# Curriculum Vitae : ELIAS C. AIFANTIS/ECA

**Last Update : January 2019**

Professor Emeritus: College of Engineering, Aristotle University, Thessaloniki, GR-54124, Greece

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## ■Personal Data

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

*Home 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 2000-10; Emeritus Professor 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)
- TSU/Togliatti State University, Russia: Invited Foreign Lead Scientist/Director: International Laboratory - MegaGrant project on "Fabrication and Study of Advanced Functional Metallic Materials with Extremely High Density of Defects" - Ministry of Education and Science of Russian Federation, 2017-2018

## ■Academic Distinctions

- Distinction for the fastest (2 years) PhD without a Master in the State of Minnesota, 1975
- Distinction for the youngest (at the age of 31) Full Professionship in the State of Michigan, 1982
- 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 55$^{th}$ 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 Univ., Chengdu-China, 2014
- Aifantis International Symposium honoring his 65th birthday, 4-9 October, 2015, Antalya/Turkey
- Fray International Sustainability Award (along with Nobel Laureate El-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
- Winner of MegaGrant Award for World's leading Scientists to Supervise Govermental Research Centers of the Russian Federation, 2017
- Mercator Fellow, "FRASCAL - Fracture Across Scales", University of Erlangen, Nurnberg, 2018

**■Teaching and Research**

- *Undergraduate Courses* in Statics and Dynamics; Strength and Mechanics of Materials; Elasticity and Visoelasticity; 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) MIS 5045454: "Material Instabilities, Size Effects, and Morphogenesis: Nanomaterials and Brain", 2018-2019; ~ 72,000 Euros
- *PI:* Hellenic Foundation for Research and Innovation (HFRI) MIS 5005134: "Nano-chemo-mechanics in Deformation and Fracture: Theory and Applications in LiBs and SGS", 2018-2019; ~ 63,000 Euros

- *PI-Director:* 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 milion Rubbles
- *PI-Coordinator:* Multi-investigator EU project H2020-MSCA-RISE-2016 No. 734485: "Fracture Across Scales and Materials, Professes and Disciplines/FRAMED", 2017-2021; ~ 1 million Euros
- *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:* EU project H2020-MSCA-RISE-2018 No 824022, "Atomistic to Molecular to Bulk Turbulence/ATM2BT", 2019-2023; ~ 299,000 Euros
- *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)**

- *Coordinator/Partner* 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 latest 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* (Kaizerslautern/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**;** *Keynote Lecture in Material Science and Technology (MS&T)*, October 14 – 18 2018, Columbus/US**;** *Keynote Lecture in 4th Russia-Japan International Symposium on Advanced Materials (RJISAM IV)*, 6 December 2018, Kumamoto/Japan.

- *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 Penninsula/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*; E.C. Aifantis, Shechtman-Suresh Convocation and Honorary Symposium,* 30 November – 3 December 2018, Thessaloniki/Greece.

- *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*: *~10670* times/*52* h-index (ISI); *~11500* times/*53* h-index (Scopus); *~17860* times/*66* 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: 835, Scopus: 920; Google Scholar: 1379; 4th most cited article of the Journal];

E.C. Aifantis, The physics of plastic deformation, Int. J. Plasticity 3, 211-247 (1987). [ISI: 605, Scopus: 657; Google Scholar: 988; 8th 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: 505, Scopus: 561; Google Scholar: 828; 8th 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: 920/Scopus, 835/ISI, 1379/Google Scholar]

**2.** *E.C. Aifantis*, The physics of plastic deformation, Int. J. Plasticity 3, 211-247 (1987). [Citations: 657/Scopus, 657/ISI, 988/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: 561/Scopus, 505/ISI, 828/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, 480/ISI, Google Scholar not listed]

**5.** *E.C. Aifantis*, Update on a class of gradient theories, Mechanics of Materials 35, 259-280 (2003). [Citations: 300/Scopus, 272/ISI, 374/Google Scholar]

**6.** *E.C. Aifantis*, Strain gradient interpretation of size effects, Int. J. Fract. 95, 299-314 (1999). [Citations: 346/Scopus, 271/ISI, 482/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: 208/Scopus, 183/ISI, 306/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: 247/Scopus, 221/ISI, 353/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: 215/Scopus, 211/ISI, 280/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: 242/Scopus, 233/ISI, 350/Google Scholar]

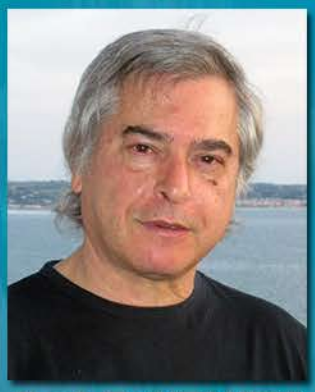
**11.** *E.C. Aifantis*, On the problem of diffusion in solids, Acta Mechanica 37, 265-296, 1980. [Citations: 231/Scopus, 193/ISI, 377/Google Scholar]

**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: 313/Scopus, 282/ISI, 410/Google Scholar]

### ■*Research Topics Pioneered by ECA in Books 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 Coincise Historical Perspective, Springer, 2013).

# 2015 :: SUSTAINABLE INDUSTRIAL PROCESSING SUMMIT & EXHIBITION



Prof. E. AIFANTIS

## AIFANTIS INTERNATIONAL SYMPOSIUM

**Multiscale Mechanics and Multiphysics of Solids Across Materials, Processes and Scales.**

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; Experimental Mechanics; Fracture Mechanics; Computational Mechanics; Stochastic Mechanics; Geomechanics; Biomechanics; Thermomechanics; Chemomechanics; Electromechanics; Magnetomechanics; Optomechanics; Discrete vs. Continuous Media Modeling; Fractal Media, Fractional Material Mechanics

**Nobel Laureates Opening Event**

Technological Entreprenership

Metals Helping Life

Dan SHECHTMAN
2011
Nobel Prize in Chemistry

Ei-ichi NEGISHI
2010

**4 - 9 October 2015,**
**Cornelia Diamond**
**Antalya, Turkey**

**FLOGEN**
STAR OUTREACH

**Florian Kongoli**
CEO & President
Flogen Technologies
Canada / USA

**Stephane Bordas**
Professor
Univ. of Luxembourg
Luxembourg

**Yuri Estrin**
Professor/Director
Monash Univ.
Australia

**Check Website for important dates**

**Summit WebSite**: www.flogen.org/sips2015 **Contact**: Dr Florian Kongoli(fkongoli@flogen.org)
**Phone**: 1-514-344-8786 Toll Free: 1-877-2-FLOGEN (Within North America) **Fax**: 1-514-344-0361

# 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 Shechtman 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.

*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*

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.

**www.flogen.org/sips2015/**