkidiki, HELLAS
Greccotel Meliton Tel. 0375-71221, Fax 0375-71502

Coordinator : E.C. Aifantis

Sponsors

- Commission of European Communities
- Aristotle University of Thessaloniki
- Institute for Mechanics and Materials
- Michigan Technological University

Scientific Committee

| | |
|------------------------|-----------------------------|
| R. de Borst (Delft) | W. Milligan (Houghton) |
| A. Carpinteri (Torino) | H. Neuhauser (Braunschweig) |
| N. Fleck (Cambridge) | G. Pouget (Paris) |
| H. Herrmann (Paris) | H. Zbib (Pullman) |

International Participation

| | | | |
|-------------------------|----------------------------|---------------------------|-------------------------|
| J. Andersen (France) | Y. Gordienko (Ukraine) | W. Milligan (USA) | B. Sluys (Holland) |
| I. Antoniou (Belgium) | M. Gutkin (Russia) | H. Muhlhaus (Australia) | K. Soldatos (UK) |
| D. Bammann (USA) | P. Hahner (Italy) | O. Naimark (Russia) | J. Sutherland (USA) |
| G. Beltz (USA) | S. Kalidindi (USA) | Y. Podladchikov (Holland) | Ch. Tsakmakis (Germany) |
| J. Botsis (Switzerland) | D. Konstantinidis (France) | A. Poliakov (France), | K. Valanis (USA) |
| E. Busso (UK) | H. Laemmer (Germany) | V. Popov (Russia) | G. Voyiadjis (USA) |
| G. Ferro (Italy) | D. Lipkin (USA) | R. Pyrz (Denmark) | T. Webb (USA) |
| N. Fleck (UK) | T. Malmberg (Germany) | B. Ritter (Germany) | M. Zaiser (Germany) |
| P. Frantzis (UK) | Y. Mecheryakov (Russia) | E. Rizzi (Italy) | A. Ziegenbein (Germany) |
| G. Frantziskonis (USA) | J. van Mier (Holland) | A. Romanov (Russia) | H. Zbib (USA) |

Hellenic Participation

| | | | |
|-------------------------|-------------------------------|-----------------------------|---------------------------|
| N. Aravas (Volos) | E. Gdoutos (Xanthi) | K. Moutsopoulos (Thessal.) | D. Sotiropoulos (Crete) |
| D. Beskos (Patras) | H. Georgiadis (Thessal.) | N. Moutsopoulos (Thessal.) | H. Stapountzis (Thessal.) |
| A. Bountis (Patras) | A. Konstandopoulos (Thessal.) | M. Pagitsas (Thessal.) | I. Tsagrakis (Thessal.) |
| I. Chasiotis (Thessal.) | S. Logothetidis (Thessal.) | D. Panayiotounakos (Athens) | I. Vardoulakis (Athens) |
| Y. Dafalias (Athens) | I. Mastorakos (Thessal.) | P. Patsalas (Thessal.) | A. Varias (Athens) |

Organizers

- **Laboratory of Mechanics of Materials, Polytechnic School, Aristotle University of Thessaloniki, GR 54006, Thessaloniki, Hellas, Tel & Fax : 30/31 995921, e-mail : giannis@kelifos.physics.auth.gr**
- **Center for Mechanics of Materials and Instabilities, Michigan Technological University, Houghton MI 49931, USA, Tel : 906/487-1518, Fax : 906/487-2282, e-mail : sburack@mtu.edu**



SECOND EUROCONFERENCE AND INTERNATIONAL SYMPOSIUM ON MATERIAL INSTABILITIES IN DEFORMATION AND FRACTURE

31 August - 4 September 1997
AUT, Thessaloniki, HELLAS

Coordinator: E.C. Aifantis

SPONSORS

- Aristotle University of Thessaloniki
- Commission of European Communities
- Greek Ministry of Education
- Michigan Technological University
- Institute for Mechanics and Materials
- Greek Ministry of Culture

SCIENTIFIC COMMITTEE

| | | |
|------------------------|-----------------------------|-----------------------------|
| D. Bammann (Livermore) | H. Herrmann (Paris) | A. Romanov (St. Petersburg) |
| R. de Borst (Delft) | W. Milligan (Houghton) | A. Rosakis (Pasadena) |
| A. Carpinteri (Torino) | H. Neuhauser (Braunschweig) | I. Vardoulakis (Athens) |
| N. Fleck (Cambridge) | G. Pouget (Paris) | H. Zbib (Pullman) |

INTERNATIONAL PARTICIPATION

| | | | |
|-----------------------------|----------------------------|-------------------------------|---------------------------|
| J. Andersen (UK) | G. Gioia (USA) | A. Majlessi (USA) | A. Romanov (Russia) |
| I. Antoniou (Belgium) | N. Ghoniem (USA) | T. Malmberg (Germany) | A. Rosakis (USA) |
| B. Asaro (USA) | M. Glazov (USA) | A. Massih (Sweden) | K. Santaoja (Finland) |
| T. Atanackovic (Yugoslavia) | P. Goltermann (Denmark) | G. Maugin (France) | A. Seeger (Germany) |
| D. Bammann (USA) | M. Gutkin (Russia) | Y. Mescheryakov (Russia) | S. Shah (USA) |
| Z. Bazant (USA) | R. Hahner (Italy) | M. Meyers (USA) | B. Smirnov (Russia) |
| V. Bengus (Ukraine) | O. Hausler (Germany) | L. Mikkelsen (Denmark) | G. Solomos (Italy) |
| M. Brocato (Italy) | H. Herrmann (France) | W. Milligan (USA) | P. Steinmann (Germany) |
| R. de Borst (Holland) | N. Huber (Germany) | N. Morozov (Russia) | D. Sumarac (Yugoslavia) |
| A. Carpinteri (Italy) | L. Illman (Sweden) | R. Mullen (USA) | J-E. Sundgren (Sweden) |
| P. Castaneda (USA) | D. Isobe (Japan) | A. Needleman (USA) | Ch. Tsakmakis (Germany) |
| I. Chasiotis (USA) | W. Jansohn (Germany) | S. Nemat-Nasser (USA) | F-J. Ulm (France) |
| Y. Drossinos (Italy) | J. Jarić (Yugoslavia) | L. Nicolas (France) | A. Vakakis (USA) |
| V. Erofejev (Russia) | M. Khaleel (USA) | A. Nortmann (Germany) | K. Valanis (USA) |
| T. Folias (USA) | D. Konstantinidis (France) | P. Onck (Holland) | S. Valliappan (Australia) |
| I. Fonseca (USA) | F. Kun (Hungary) | V. Panin (Russia) | J. Willis (UK) |
| S. Forest (France) | K-S. Kim (USA) | L. Pitaevskii (Russia) | H. Yuan (Switzerland) |
| R. Fosdick (USA) | J. Lambropoulos (USA) | Y. Podladchikov (Switzerland) | M. Zaiser (Greece) |
| G. Gazonas (USA) | D. Lassila (USA) | I. Prigogine (Belgium) | H. Zbib (USA) |
| M. Geers (Belgium) | J. Li (USA) | C. Rebholz (UK) | A. Ziegenbein (Germany) |
| W. Gerberich (USA) | M. Lusk (USA) | J. Rice (USA) | M. Zikry (USA) |

HELLENIC PARTICIPATION

| | | | | | | |
|-----------------|----------------|----------------|-------------------|--------------------|--------------------|----------------|
| I. Antonopoulos | D. Beskos | Y. Dafalias | I. Hadjidemetriou | S. Logothetidis | D. Panayiotounakos | I. Vardoulakis |
| N. Aravas | A. Bountis | G. Exadaktylos | A. Kounadis | A. Mamalis | D. Sotiropoulos | A. Varias |
| P. Argyrakis | G. Contopoulos | E. Gdoutos | G. Lianis | P. Panagiotopoulos | P. Theocharis | P. Vavrotsos |

Posters: P. Andriotaki, N. Hatzitritofon, A. Konstantopoulos, A. Liolios, K. Moutsopoulos, K. Papoulia, Z. Riga, H. Stipounzis, G. Kanellis et al., Th. Karakostas et al., Ch. Massalas et al., Ch. Tzimopoulos et al.

Local Committee: A. Konstantinidis, I. Mastorakos, G. Efremidis, Z. Kehagia-K. Kalaitzidou, M. Avlonitis/N. Litosatos, I. Eleftheriadis-I. Tsagrakis, S. Papargyri

ORGANIZERS

- ▶ **Laboratory of Mechanics and Materials, Aristotle University of Thessaloniki,**
GR - 54006, Thessaloniki, Hellas, Tel & Fax : 30/31 995921, e-mail : mom@mom.gen.auth.gr
- ▶ **Center for Mechanics of Materials and Instabilities, Michigan Technological University,**
Houghton, MI 49931, USA, Tel : 906/487-1518, Fax : 906/487-2282, e-mail : mom@mtu.edu



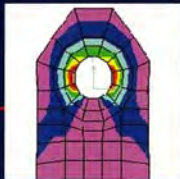
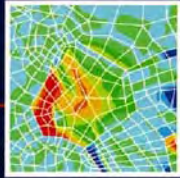
HELLENIC SOCIETY FOR
THEORETICAL & APPLIED
MECHANICS (HSTAM)

Member of the International Union of
Theoretical and Applied Mechanics

ARISTOTLE UNIVERSITY
OF THESSALONIKI
(AUT)



Polytechnic School
Laboratory of Mechanics and Materials



6th NATIONAL CONGRESS ON MECHANICS

THESSALONIKI, July 19-21, 2001

Dedicated to the memory of late
Professor and Academician P.S.Theocaris

CHAIRMAN SHIP : E. C. Aifantis

HONORARY CHAIRMEN : G. Lianis, A. Armenakas.

HSTAM COUNCIL : A. Kounadis (President), J. Katsikadelis (Vice - President), D. Beskos (General Secretary), A. Vakakis (Treasurer), I. Vardoulakis, A. Mavraganis, D. Panayotounakos, H. Georgiadis, V. Koumoussis, G. Papadopoulos, M. Papadrakakis.

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LOCAL ARRANGEMENTS COMMITTEE : *Section of Mechanics* - A. Ambatjidis, E. Douka, M. Matsikoudi, S. Papargyri, *Graduate Students* - F. Akintayo, G. Efremidis, K. Kosmidis, K. Kalaitzidou/S. Marras, I. Mastorakos, P. Sapalidis, *Undergraduate Students* - T. Atmakidis, D. Dodou.

RESEARCH AREAS : Mechanics of deformable solid bodies, structural mechanics, fluid mechanics, theoretical mechanics and mathematical methods, computational mechanics and numerical methods, experimental mechanics and measurements, geomechanics, biomechanics, wave mechanics and solitons, fracture and defects, micromechanics and microstructures, materials : composites, polymers, ceramics.

AUT, Polytechnic School, Lab. of Mechanics and Materials, Box 468, GR 540 06 Thessaloniki, GREECE Tel: +30-31-995923, Fax: +30-31-995921, Email: cong2001@vergina.eng.auth.gr <http://mech3.gen.auth.gr>

SPONSORS: GENERAL DEPARTMENT OF POLYTECHNIC FACULTY/ ARISTOTLE UNIVERSITY' S RESEARCH COMMITTEE / MINISTRY OF EDUCATION AND RELIGIOUS AFFAIRS/ DEMOKRITOS UNIVERSITY OF THRACE/ POLYTECHNIC FACULTY



5th EUROMECH SOLID MECHANICS CONFERENCE

ESMC - 5

August 17-22, 2003, AUT, Thessaloniki, GREECE

Coordinator: E.C. Aifantis

ESMC COMMITTEE

- *Chair*: B.A. Schrefler (I)
- *Members* : A. Benallal (F), J. Botsis (CHE), N. Fleck (UK), I.G. Goryacheva (RUS), M. Langseth (NOR), M. Okrouhlik (CZ), M. Potier-Ferry (F), F.G. Rammerstorfer (A), H. Ulbrich (DE)

CONFERENCE THEMES

Continuum Mechanics: Elasticity/Plasticity/Waves, Structural Mechanics: Plates/Shells/Vibrations, Experimental and Computational Mechanics, Mechanics of Materials: Fracture/Damage/Composites, Micromechanics and Nanomechanics, Geomechanics and Biomechanics, Manufacturing and Contact Mechanics, Impact and Penetration Mechanics, Nonlinear and Probabilistic Mechanics, Other Topics in Mechanics: Smart Materials and Systems; Dynamics and Stability; Optimization and Control

GENERAL / PLENARY LECTURES

- C. Polizzotto (I): Unified thermodynamic framework for nonlocal/gradient continuum theories
- A. Romanov (RUS): Mechanics and physics of disclinations in solids
- S. Roux (F): Effective toughness of heterogeneous brittle materials
- P. Suquet (F): Intraphase strain heterogeneity in nonlinear composites: A computational approach
- F.D. Fischer (A): Twins, their development and growth
- D. Gross (D): Configurational forces and their application in solid mechanics
- J. Plešek (CZ): Geometric framework for incremental constitutive equations
- N. Jones (UK): Several phenomena in structural impact and structural crashworthiness
- The EUROMECH Solid Mechanics Prize Lecture: Strain controlled deformation- and stress-states

CONFERENCE SYMPOSIA

- Advanced Modeling of Heterogeneous Materials -Homogenization/Generalized Continua
- Mechanics and Physics of Microstructures / Nanostructures - Size effects
- Vibration, Identification and Control of Dynamical Systems
- Nonlocal Plasticity - Continuum vs. Discrete Formulations
- Mechanical Behavior of Woven Structures: Fabric and Other Reticulated Media

MINI SYMPOSIA

- Identification Problems for Materials and Structures
- Dislocation and Disclination Models for Work Hardening and Failure
- Configurational Mechanics
- Environmental Effects in Fracture and Material Degradation
- Mechanical Modeling in Natural Hazards
- Petroleum Geomechanics - From Theory to Industrial Applications

Laboratory of Mechanics and Materials, Faculty of Engineering, Box 468,
Aristotle University of Thessaloniki (AUT), GR 54124 Thessaloniki, GREECE
Tel.: +30-2310-995923, FAX: +30-2310-995921, Email: esmc2003@mom.gen.auth.gr, <http://mech3.gen.auth.gr>



19th Panhellenic Conference/Summer School

NONLINEAR SCIENCE AND COMPLEXITY

Thessaloniki, July 10 – 22, 2006

Complexity, or the “study of complex systems” has emerged as a new science - often called Nonlinear Science - from the need to understand complicated problems of the Natural and Social Sciences. These problems generally involve many coupled variables and are characterized by **unpredictable time evolution and/or highly intricate spatial patterns**. In recent years, efforts to solve such problems have concentrated upon the use of analytical and numerical methods of **Nonlinear Dynamical Systems, Chaos Theory and Fractal Geometry**.

Organizing Scientific Committee: T. Bountis (Patras), E. Aifantis (Thessaloniki)

Invited Speakers: E. Aifantis (Thessaloniki), I. Antoniou (Thessaloniki), A. Bezerianos (Patras), T. Bountis (Patras), G. Contopoulos (Athens), R. Dworak (Vienna), J. Hadjidemetriou (Thessaloniki), K. Hizanidis (Athens), S. Ichtiaroglou (Thessaloniki), C. Jung (Cuernavaca), P.G.L. Leach (Durban), N. Lygeros (Lyon), I. Nicolis (Patras), S. Pnevmatikos (Patras), A. Provata (Athens), M. Robnik (Maribor), G. Tsironis (Heraklion), A. Vakakis (Athens), J.P. Van der Weele (Patras), L. Vlachos (Thessaloniki).

Funded by: Ministry of Culture, Ministry of Education, Aristotle University of Thessaloniki

Contact Information:

- Prof T. Bountis (Chairman) Department of Mathematics - CRANS, University of Patras Patras 26110 Phone/Fax +30 2610 997381 bountis@math.upatras.gr , tassos50@otenet.gr
- Prof E. Aifantis, General Department, Engineering School, University of Thessaloniki, Thessaloniki 54006, Phone/Fax: +30 2310 995921, mom@mom.gen.auth.gr
- **Homepage:** <http://web.auth.gr/nonlinear/>

CULTURAL EVENT (Monday, July 17th):

Part I: Complexity in Politics/Ethics/Societies, Main Amphitheater, Polytechnic School, AUT.

A. Dimitropoulos (Athens), N. Lygeros (Lyon), P. Savvidis (Thessaloniki), K. Zouraris (Thessaloniki), H.-P. Rossmanith (Vienna).

Part II: Voice/Music/Theater, Macedonian Museum of Contemporary Art, Hellexpo, Thessaloniki.

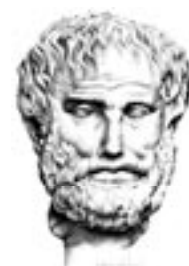
Part IIA: Voice, Music

- Savina Yannatou – Solo Voice
- Theodore: Modern–Classic/Jazz
- Filippos/Orestis/Elias: Sounds like Music – Alternative Rock/Electonica

Part IIB: Theater

The Apology of Socrates (Translation of Plato by Electra Andreadi)

- Loukas Skipitaris/Broadway Veteran Director
- Yannis Simonides/Emmy Award Winning Actor
- Theoni Aldredge/Academy (Oscar) Award Winning Costume Designer
- Caryn Heilman/Master Percussionist



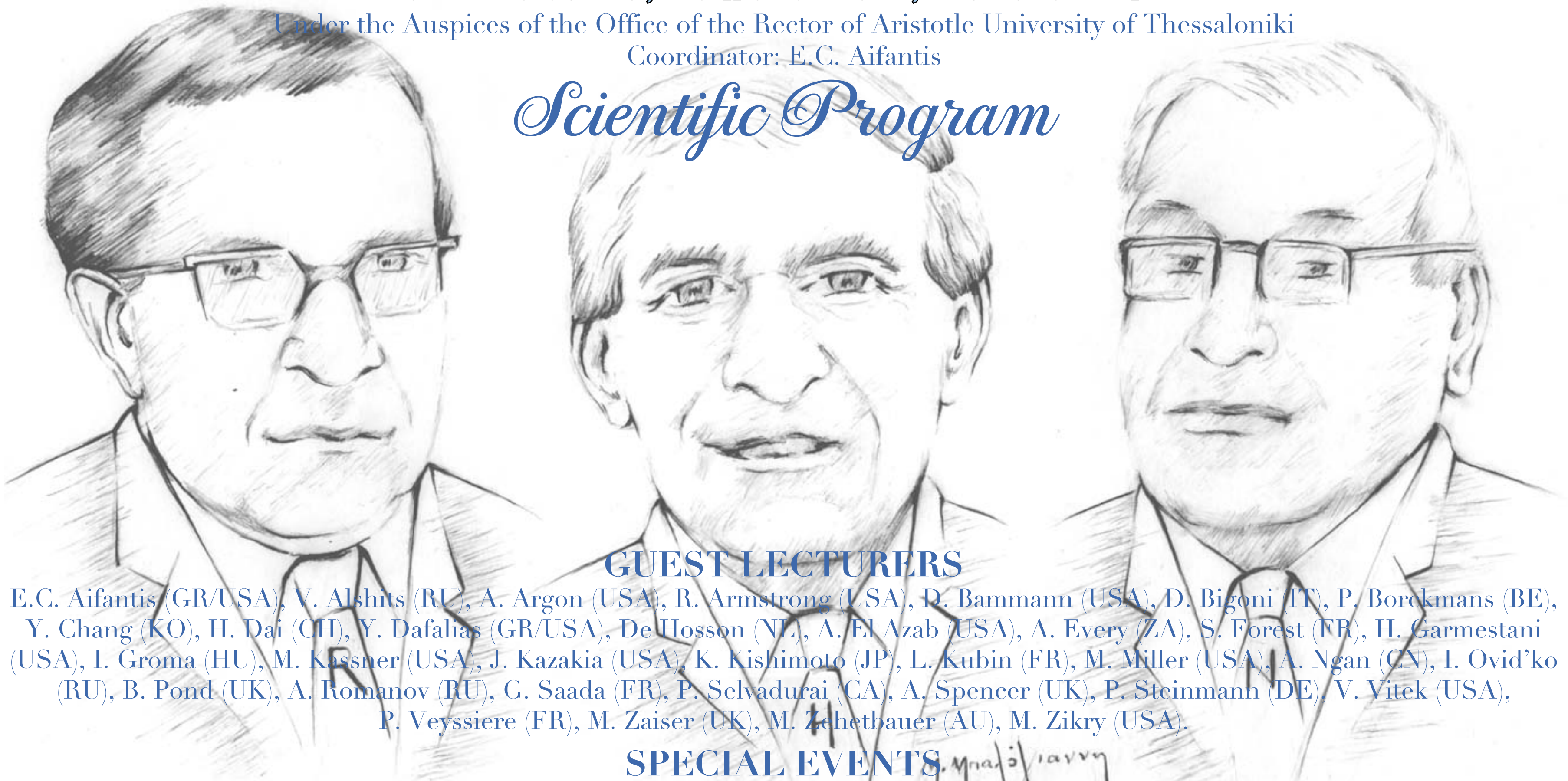
1ST WORLD SYMPOSIUM ON MULTISCALE MATERIAL MECHANICS AND ENGINEERING SCIENCES

April 29 - May 2, 2007, AUT, Thessaloniki, GREECE

**Dedicated to the Memory of
Frank Nabarro, Edward Hart, Ronald Rivlin**

Under the Auspices of the Office of the Rector of Aristotle University of Thessaloniki
Coordinator: E.C. Aifantis

Scientific Program



GUEST LECTURERS

E.C. Aifantis (GR/USA), V. Alshits (RU), A. Argon (USA), R. Armstrong (USA), D. Bammann (USA), D. Bigoni (IT), P. Borekmans (BE), Y. Chang (KO), H. Dai (CH), Y. Dafalias (GR/USA), De Hosson (NL), A. El Azab (USA), A. Every (ZA), S. Forest (FR), H. Garmestani (USA), I. Groma (HU), M. Kassner (USA), J. Kazakia (USA), K. Kishimoto (JP), L. Kubin (FR), M. Miller (USA), A. Ngan (CN), I. Ovid'ko (RU), B. Pond (UK), A. Romanov (RU), G. Saada (FR), P. Selvadurai (CA), A. Spencer (UK), P. Steinmann (DE), V. Vitek (USA), P. Veyssiere (FR), M. Zaiser (UK), M. Zehetbauer (AU), M. Zikry (USA).

SPECIAL EVENTS

- **FINAL EU/RTN DEFINO MEETING:** Deformation and Fracture Instabilities in Novel Materials and Processes
- **SUMMER SCHOOL:** Multiscale Material Mechanics & Engineering Sciences: From Macro to Nano Scales

Cultural Program

1 May 2007; Aithousa Teleton AUT; 7:00 p.m.

Exhibition : Authentic Ancient Hellenic Musical Instruments

Performances : From Ancient Hellenic to Modern Electronic Music

- Genuine Ancient Hellenic Musical Pieces / Orchestra of Ancient Hellenic Instruments
- Orphic-Carnatic-Byzantine Hymns / F. Papadodima • Modern Electronic Tunes / SLM

Theater : Plato's Apology of Socrates

- Y. Simonides / Emmy Award Winning Actor

Art-Science-Technology-Society Interactions

2-3 May 2007; Main Amphitheater, Polytechnic School, AUT; 7:00 p.m.

May 2 Workshop I: The Ancient Hellenic Architecture and Technology

- Prehistoric Aegean Architecture and Culture – Akrotiri Thera / C. Palyvou
- The Antikythera Mechanism-Calculator of the Hellenistic Period / J. Seiradakis

May 3 Workshop II: The Scientist's Humane and the Human's Cosmological Perspective

- Elementary Particles and Microcosmology / G. Lazarides
- Humanism and Science / A. Strano

SPONSORS

- Aristotle University of Thessaloniki (Office of the Rector, Office of the Dean of Engineering, General Department, Research Committee)
- University of Groningen (Department of Applied Physics, Zernike Institute for Advanced Materials)
- Hellenic Ministries of Education and Religious Affairs (EPEAEK), Culture *, Macedonia-Thrace *
- Municipality of Thessaloniki, Prefecture of Thessaloniki *
- Netherlands Institute for Metals Research, Corus Res. Development & Technology (NL),
- MIRTEC SA (GR), National Technical University of Athens, Technical University Crete *, CERTH *
- Wits, Cornell, Lehigh, Georgia Tech, Michigan Tech
- Academy of Athens, Institute of Physics/IoP, Institute "Aristotelis"

* pending

More information can be found in the web site (<http://web.auth.gr/NabarroHartRivlin>)

1st IC4N - 2008

1st International Conference
from *Nanoparticles & Nanomaterials* to *Nanodevices & Nanosystems*

www.uta.edu/ic4n

Halkidiki, Greece June 16-18, 2008

IC4N@uta.edu

CALL FOR PAPERS!

IMPORTANT DATES

ABSTRACTS
MARCH 31, 2008
ACCEPTANCE
APRIL 15, 2008
EARLY REGISTRATION
APRIL 30, 2008
MANUSCRIPTS
JUNE 16, 2008

PUBLICATION

Papers may be published in:

- *J Nano Research*
- *J Mech. Beh. Materials*
- *J Nanoscience Nanotechnology*
- *Advanced Science Letters*
- *Inter. J Modern Physics B*
- *J Comp. Theor. Nanoscience*

An elite volume with the Plenary Lecture, Keynote/Invited Lectures, and the abstracts of contributed talks/posters is planned.

Publication Committee

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U. Patras, Greece
W. Schommers
FZK, Germany
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Organizers

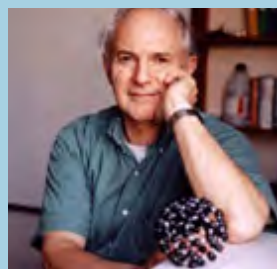
E.I. Meletis *U. Texas-Arlington, US* **E.C. Aifantis** *Aristotle U., GR* **E. Kaxiras** *Harvard U., US*
MTU, US

Dear Colleague,

We invite you to contribute an oral or poster presentation to IC4N-2008. World leaders in nanoscale science and engineering will address and discuss current state of the art, barriers to progress, and future rewarding research. These issues can have an unprecedented global impact on science and technology, as well as human health, energy, and our environment.

On behalf of the organizers,
Professor Stathis I. Meletis,
University of Texas at Arlington

Plenary Lecture:
Nobel Laureate 1996
Professor, Sir H.W. Kroto
Mechanisms of Self Assembly
at Nanoscale Dimensions



Keynote Lectures:

R.Z. Valiev - (Ufa/RU) *On Bulk Nanomaterials*
B.I. Yakobson - (Rice/US) *On Carbon Nanotubes*
A.E. Romanov - (Ioffe/RU) *On Nanodeformation and Nanodefects*
J. Bush - (MIT/US) *On Surface Tension in Nanobiology*

Conference Topics:

- **Fundamentals:** Theory/ Experiments/ Simulations
- **Nanomaterials:** Synthesis/Characterization/Properties
- **Nanoobjects:** Nano -particles, -wires, -tubes, -sheets
- **Nanomodeling:** Nano-mechanics/-electronics/-biology
- **Nanoapplications:** Energy/Environment/Medical
- **Nanofabrication & Nanomanufacturing**
- **Nanodevices & Nanosystems**
- **Mini-Symposia on New Directions**
- **The Gerberich Symposium on Nanoindentation**

Local Arrangements Committee

K.E. Aifantis, S. Anastasiadis, P. Argyrakos, M. Arsenakis, G. Dimitrakopoulos, A. Giannakoudakis, I. Karapanagiotis, P. Koidis, G. Konstandopoulos, A. Konstandinidis, G. Kourouklis, S. Panas, E.K. Polychroniadis, V. Rothos, T. Yioulitis

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ARISTOTLE
UNIVERSITY
of Thessaloniki





2nd WORLD SYMPOSIUM ON MULTISCALE MATERIAL MECHANICS & ENGINEERING SCIENCES

*Under the Auspices of the
Office of the Rector of Aristotle University of Thessaloniki (AUT)
Department of Mathematics, Physical and Computational Sciences (AUT)
Center for the Mechanics of Material Instabilities and Manufacturing Processes (MTU)*

Coordinator: E.C. Aifantis

• *Honorary Doctoral Degree Recipients*

21 May 2009, Main Aula (Aithousa Teleton), AUT, 12 pm

Gerard Maugin (University Pierre and Marie Curie, Paris)

From Phase Transformation Fronts to the Growth of Long Bones – An Introduction

Constantino Tsallis (Centro Brasileiro de Pesquisas Fisicas, Brazil)

*Aristotelian Metaphor, Caratheodory Thermodynamics, and Nonextensive Statistical
Mechanics - An Epistemological Promenade*

• *Music - Science / Technology Interactions*

Musical Event

21 May 2009, Main Aula (Aithousa Teleton), AUT, 7 pm

Coordinator-Conductor: Th. Antoniou, Piano Soloist: V. Stylianos, Ensemble: Idee Fixe

- *Theodore Antoniou: Duo for clarinet and Bayan
Celebration Xc*
- *Elias Aifantis: Sounds Like Music I&II*
- *William Antoniou: Right in 7*
- *Antonis Anestis: April Quintet*
- *Leontios Hadjileontiadis: Silent TransVoices*
- *Savvas Tsiligiridis: Emvolimon*

• *New Science & Engineering in Mechanics & Thermodynamics*

22 May 2009, Senate Hall, AUT, 9 am

*E.C. Aifantis (GR), K. Aifantis (GR), H. Askès (UK), D. Bammann (USA),
H. Dai (China), S. Forest (France), J. Goddard (USA), Gerard Maugin (France),
P. Podio-Guidugli (Italy), P. Steinmann (Germany), Q. Sun (China), C. Tsallis (Brazil)*



ARISTOTLE UNIVERSITY OF
THESSALONIKI (AUT)

MICHIGAN TECHNOLOGICAL
UNIVERSITY (MTU)



INTERNATIONAL WORKSHOP ON ENGINEERING EDUCATION PERSPECTIVES A BALKAN CASE-STUDY

University Senate Auditorium: Karatheodory Administration Building, AUT

31 May – 1 June 2010

Feature Lecture

S. Baloyiannis (AUT)

*On the Philosophy of Neurosciences and Education:
From Classical Greece and Byzantine Era to Modern Times*

International Participation

- *G. Djordjevic*, Univ. Nis-Physics/SEENET-MTP Executive Director
- *T. Perry*, ASME Director, Education & Professional Development
- *D. Sumarac*, Univ. Belgrade-Civil/President Serbia Chamber of Engineering (Former Minister)
- *R. Warrington*, Michigan Tech/Director Pavlis Institute
- *A. Warrington*, MTU-Pavlis Institute
- *W. Wepfer*, Georgia Tech/Chair ME & ASME – VP Engineering Education

Hellenic Participation

*K. Aifantis (AUT/MTU-ERC), A. Avdelas (AUT), E. Iakovou (AUT), G. Grouios (AUT),
S. Kourkoulis (NTUA), J. Markopoulos (AUT), N. Moussiopoulos (AUT), I. Mylopoulos (AUT),
G. Pavlos (DUTH), E. Sidiropoulos (AUT), E. Varella (AUT), A. Zabaniotou (AUT)*

Coordinator: E.C. Aifantis

Under the Auspices of the

Office of the Rector of Aristotle University of Thessaloniki (AUT)

Office of the Dean of Engineering (AUT)

Department of Mathematics, Physical and Computational Sciences (AUT)

Center for the Mechanics of Material Instabilities and Manufacturing Processes (MTU)

TOPICS/FOCUS

- DIFFERENT EMPHASIS WILL BE GIVEN EACH YEAR IN SELECTED TOPICS. THIS YEAR'S INTRODUCTORY LECTURES WILL FOCUS ON:
 - (I) CONTINUUM MECHANICS AND STRUCTURAL DEFECTS ACROSS THE SCALE SPECTRUM;
 - (II) NANOSCIENCES AND NANOTECHNOLOGIES FOR ADVANCED INFRASTRUCTURE ENGINEERING, ENERGY, BIOMEDICINE AND ENVIRONMENT, AS WELL AS
 - (III) GENERAL PUBLIC LECTURES ON SCIENCE/TECHNOLOGY - ART & SOCIETY INTERACTIONS.

- CULTURAL EXCURSIONS WILL ALSO TAKE PLACE.

LECTURERS/STUDENTS

LECTURERS WILL INVOLVE INTERNATIONALLY RENOWNED PROFESSORS AND SCIENTISTS IN US, EU AND THE INCO COUNTRIES. EMPHASIS WILL BE PLACED IN THE BALKAN REGION DUE TO THESSALONIKI'S GEOGRAPHICAL LOCATION AND CULTURAL HERITAGE. THIS YEAR WE EXPECT 4-5 STUDENTS (ADVANCED UNDERGRADUATES/BEGINNING GRADUATES) FROM US, AN EQUAL NUMBER FROM SERBIA/MOLDOVA, ONE STUDENT FROM CHINA AND ABOUT 10 STUDENTS FROM EU, ALONG WITH SOME ATTENDANCE OF ADVANCED DOCTORAL STUDENTS AND POSTDOCS OF AUT. THE TOTAL NUMBER OF STUDENTS WILL BE LIMITED TO 20.

COURSE DURATION/CREDITS

THERE WILL BE 30 HOURS AND A TAKE HOME EXAM, FOLLOWED BY A PROJECT TO BE COMPLETED BY THE END OF YEAR. THIS WILL BE EQUIVALENT TO 2-3 CREDITS OF COURSE WORK IN STANDARD US CURRICULA. A CERTIFICATE WILL BE GIVEN AT THE END OF THE COURSE WITH A DESCRIPTION OF THE LECTURES/SEMINARS TOPICS AND PROJECT.

THEMATIC AREAS

- 1) FUNDAMENTALS IN ENGINEERING AND PHYSICAL SCIENCES
- 2) NANOSCIENCES & NANOTECHNOLOGIES: APPLICATIONS TO CONSTRUCTION, MANUFACTURING, ENERGY/ENVIRONMENT & HEALTH
- 3) NEW HORIZONS ON SCIENCE/TECHNOLOGY - ART & SOCIETY INTERACTIONS

LECTURES:

- AIFANTIS E.C./MATERIAL MECHANICS, THESSALONIKI/GR - HOUGHTON/US
- BAMMANN D./MATERIAL MECHANICS, STARKVILLE/US
- CANTER V./CONDENSED MATTER PHYSICS, CHISINAU/MD
- GROUIOS G./PHYSICAL EDUCATION, THESSALONIKI/GR
- KOIDIS P./DENTAL SCHOOL, THESSALONIKI/GR
- ROMANOV A./METAL PHYSICS - MATERIALS SCIENCE, ST. PETERSBURG/RU
- SIDIROPOULOS E./RURAL ENGINEERING, THESSALONIKI/GR
- SIETTOS C./SCHOOL OF APPLIED MATHEMATICS & PHYSICAL SCIENCES, ATHENS/GR
- SUMARAC D./CIVIL ENGINEERING, BELGRADE/YU

SEMINARS:

- DIMITRAKOPULOS G., HATZISTYLIANOU M., KALOGIROU O., KONSTANTINIDIS A., KATSIFARAKIS K., ROTHOS V., SOTIROPOULOS S. & YIOULTSIS T., THESSALONIKI/GR
- AIFANTIS K., THESSALONIKI/GR - HOUGHTON/US
- STRATAKIS E. & TSIBIDIS G., HERAKLION/GR
- PAVLOS G., XANTHI/GR
- KOLESNIKOVA A., ST. PETERSBURG/RU
- RUSSO L., NAPLES/IT



AUT



TAMU



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Summer School on

Multiscale Material Mechanics and Engineering Sciences

Curricula Interfacing
and Innovation

21-30/8/2010@Epanomi / Greece



Epanomi

Under the Auspices of:

Aristotle University (AUT), Michigan Tech (MTU), Texas A&M (TAMU),
Mississippi State (MSU), University of Belgrade (UoB),
Moldova Academy of Sciences (ASM) and Municipality of Epanomi

Saturday, August 21

9:00 – 9:30 Welcome

Elias Aifantis, Aristotle University/GR

Despo Lialiou, Vice Rector of Academic Affairs

Apostolos Oikonomidis, Mayor of Epanomi

9:30 – 12:30 Elias Aifantis/Material Mechanics,

AUT/GR & MTU/US: *Multiscale Material Mechanics: An Introduction*

12:30 – 14:00 Lunch Break

14:00 – 17:00 Doug Bammann/Material Mechanics,

Mississippi State/US: *Internal Variable Theory: An Introduction*

Georgios Tsibidis, Applied Mathematics,

FORTH/GR: *Heat Transfer Mechanisms due to Interaction of Short*

and Ultrashort Pulsed Lasers with Matter & Investigation of Binding

Mechanisms of Nuclear Proteins by using Reaction-diffusion Equations

Sunday, August 22

9:00 – 12:00 Alexey Romanov/Metal Physics - Materials

Science, Ioffe Physical - Technical Institute/RU: *Defect Theory*

Across Scales: Dislocations & Disclinations

12:00 – 14:00 Lunch Break

14:00 – 17:00 Georgios Dimitrakopoulos/Solid State

Physics - TEM, AUT/GR: *Nanoscale Science of Compound*

Semiconductors by Transmission Electron Microscopy and Simulation

Methods: Towards Energy-efficient Opto-electronic Emitters

Emmanuel Stratakis/Laser Physics - AFM,

FORTH/GR: *Biomimetic Artificial Micro/Nano Structured Surfaces*

for Microfluidic and Tissue Engineering Applications

Monday, August 23

9:00 – 12:00 Costas Siettos, Engineering Sciences - Simulations,

NTUA/GR: *Handling Complexity: Equation-Free Multiscale*

Computations with Applications to Material Science,

Epidemiology and Neuroscience

12:00 – 14:00 Lunch Break

14:00 – 17:00 Lucia Russo/Chemistry - Nonlinear Science,

National Research Council of Italy/IT: *Model Reduction of*

Multiscale Dynamical Systems and Inertial Manifold Theory

George Pavlos/Engineering Physics, Demokritos

University/GR: *Complexity in Science and Civilization: An*

Introduction to the Complexity Theory

20:00 – 21:00 General Public Lecture

John Seiradakis/Astronomy and Mechanics,

AUT/GR: *The Antikythera Mechanism - Calculator of the Hellenistic*

Period

Tuesday, August 24

9:00 – 12:00 Valeriu Canter/Condensed Matter Physics,

Moldova Academy of Sciences/MD: *Plasmonics: Bridge Between*

Nanoscale Electronics and Microscale Photonics

12:00 – 14:00 Lunch Break

14:00 – 17:00 Traianos Yioultsis/Electrical Engineering,

AUT/GR: *Computational Methods in Electromagnetics and Photonics*

Sotiris Sotiropoulos/Chemistry, AUT/GR:

Introduction to Electrochemical Science and Technology:

Microelectrodes in Electroanalysis and in Probing Chemical Reactivity

Wednesday, August 25

9:00 – 12:00 Dragoslav Sumarac/Civil Engineering, University

of Belgrade/YU: *Cyclic Plasticity with an Application to Very Low*

Cycle Fatigue for Antiseismic Design

12:00 – 14:00 Lunch Break

14:00 – 17:00 Epaminondas Sidiropoulos/Rural Engineering,

AUT/GR: *Neural Networks and Genetic Algorithms in Water*

Management

Konstantinos Katsifarakis/Civil Engineering,

AUT/GR: *Flow Simulation and Optimal Management of Groundwater*

Resources: The Balance Between Accuracy and Computational

Efficiency

Thursday, August 26

9:00 – 12:00 Elias Aifantis/Material Mechanics,

AUT/GR & MTU/US: *Nanomechanics: Applications to Engineering*

Sciences

Alexey Romanov/Metal Physics - Materials

Science, Ioffe Physical - Technical Institute/RU: *Nanomaterials:*

Applications to New Technologies

Valeriu Canter/Condensed Matter Physics,

Moldova Academy of Sciences/MD: *Nanophysics: Applications to*

Nanothermoelectricity for Thermal Management of Devices and

Energy Conversion

12:00 – 14:00 Lunch Break

14:00 – 17:00 Katerina Aifantis/Material Mechanics,

AUT/GR & MTU/US: *Nanomechanics: Applications to Energy Storage*

and Biomedicine

Anna Kolesnikova/Applied Physics, Institute of

Problems of Mechanical Engineering/RU: *Nanoscale Elasticity:*

Solution to Boundary Value Problems

Friday, August 27

9:00 – 12:00 Epaminondas Sidiropoulos/Rural Engineering,

AUT/GR: *Introduction to Genetic Algorithms and related Biologically*

inspired Methods

12:00 – 14:00 Lunch Break

14:00 – 17:00 Avraam Konstantinidis/Material Mechanics,

AUT/GR: *Wavelets, Neural Networks and Stochasticity in Mechanics*

Vassilios Rothos/Mathematics, AUT/GR:

Coherent Structure in Nonlinear Media: An Introduction

20:00 – 21:00 General Public Lecture

Stavros Baloyiannis/Medical School,

AUT/GR: *The Contribution of Hellenic Thought Throughout the*

Centuries, from Ancient to Modern Times

Saturday, August 28

9:00 – 12:00 Georgios Groivos/Physical Education, AUT/GR:

The Imperfect Organism: On the Concept of Fluctuating

Asymmetry and its Significance in Humans, Non-Human Living

Organisms and Plants

12:00 – 14:00 Lunch Break

14:00 – 16:00 Maria Hatzistylianou/Medical School, AUT/GR:

An Introduction to the Immune System with Potential

Nanomaterial Applications

Sunday, August 29

9:00 – 12:00 Petros Koidis/Dental School, AUT/GR:

An Introduction to Applications of Materials Science & Mechanics

in Dentistry

12:00 – 14:00 Lunch Break

14:00 – 16:00 Orestis Kalogirou/Physics, AUT/GR:

Biomedical Applications of Magnetic Nanoparticles

Monday, August 30

9:00 – 12:00 Round Table / Closure - Future



AUT



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MTU



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List of Students attending the Summer School

A. International Participation

| No | Name | Institute | Status | Background | Attendance | Origin/Gender |
|----|--------------------|----------------------|-------------|-----------------------|------------|------------------|
| 1 | Brent Volk | Texas A&M/US | PhD Student | Civil Engineering | Full | USA (male) |
| 2 | Krishna Bharadwaj | Texas A&M/US | PhD Student | Civil Engineering | Full | India (male) |
| 3 | Frank Gardea | Texas A&M/US | PhD Student | Civil Engineering | Full | USA (male) |
| 4 | Swapnil Chandratre | Texas A&M/US | PhD Student | Civil Engineering | Full | India (male) |
| 5 | Barladean Oleg | State U. Moldova/MD | PhD Student | Telecom. Engineering | Full | Moldova (male) |
| 6 | Sergiu Draguta | Techn. U. Moldova/MD | PhD Student | Physics | Full | Moldova (male) |
| 7 | Ghincul Olga | Techn. U. Moldova/MD | PhD Student | Telecom. Engineering | Full | Moldova (female) |
| 8 | Zorana Golubovic | Univ. of Belgrade/RS | PhD Student | Mechan. Engineering | Full | Serbia (female) |
| 9 | Zoran Perovic | Univ. of Belgrade/RS | PhD Student | Civil Engineering | Full | Serbia (male) |
| 10 | Xu Zhang | Huazhong U./CN | PhD Student | Engineering Mechanics | Full | China (male) |

B. EU Participation

| No | Name | Institute | Status | Background | Attendance | Origin/Gender |
|----|----------------------|-----------|---------------|------------------------|------------|---------------|
| 1 | George Sofianidis | AUT/GR | PhD Student | Physical Education | Full | Greece (male) |
| 2 | Anthimos Pavlidis | AUT/GR | Undergraduate | Civil Engineering | Full | Greece (male) |
| 3 | Stavros Aggelis | AUT/GR | Undergraduate | Electrical Engineering | Full | Greece (male) |
| 4 | Avraam Tsitlakidis | AUT/GR | MS Student | Medical School | Full | Greece (male) |
| 5 | Alexandros Louizos | AUT/GR | PhD Student | Medical School | Full | Greece (male) |
| 6 | Prodromos Liamadis | AUT/GR | MS Student | Materials Science | Full | Greece (male) |
| 7 | Andreas Kourelis | AUT/GR | Graduate | Biology | Full | Greece (male) |
| 8 | Elias Fridas | AUT/GR | Graduate | Biology | Full | Greece (male) |
| 9 | Kyriakos Ekmektoglou | AUT/GR | Undergraduate | Civil Engineering | Full | Greece (male) |
| 10 | Andreas Reppas | NTUA/GR | PhD Student | Applied Mechanics | Full | Greece (male) |
| 11 | George Spyropoulos | FORTH/GR | Graduate | Materials Science | Full | Greece (male) |

Other Attendees: Femi Akintayo (PhD Graduate/Nigeria), Dimitris Tragoudaras (PostDoc/Greece), George Petsos (PostDoc/Greece), Lazarus Tenekezis (PostDoc/Greece), Kostas Kantelis (MS Student/Greece)



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'I got a degree at 19, PhD at 21'

Katerina Aifantis is passionate about science.

She passed her degree at 19, and was awarded a PhD in natural sciences and mathematics at the age of 21.

Her studies took her from Michigan Tech in the US, to Cambridge University, UK, and then to the University of Groningen in the Netherlands.

Dr Aifantis is one of the first recipients of a new funding programme for "exceptional" researchers who chose to work in Europe.

Now 24, she is the youngest recipient of one of the first European Research Council (ERC) starting grants. She will use the grant to spearhead a research programme studying mechanisms that exist at very small scales in the "tiny world" of nanotechnology.

The aim of the work is to develop new applications of nanotechnology in the field of biomedicine, such as miniature batteries for brain implants designed to treat diseases such as Parkinson's.

Such devices would apply a current to dead nerves, and help activate parts of the brain that have been damaged, she says.



Dr Aifantis: developing new theories in the nanoworld

“ I met this beautiful community in science and I really wanted to be a part of it ”

Katerina Aifantis

"I have to apply a new theoretical framework in order to capture what goes on in the nanoscale," she says.

She credits her precocity with growing up in a scientific environment - her father is a scientist working in the field of mechanics, who was surrounded by Nobel Prize winners.

"I met this beautiful community in science and I really wanted to be a part of it," she explains. "I also wanted to see exactly what he was doing so that motivated me to go fast in my studies."

At 16, she was given the opportunity to enrol at Michigan Tech by her High School principal.

She passed her degree in engineering at 19, then went to Cambridge University in the UK for her PhD. She was supervised by the applied mathematician, Professor John

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Willis.

"He let me go straight ahead into research instead of making me take courses and following the traditional path," she says.

Although she finished her dissertation within a year, she was unable to submit for a PhD at Cambridge because rules stipulate a minimum of three years of study.

"John Willis and I thought that I could transfer to a different university in Europe that has no time requirements," she explains.

She moved to the University of Groningen, which was doing similar experiments, and became the Netherland's youngest PhD ever, aged just 21.

"I guess I was very blessed in having wonderful people to support me, and also both my father and my mother were very supportive of my love for science," she says.

Her advice to other young scientists is to surround themselves by supportive mentors who will help them do something new in the field. "Motivation is the main thing," she adds.

She says the ERC starting grant helps ambitious young scientists who want to focus on their research.

"Because I went very fast, and I got my PhD when I was 21, I was looking for something challenging to do," she says.

"It's just something amazing for us young people wanting to start out dynamically," she adds.

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New European agency introduces internationally competitive funding for basic research

Some 300 young researchers are receiving roughly €1 million apiece in a new strategy to strengthen Europe's research base through broader competition.

Just a few months into a postdoc at Harvard University, Katerina Aifantis is leaving for greener pastures: She is headed for Aristotle University in Thessaloniki, Greece, where, with more than €1 million (\$1.5 million) over five years from the European Research Council, she hopes to nucleate a nano-mechanics center.

Aifantis is one of roughly 300 awardees among more than 9000 applicants in the ERC's first grant competition. The agency announced the winners of the "starting grants"—intended to jump-start careers—in February, around the time of its first birthday. Says ERC president Fotis Kafatos of Imperial College London, "We are not looking for the sure bets, we are looking for the most visionary and interesting bets that we feel have a reasonable chance of success."

"Added value"

The ERC marks the beginning of European funding for basic research; traditionally, basic research has been the purview of national funding agencies, and the European Commission—which launched the ERC—supported applied and industrial research. Starting grants went to researchers in the physical sciences and engineering (45%), life sciences (40%), and the humanities (15%).

"About 10 years ago, some of us involved in science, especially in life science, got together and said we needed strong support for research at the European level, as well as at the national level, to focus on top-quality research," says Kafatos, who at the time was director of the European Molecular Biology Laboratory in Heidelberg, Germany. By involving all of Europe, rather than just one country, he adds, "you sharpen the competition. If you are in a small country, and you and your friends are the only excellent scientists in a field, it's stagnant."

In political circles, however, "the prevailing orthodoxy was that we didn't need an ERC," Kafatos continues, noting that the surprise support of



Katerina Aifantis with Janez Potočnik, the European commissioner for science and research.

the UK's then science minister David Sainsbury in 2004 was key. "On his way to a meeting of the council of ministers, he read the brief [prepared by his aides] and background documents. He called his aides to ask why he was supposed to vote 'no.'" Unsatisfied with the answer, Sainsbury voted yes. "The fact that the UK was in favor was not expected: It was the spark that got everyone enthusiastic," says Kafatos.

The ERC's budget of €7.5 billion for 2007–13 comes directly from the European Commission, not from member states. "This is important because otherwise they'd say, 'This is my money, I want it back,'" says Kafatos. "There was no political interference," adds Ernst-Ludwig Winnacker, the ERC's secretary general and former president of Germany's main research agency. "It's really bottom up. Nobody told us to fund some fashionable things. Nobody said, 'Take care of the Baltic states.' For this the [European Union] has other programs." Anyone may apply for ERC funding; the only requirements are that the work be based at a research institution in Europe or a

paying associate member country such as Israel or Turkey and, for the starting grants, researchers must be two to nine years post-PhD. The ERC will also award money to established researchers, via its "advanced grants," for which applications were due over the past few weeks.

"The idea was to create added value, not copy what the national agencies do," says Winnacker. The ERC offers larger grants generally, and more money to junior scientists, than do most national agencies. "There are very bleak perspectives in many European countries for junior scientists," Winnacker says. "And most scientists tend to be quite conservative if it comes to changing their funding strategies. They don't jump onto projects where the probability of getting funding is lower. So the [ERC grants] create a lot of independence. We hope to get people to discontinue what they do and come up with something risky."

Best performance

Winning an ERC grant landed Sander Woutersen a job. "It's so prestigious that the University of Amsterdam offered me a permanent position," says Woutersen, a physicist who uses laser techniques to study protein folding. "It's a large amount of money and personnel, a big responsibility, so I wrote a proposal that was a mixture of safe and risky parts. I want to make sure my two PhD students get results and can write articles." The "risky" aspect, he adds, will be "to try new experimental methods. Many time-resolved methods that should be sensitive to protein conformation have not as yet been investigated."

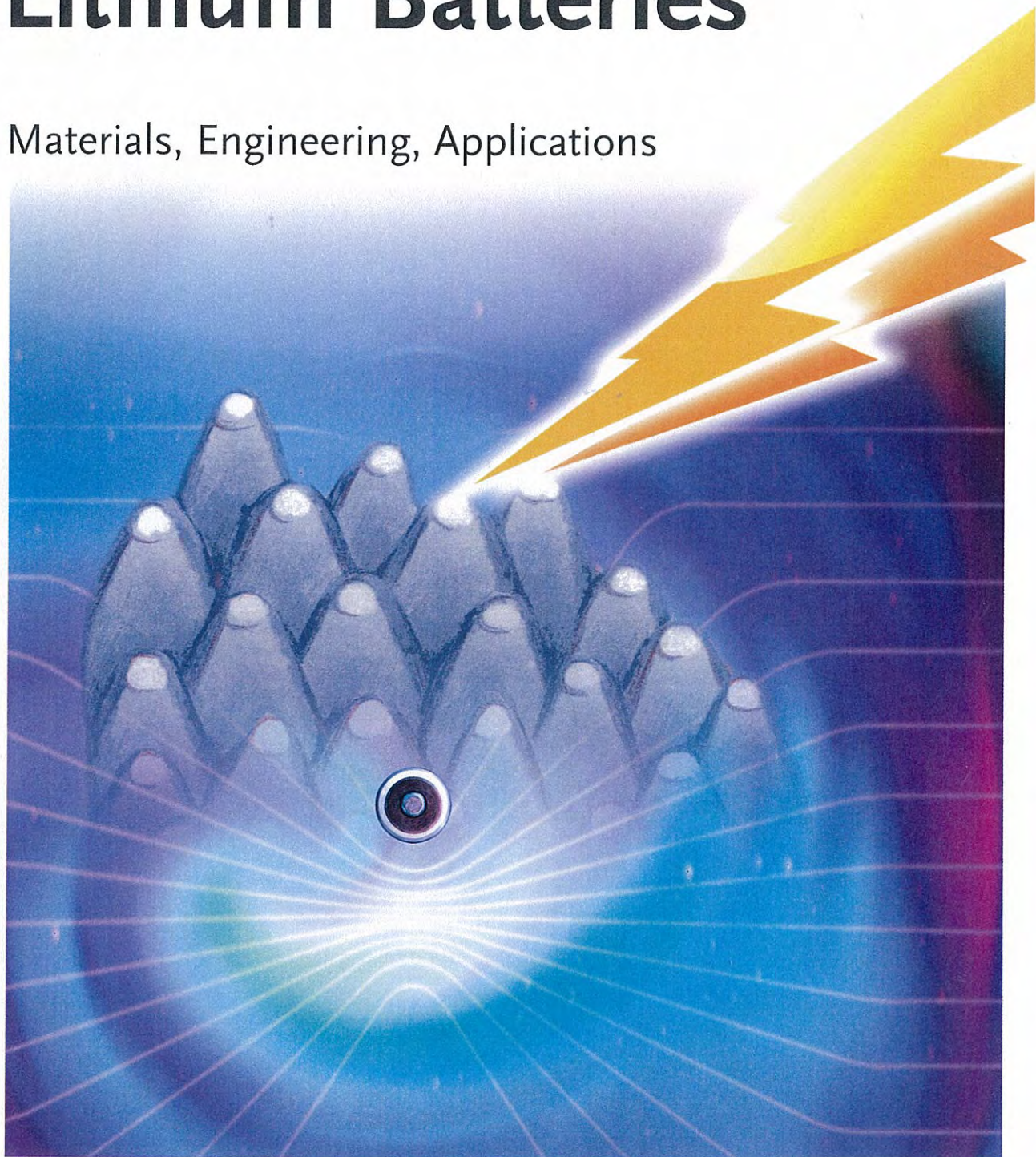
For her part, Aifantis—at 24 the youngest recipient of an ERC starting grant—is working on making smaller, less fracture-sensitive lithium batteries. "What's of interest is to make anodes with higher capacities," she says. "I am working on a theoretical framework to help develop design criteria. This will help predict what materials will be the

Edited by K. E. Aifantis,
S. A. Hackney, and R. V. Kumar

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High Energy Density Lithium Batteries

Materials, Engineering, Applications





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Thermodynamics applied to gradient theories involving the accumulated plastic strain: The theories of Aifantis and Fleck and Hutchinson and their generalization

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ABSTRACT

We discuss the physical nature of flow rules for rate-independent (gradient) plasticity laid down by Aifantis and by Fleck and Hutchinson. As a central result we show that:

- the flow rule of Fleck and Hutchinson is incompatible with thermodynamics unless its nonlocal term is dropped. If the underlying theory is augmented by a general defect energy dependent on γ^p and $\nabla\gamma^p$, then compatibility with thermodynamics requires that its flow rule reduce to that of Aifantis.

We establish this result (and others) within a general framework obtained by combining a virtual-power principle of Fleck and Hutchinson with the first two laws of thermodynamics—balance of energy and the Clausius–Duhem inequality—under isothermal conditions.

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1. Introduction

Conventional plasticity theories cannot characterize standard experimental results exhibiting size effects such as that summarized by the assertion: “smaller is stronger”.² And while conventional theories can characterize the onset of localization, they cannot address issues associated with the attendant instabilities, issues such as the wave length of ensuing oscillations and the thickness of shear bands.³ To model such inherently size-dependent phenomena requires a theory with one or more material length scales, and—apparently—the earliest attempt at a plasticity theory with a material length scale is contained in the seminal work of Aifantis who—working within the framework of small deformations—proposed the flow rule⁴

$$\tau = S(\gamma^p) - \beta\Delta\gamma^p, \quad (1.1)$$

obtained by essentially adding the term $-\beta\Delta\gamma^p$ to the conventional flow rule $\tau = S(\gamma^p)$. Here $S(\gamma^p)$ and β are strictly positive,

$$\Delta = \text{div } \nabla$$

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² Cf., e.g., Fleck et al. (1994) and Hutchinson (2000).

³ Cf. e.g., Aifantis (1984, 1987, 2003), Mülhaus and Aifantis (1991) and De Borst and Mülhaus (1992).

⁴ Aifantis (1987, Eq. (99)). Cf. also Aifantis (1984, Eq. (31)) (which is one space dimension and contains a typo).

SIPS



AIFANTIS INTERNATIONAL SYMPOSIUM

Multiscale Material Mechanics and Multiphysics and Sustainable Applications
[International Symposium on Multiscale Material Mechanics in the 21st Century]
ANTALYA, TURKEY, 4 - 9 October 2015



Dr. **Florian Kongoli** (CEO at FLOGEN Technologies Inc., USA/Canada: www.flogen.com), Professor **Stephane Bordas** (University of Luxembourg, Luxembourg: hdl.handle.net/10993/19425) and Professor **Yuri Estrin** (Monash University, Australia: www.eng.monash.edu.au/materials/about/people/profile/estriny), who are organizing the **Aifantis International Symposium** (Intl. Symp. on Multiscale Material Mechanics in the 21st Century) / www.flogen.org/sips2015/Multiscale, are kindly inviting you to join their symposium which will be held from 4-9 October 2015 at the all-inclusive extravagantly modern Cornelia Diamond Golf Resort and SPA in Antalya, Turkey: www.corneliadiamond.com/hotels.asp?hotelID=3&lang=EN

The abstract submission session is now open: www.flogen.org/sips2015/abstract_submission.php?step=1. You can find the steps on how submitting it here: www.flogen.org/sips2015/?gid=73

This major symposium is in honor of the distinguished work and lifetime achievements of Prof. Elias C. Aifantis. Professor Aifantis is a well-known figure for his deep impact in **multiscale material mechanics and multiphysics processes**, especially in their application for developing sustainable new technologies. He is author of almost 600 scientific papers. Throughout his career, his activity has impacted various fields, such as:

- Spatio-Temporal Instabilities in Deformation and Fracture
- Fracture Instabilities in Novel Materials and Processes
- Degradation and Instabilities in Geomaterials with Application to Hazard Mitigation
- Stress-assisted diffusion theories for hydrogen embrittlement and stress corrosion cracking
- Flow through double porosity media theories with applications to consolidation and subsidence in geomaterials
- Relocation of Maxwell's line and the derivation of transition, reversal and periodic solutions for fluid interfaces.
- First gradient plasticity theory to predict the thickness of shear bands and eliminate the mesh-size dependence of FE calculations in the strain softening regime
- Nanostructured materials; nanomechanics; dislocation patterning and material instabilities.
- Gradient elasticity (GradEla) model to eliminate singularities from dislocation lines and crack tips

The symposium is organized on the occasion of his 2 anniversaries in the same year: His age anniversary (he becomes 65 in October 2015) and scientific anniversary (in 2015 he reaches 40 years of continuous scientific contributions). Reflecting this rich activity, the symposium will feature plenary, keynote and invited lectures on multiscale material mechanics and multiphysics processes with applications ranging from modern engineering science and technology to biology and medicine. Additional lectures from young scientists and engineers are encouraged in related interdisciplinary research fields. These may include metals and alloys, polymers and composites, geomaterials and biomaterials, as well as novel materials in thin film and bulk configurations for high energy density storage, optoelectronics and biomedicine applications. Advanced multiscale models on elasticity, viscoelasticity, plasticity, and damage, as well as coupled thermomechanical, chemomechanical, electromechanical, and optomechanical theories are desirable.

Contributed Lectures and Posters are also invited on general material mechanics and material physics topics, such as: Generalized Continuum Mechanics; Gradient Elasticity; Gradient Viscoelasticity; Gradient Plasticity; Gradient Damage; Nanomechanics; Material Instabilities; Defects in Solids; Diffusion in Solids; Phase Transformations in Solids; Dislocation Patterning; Shear bands, Twins, Size Effects; Metals, Polymers, Ceramics; Soils, Rocks, Concrete; Novel Materials, Thin Films; Electronic, Magnetic, Thermoelectric, Photonic Materials; Cellular Materials, Metallic Glasses; Nanomaterials, Nanocomposites; High Density Energy Storage Materials; Biomaterials, Bio-inspired Materials; Material Fabrication/Forming Mechanics; Fracture Mechanics; Computational Mechanics; Stochastic Mechanics; Geomechanics; Biomechanics; Thermomechanics; Chemomechanics; Electromechanics; Magnetomechanics; Optomechanics; Discrete vs. Continuous Media Modeling; Fractal Media, Fractional Material Mechanics.

Specific thematic symposia are planned as follows:

- **Dislocation Patterning** organized by Professors Zaiser, El-Azab and Groma
- **Size Effects in Plasticity: from Small to Meso Scale** organized by Professors Ngan, De Hosson and Maas
- **Gradient Plasticity** organized by Professors Voyiadjis, Bammann and Zbib
- **Gradient Elasticity** organized by Professors Askes, Isaksson and Gutkin
- **Defects in Solids** organized by Professors Romanov, Ovidko and Capalungo
- **Multiscale Coupled Computational Continuum Mechanics** organized by Professors Bordas, Forest and Goddard
- **Experimental Nanomechanics** organized by Professors Chasiotis, Espinosa and Korsunsky

Round Table Discussion

A round table discussion open to everyone interested will be organized at a specific date and time with high level representatives of various technologies and industries to debate freely and without reservations all sensitive issues of all existing technologies identifying positive, neutral and negative points of all technologies in terms of sustainability.

You can find the flyer of the symposium here: www.flogen.org/sips2015/pdf/Aifantis_web.pdf

Contributed articles will be doubled peer-reviewed and will be published in Conference Official Proceedings having an ISBN and an ISSN number. Selected contributed articles will also be published in the Journal of Mechanical Behavior of Materials and other ISI Mechanics of Biomaterials/Biomaterials Journals.

An inspiring event with Prof. Dan Shechtman will serve as the "Curtain-Opening" event of the Summit (Sunday afternoon/evening, 4 October 2015) entitled "**Technological Entrepreneurship - Key to Sustainable World Peace and Prosperity**"



Besides being the 2011 Nobel Laureate in Chemistry, Professor Shechtman is known as one of the Pioneers of Technological Start-up Revolution (Financial Times, 2012). It is an inspiring accounting on his experience on the role of technological entrepreneurship on the sustainable world peace and prosperity with rich advises for success drawn from successful entrepreneurs he helped train.

You are kindly invited to actively participate, and we are looking forward to meeting you in the magnificent Cornelia Diamond Golf Resort and SPA in Antalya, one of the most beautiful beaches in the world.

Best Regards

Organizing Committee

2015 - Sustainable Industrial Processing Summit

symposiums@flogen.org

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SIPS 2015 tackles key sustainability issues

In early October 2015, the excellent SIPS 2015 (Sustainable Industrial Processing Summit) was held in Antalya, Turkey. *Copper Worldwide* attended the event, which included many key presentations and discussions on state of the art non-ferrous metal processing technologies. The level of awareness of the global climate situation, the detail and length to which speakers at this event had prepared, and the active engagement of the 500 or so delegates, were testament to the ability of organiser Flogen Star Outreach, in particular Dr. Florian Kongoli. The aim of SIPS 2015, as with previous well-attended Flogen Symposia, was to bring together and invigorate a diverse and talented global Scientific Community under a common purpose, that of furthering the technological innovation in resource processing and stewardship.



Dr. Florian Kongoli presenting Lord John Prescott with the 2015 Shechtman International Leadership Award (Photo: Flogen)

The Sustainable Industrial Processing Summit incorporated 23 symposia covering the entire cycle of metals and materials science from mining, extraction, processing, manufacturing, recycling, waste treatment, environmental, health, legal, management, policy, taxation and social issues. Five symposia were dedicated to the lifetime achievements of:

- *Prof. Elias Aifantis* – 2015 honoree with Aifantis International Symposium on Multiscale Material Mechanics and Multiphysics and Sustainable Applications
- *Prof. Heinrich Wilhelm Gudenau* – 2015 honoree with Gudenau International Symposium on Sustainable Iron and Steel Making
- *Prof. John Meech* – 2015 honoree (postmortem) with Meech International Symposium on Sustainable Mining Operations
- *Prof. Cyro Takano* – 2015 honoree with Takano International Symposium on Sustainable Metals & Alloys Processing
- *Prof. Andrey V. Vanyukov* – 2015 honoree (postmortem) with Vanyukov International Symposium on Sustainable Non-ferrous Smelting and Processing

The honorees cover areas of materials sciences that look distinct but are actually related to each other and all have in common sustainability. Plenary sessions included presentations from many scientific personalities and among them a presentation from 2011 Nobel Laureate in Chemistry, Prof. Dan



Key SIPS 2015 speakers were (l to r) Prof. Aifantis, Lord John Prescott, Ei-ichi Negishi, Prof. Gudenau, Prof. Dan Schechtman, Prof. Takano, with Dr. Florian Kongoli, Organiser

Schechtman about the challenges of materials science and engineering, a presentation of 2010 Nobel Laureate in Chemistry, Ei-ichi Negishi about the help that metals give to organic life, as well as a powerful address from Lord John Prescott, House of Lords UK, about his view of sustainability issues.

During the event the winners of two FLOGEN AWARDS were announced. The 2015 Fray International Sustainability Award went to: Ei-ichi Negishi, Purdue University, USA, 2010 Nobel prize in Chemistry; Elias Aifantis, Michigan Tech. University USA and Aristotle University, Greece; Cyro Takano, University of Sao Paulo, Brazil; Heinrich W.

Gudenau, RWTH Aachen Germany; and Queiroz Galvão Group, Brazil. The 2015 Shechtman International Leadership Award went to Lord John Prescott, House of Lords, UK (Deputy Prime Minister of UK, 1997-2007).

Many previous FLOGEN AWARDS winners have got further subsequent high recognition. They include:

- *Stephane Dion*, recipient of FLOGEN 2011 Fray International Sustainability Award in the category of politics, who recently became Foreign Minister of Canada.
- *Oscar Gonzalez Rocha*, CEO of Southern Copper Corporation, recipient of FLOGEN 2014 Fray International Sustainability Award in the category of corporations, was

honoured in 2015 as Copper Man of the Year and received the Ankh Award from The Copper Club in New York City. Supporters of FLOGEN, NASA Astronaut Hon. Marc Garneau and Justin Trudeau became in 2015 Minister of Transport and Prime Minister of Canada respectively.

Many positive comments were received about SIPS 2015, including from Prof. Brajendra Mishra (AIME, TMS) – “One of the most well-organised meetings I have attended”, and Julien Rethore, INSA Lyon – “My best conference this year”. The SIPS 2016 venue is being decided during November 2015 and will be announced shortly.

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