# Curriculum Vitae


## Emmanuel Stratakis

**PhD, Physics**

**Institute of Electronic Structure and Laser**

**Foundation for Research and Technology Hellas**



**Heraklion, 21-09-2017**

# Emmanuel Stratakis

Research Director, Group leader of Ultrafast Laser Micro- and Nano- Processing Lab
Institute of Electronic Structure and Laser (IESL)
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**Researcher ID page:** http://www.researcherid.com/rid/B-5365-2011
**Google Scholar page:** http://scholar.google.gr/citations?user=LEmHpTIAAAAJ&hl=en
**Research Gate page:** https://www.researchgate.net/profile/Emmanuel_Stratakis

## 1. EDUCATION

**Ph.D**. in Physics, Department of Physics, University of Crete, Greece, 2001.
Title: "Photoinduced metastable phenomena in Hydrogenated amorphous Silicon. The role of microstructure, from amorphous to microcrystalline material".
**M.Sc.** in Condensed matter Physics, Department of Physics, University of Crete, Greece, 1997.
**B.Sc.** in Physics, Department of Physics, University of Crete, Greece, 1995.

## 2. PROFESSIONAL EXPERIENCE

**Application Scientist**, **FORTH-IESL**, Laser and Applications Division, Heraklion, Greece (2007 – present)
**Leader** of Ultrafast Laser Micro- and Nano- processing laboratory of IESL-FORTH (2007 – present)
**Adjunct Professor, University of Crete**, Materials Science and Technology Department, Greece. (2001 – present)
**Visiting Researcher, University of California, Berkeley**, Department of Mechanical Engineering, California, USA (Fall 2008)
**Postdoctoral Researcher, University of California, Berkeley**, Department of Mechanical Engineering, California, USA (Fall 2006)
**Postdoctoral Researcher, FORTH-IESL**, Amorphous Materials Laboratory (2003 – 2005).

## 3. DISTINCTIONS AND SCHOLARSHIPS

**Member of the COST Scientific Committee:** http://www.cost.eu/about_cost/who/(type)/6/(alpha)/S
**National Expert at the Programme Committee implementing H2020 Configuration NMBP Horizon 2020:** Configuration- 'Nanotechnologies, Advanced materials, Biotechnology, Advanced manufacturing and processing' (2014 – present)
**National Representative for the Horizon 2020:** National Delegate of the Shadow committee for the Horizon 2020 on: Nanotechnologies, Advanced materials, Biotechnology, Advanced Manufacturing and Processing. (2013 – 2014)
**Member of the Editorial Board,** *Applied Sciences, section 'Optics and Lasers'*
**Guest Editor** of the Special Issue "Biomimetic and Functional Materials, *International Journal of Molecular Sciences*.
**Manager (on behalf of FORTH-IESL)** of the NFFA-EUROPE Research Infrastructure, funded under the H2020-European Research Infrastructures Call.

**Manager (on behalf of FORTH-IESL)** of the Satellite Laboratory of the EU-NCL Research Infrastructure, funded under the H2020-European Research Infrastructures Call.

**National Representative and Management Committee Member** of the COST Actions MP0902, IC1208, MP1307, MP1302.

**FORTH representative in the Working Team** '*Energy'* of the Regional Council for Innovation of Crete Region (2013 – 2014)

**Student Award,** State Scholarship Foundation, (1992-1994).

**Scholar**, National Scholarship Foundation, Microelectronics – Optoelectronics Graduate Program, EPEAEK. Scholarship for PhD, (1997-2001).

## 4. RESEARCH INTERESTS

- Ultrafast laser micro/nano processing techniques.
- Biomimetic laser processing.
- Laser-processed nanomaterials for organic electronics.
- Ultrafast laser synthesis and diagnostics of Graphene and related 2D materials.
- Laser engineering of biomaterials for tissue engineering and neuroelectronic applications.

## 5. ACHIEVEMENTS

- **~124 SCI publications** in international peer-reviewed journals, **~11 conference papers** in peer-reviewed journals, ~**15** publications in **conference proceedings**, **10 chapters** in scientific books, **11 review articles**, **1 monograph**.
- **3501 citations**, **h-index**: **32** (Source: Web of Science, 21/09/2017)
  **4530 citations**, **h-index**: **38, i-10-index: 97** (Source: Google Scholar, 21/09/2016)
- **2 patents**.
- **Academic and Research Excellence in Higher Education**: '*Smart and Responsive Surfaces'* CTI "Diophantus", Greek Ministry of Education (**Co-investigator**)
- **5 Cover Pages** in *Advanced Functional Materials, Advanced Optical Materials, Advanced Energy Materials, Nanoscale, ChemNanoMat*
- **Documentary** on biomimetic surfaces *'Genious of nature'*, Film Produced by Terra Mater Factual Studios in co-production with BBC.
- **Coverage** by **Public and Scientific Media** including: *Oxford Scientific films, SPIE Newsroom*, *VIMA Science*, *Frost and Sullivan, RSC highlights in Chemical Science, APS news, Materials Views etc.*
- **22 Invited Talks, 1 Plenary Lecture, 3 Keynote Lectures** in international conferences, **8** invited talks in academic institutions, **3** invited talks in special workshops.
- **Lecturer** in **8** Summer Schools
- **Principal** and Co-**Investigator** in **21** European Research Projects, (**12** running).
- **Evaluator** for National (NSF-USA, China, Italy, France, Belgium, Romania, Czech Republic), European (FP7, ERANET) and private funded Research Proposals (Fondazione Cariplo).
- **Referee** in high impact international scientific journals including *Nature-Light:Science and Applications*: *Nanoletters, ACS Nano*, *Advanced Materials*, *Biomaterials*, *Advanced Functional Materials, Physical Review B, Nanoscale, Nature-Scientific Reports, Optics Express, Optics Letters, Applied Physics Letters, Nanotechnology*.
- **Organizer and Co-organizer** of **3** conferences and **3** workshops.
- **Chairperson** in **12** international conferences.
- **Supervised 4** PhD, **12** MSc theses and **23** BSc diploma works.
- **Currently supervising 6** PhD candidates, **8** MSc candidates and **5** BSc diploma works, and **co-supervising 2** PhD candidates.

## 6. FUNDED RESEARCH PROJECTS

**Total Budget as PI: ~ 3.5 MEuros:** In particular:

1. **MouldTex: HORIZON 2020 FOF-06-2017, GA 768705**: *FRICTION OPTIMISATION OF SEALS THROUGH ADVANCED LASER SURFACE TEXTURING OF MOULDS (2017-2021).* FORTH Budget 580,000 Euro, Total Budget: 5,133,000 Euros – **Project Manager and Coordinator for FORTH.**
2. **NFFA-EUROPE Infrastructure, GA 654360: H2020-European Research Infrastructures, INFRAIA-1-2014-2015** '*Nanoscience Foundries & Fine Analysis*', FORTH Budget 770,000 Euro, Total Budget: 11,600,000 Euros – **Project Manager and Coordinator for FORTH.**
3. **LiNaBioFLuid: 'HORIZON 2020 FET OPEN, GA 665337** *'Laser-Induced Nanostructures as Biomimetic Model of Fluid Transport in the Integument of Animals'* FORTH Budget 490,000 Euro – Total Budget: 3,000,000 Euros: **Project Coordinator.**
4. **LASERLAB-EUROPE Infrastructure, GA 654148: H2020-European Research Infrastructures, INFRAIA-1-2014-2015** '*Integrated Initiative of European Laser Research Infrastructures*' FORTH Budget 430,000 Euro – Total Budget: 10,000,000 Euros: **WP Coordinator for FORTH.**
5. **LASERLAB-EUROPE Infrastructure:** '*The Integrated Initiative of European Laser Research Infrastructures I*, INFRA-2011-1.1.19 LASERLAB III GA 284464 (2012-2015),' Budget 425,000 Euro – **WP Coordinator for FORTH.**
6. **NANoREG 2:** *'Development and implementation of Grouping and Safe-by-Design approaches within regulatory frameworks'* **HORIZON 2020, GA n.646221. Budget 50,000 Euro – Total Budget: 10,000,000 Euros: Project Manager for FORTH-IESL.**
7. **3D NEUROSCAFFOLDS**: '*3D Scaffolds hosting neural stem cells: developing Neuroimplants and Neurobiosensors' Funding of proposals positively evaluated in the third announcement of ERC Grant Schemes*', Greek Ministry of Education (2012-2015), **Budget 1,037,000 Euros, Co-Principal Investigator.**
8. **LAG NP**: '*Laser-assisted generation of functionalized metallic nanoparticles*' Grant Agreement No. 226164 - ERANET-RUS Innovation (2012-2014), **Budget 120,000 Euro - Principal Investigator**
9. **OPTBIO**: "*Advanced Optical Techniques in Bio-imaging and Bio-processing*", FP7–INFRASTRUCTURES–2008-1. (2009-2013) **Budget 200.000 Euro – Co-Investigator**
10. **KRIPIS BIOSYS:** *ΑΝΑΠΤΥΞΗ ΔΙΕΠΙΣΤΗΜΟΝΙΚΩΝ ΕΡΕΥΝΗΤΙΚΩΝ ΔΡΑΣΤΗΡΙΟΤΗΤΩΝ ΣΤΗΝ ΚΑΤΕΥΘΥΝΣΗ ΤΗΣ ΒΙΟΛΟΓΙΑΣ ΣΥΣΤΗΜΑΤΩΝ (2013-2015)* Greek Ministry of Education (2012-2015) **Budget: 270,000 Euro - Principal Investigator**.
11. **ΠΑΛΑΙΟΣΟΙΝΟΣ:** *'Αξιολόγηση και βελτιστοποίηση των παραγόντων παλαίωσης ερυθρών και λευκών οίνων από Κρητικές ποικιλίες'. Παραγωγή οίνων προστιθέμενης ποιοτικής αξίας*' Programm Thales, Greek Ministry of Education (2012-2015), University of Crete, Dept. of Chemistry. **Budget: 190,000 Euro, Co-investigator.**
12. **SMARTSURF,** *'Smart Multi-functional Polymer Surfaces'*, ARISTEIA II Action, Greek Ministry of Education (2012-2015), **Budget: 396,000 Euro, Co-investigator.**
13. **FLEXFED:**'*Flexible Field Emission Elements Based on Micro/Nano Graphitic Nanostructure'* Action Archimedes III, Greek Ministry of Education, (2012-2014), **Budget: 100,000 Euro, Co-investigator.**
14. **Erasmus Lifelong Learning Programme:***'Organic Electronic and Applications' (2013-2015)* 539876-LLP-1-2013-1-GR Erasmus-**EQR, Budget: 50,000 Euro - Principal Investigator**.
15. **KRIPIS PROENYL:** *ΠΡΟΗΓΜΕΝΑ ΕΝΕΡΓΕΙΑΚΑ ΥΛΙΚΑ* (2013-2015) **Budget 800,000 Euro, Co-investigator.**

## 7. CONFERENCES ORGANIZATION

1. **International Conference:** 2010 Villa Conference on Interaction Among Nanostructures (VCIAN-2010), June 21-25 2010, Santorini, Greece. (http://www.oanano.org/vcian)

2. **International Conference:** Energy Materials and Nanotechnology meeting 2012, April 16-20 2012, Orlando Florida (http://emnc.org/vcian). **Co-Chair** of the Villa Conference on Plasmonic Materials (VCPM).
3. **Workshop: Recent Advances in Biophotonics,** October 7-8 2009 Delphi, Greece. Supported by the FP6 ToK NOLIMBA "Non Linear Imaging at Microscopic Level for Biological Applications" (http://www.ico-photonics-delphi2009.org/)
4. **Member of the organizing Committee. EMRS 2013 FALL Symposium G**: Bioinspired and Biointegrated Materials as Frontiers Nanomaterials III September 16-20 (2013) Warsaw, Poland.
5. **Co-Organizer: Workshop on Biophotonics,** October 2-3 (2013), Hersonissos, Crete, Greece.
6. **Principal Organizer: Final Workgroup, Management Committee and Evaluation Meetings** of the COST Action MP0902-COINAPO, October 12-16, (2013) Heraklion Crete Greece.
7. **Principal Organizer: EMRS 2014 Falls Symposium U**: Bioinspired and Biointegrated Materials as Frontiers Nanomaterials IV September 15-19 (2014) Warsaw, Poland.
8. **Principal Organizer: 1st Israel-Greece Joint Meeting on Nanotechnology and BioNanosciene:** October 19-21 (2014), Weizmann Institute of Sciences, Rehovot Israel.
9. **Principal Organizer: 2nd Israel-Greece Joint Meeting on Nanotechnology and BioNanosciene:** October 25-28 (2016), Heraklion, Crete, Greece.
10. **Principal Organizer: Workshop on 'Organic Photovoltaics: From Materials to Market'**, part of the Industrial Technologies Conference, Athens Friday 11 (2014).
11. **Member of the international organizing Committee: EMN Meeting/ Optoelectronics** (2015), April 24-27,Beijing,China.
12. **Member of Scientific Committee**, **EMRS 2015 SPRING, Symposium CC:** 'Laser and plasma processing for advanced applications in material science' May 11-15 (2015) Lille, France.
13. **Member of Scientific and Program Committee**, **EMRS 2015 SPRING, Symposium V:** Bioinspired and Biointegrated Materials as Frontiers Nanomaterials V, May 11-15 (2015) Lille, France.
14. **Member of Scientific and Program Committee**, Light Conference: International Conference on Micro/Nano Optical Engineering - Taiwan (Light Conference: ICOME-T2015), National Cheng Kung University, Tainan, July 10-14, 2015, Organized by Light: Science & Applications (LSA), NPG (Nature Publishing Group).
15. **Member of Scientific and Program Committee**, **'CM - Materials Processing with Lasers'**, European Conference on Lasers and Electro-Optics and the XIIth European Quantum Electronics Conference (CLEO®/Europe-EQEC), June 21-25 (2015), Munich Germany.
16. **Member of the Local Organizing Committee:** Joint QualityNano-NANoREG-EU-NCL Conference and Training Workshop, July 13-17, Heraklion, Crete Greece.
17. **Member of Organizing Committee**, **EMRS 2016 Fall, Symposium B**: '*Bioinspired and biointegrated materials as frontiers nanomaterials VI*' Sept. 19-22 (2016) Warsaw, Poland.

# 8. DETAILED RECORD

## 8.1 INVITED TALKS IN INTERNATIONAL CONFERENCES

1. '*Two recent advances in materials structuring and diagnostics at the nanoscale employing ultrafast pulsed lasers*' INTERNATIONAL CONGRESS ON APPLICATIONS OF LASERS & ELECTRO_OPTICS (ICALEO), October 20-23 (2008), Temecula, CA.
2. "*Materials engineering and diagnostics at the nanoscale employing ultrafast pulsed lasers*", 1st INTERNATIONAL CONFERENCE from NANOPARTICLES & NANOMATERIALS to NANODEVICES & NANOSYSTEMS (IC4N), June 16-18, (2008), Halkidiki Greece.
3. "*Laser engineering of biomimetic materials for microfluidic and tissue engineering applications*" E-MRS SPRING MEETING 2009, June 6-12, (2009), Strasbourg, France. Symposium M 'Bioinspired and Biointegrated Materials as New Frontiers Nanomaterials'.
4. "*Application of ultra short pulse lasers for materials micro/nanoprocessing and diagnostics*", 11th international Conference on Laser Ablation (COLA) 22-27 November**,** Singapore, (2009).
5. "*Multifunctional and responsive surfaces based on fs laser micro/nano structuring*", LASERION 2010, July 7-10, (2010) Schloß Ringberg, Tegernsee, Germany.

6. "*Ultrafast laser micro/nano processing for microfluidic and tissue engineering apllications*" European Conference on Lasers and Electro-Optics and the XIIth European Quantum Electronics Conference (CLEO®/Europe-EQEC) May 22-26, (2011) Munich Germany
7. "*Biomimetic micro/nano textured materials with special responsive properties*", E-MRS SPRING MEETING 2011, May 9-13, (2011) Nice, France. Symposium P, Bioinspired and Biointegrated Materials as New Frontiers Nanomaterials.
8. "*Laser assisted photochemical modification of graphene*" 9th International Conference on Nanosciences & Nanotechnologies (NN12), 3-6 July (2012) Thessaloniki, Greece.
9. "*Laser-based micro-/nano- processing for microfluidic and tissue engineering apllications*" E-MRS SPRING MEETING 2012, May 9-13 (2012) Strasbourg, France. Symposium V, Laser materials processing for micro and nano applications.
10. "*Pulsed Laser Assisted Generation of Novel Materials and Related Applications*", 8th International Conference on Photo-Excited Processes and Applications (ICPEPA-8), August 12-17 (2012) Rochester, NY.
11. "*Laser fabrication of novel materials for plasmonic and graphene-based organic photovoltaics*" Collaborative Conference on Materials Research (CCMR), June 24 - 28, (2013) Jeju Island, South Korea,
12. "*Pulsed Laser Generation of Novel Nanomaterials for Organic Electronics*" 10th International Conference on Nanosciences & Nanotechnologies (NN13), 9-12 July (2013) Thessaloniki, Greece.
13. *"Ultrafast Laser Engineering of Biomimetic Responsive Surfaces for Microfluidics and Tissue Engineering"*
    **Keynote Introduction Lecture** E-MRS FALL MEETING 2013, September 16-20 (2013) Warsaw, Poland. Symposium G, Bioinspired and Biointegrated Materials as Frontiers Nanomaterials III.
14. *"Direct Laser Texturing of Biomimetic Surfaces for Neural Tissue Engineering*", EMRS Fall 2014 Warsaw Symposium W, 15-18 September 2014
15. *"Laser nanostructuring with temporally delayed fs double laser pulses"*, SPIE Photonics West 2015, San Francisco, February 7-12 (2015).
16. "*Laser engineering of biomimetic materials for microfluidic and tissue engineering applications*" **Keynote Introduction Lecture**, EMRS Spring 2015, Lille, Symposium V May 11-15 (2015).
17. "*Pulsed Laser Generation of Novel Nanomaterials and Related Applications*"
    **Plenary Lecture,** Light Conference: International Conference on Micro/Nano Optical Engineering - Taiwan (Light Conference: ICOME-T2015), National Cheng Kung University, Tainan, July 10-14, (2015).
18. "*Pulsed Laser Generation of Novel Nanomaterials for Nanoelectronic Applications*" Invited Lecture – Photonica 2015, Fifth International School and Conference on Photonics, August 24-28 (2015).
19. EMRS Spring 2016, Lille, Symposium A, May 02-06 (2016).
20. EMRS Spring 2016, Lille, Symposium J, May 02-06 (2016).
21. '*Photo-assisted Synthesis of 2D Nanosheet based Hybrid Materials for Organic Electronics*' MRS Spring 2016 meeting, Symposium EP05, Phoenix March 28-April 1 (2016).
22. "*Laser Assisted Generation of Novel Nanomaterials for Nanoelectronic Applications*" Nanax 7, (2016) Philipps University Marburg, Germany.
23. *"Laser induced surface structures as biomimetic model of fluid transport and neural tissue engineering,* Keynote Introduction Lecture, EMRS Spring Meeting, Lille, Symposium K, May 22-06 (2017).
24. *"Ultrashort pulsed laser surface structuring for extreme wettability and tissue engineering*" International Conference on Laser Ablation (COLA 2017), September 3-8, (2017), Marseille.

## 8.2 LECTURES IN SUMMER SCHOOLS

1. *'Ultrafast laser processing of organic photovoltaic materials'* 2th IUVSTA School on Lasers in Materials Science Laser Engineering of Surfaces and Coatings Isola di San Servolo, Venice, Italy 13th-20th July (2014)

2. *'Laser processing of Graphene for Printed Flexible and Transparent Electronics'*, Summer School on "Transparent Electronics: From Materials & Devices to Devices & Systems August (2014)
3. '*Graphene for Printed Flexible and Transparent Electronics'* Summer school in "Transparent Electronics: From Materials & Devices to Devices & Systems", July 2013
4. '*Laser assisted photochemical modification of graphene for organic electronics'* Summer school in "Graphene: Properties & Applications" Patras, Greece, July 2013.
5. "*Plasmonic Organic Electronics*" 3rd Erasmus Intensive Programme: Summer school in 'Bioinspired Materials for Solar Energy Utilization', Crete, July 2012
6. "*Plasmonic Organic Photovoltaics*" 2nd Erasmus Intensive Programme: Summer school in 'Org. Electronics and Applications', Chania, Crete, July 2011
7. "*Low frequency Organic Electronic Applications*" 1st Erasmus Intensive Programme: Summer school in 'Org. Electronics and Applications', Chania, Crete, July 2010
8. "*Biomimetic Artificial Micro/Nano Structured Surfaces for Microfluidic and Tissue Engineering Applications*", Summer School in Multiscale Material Mechanics and Engineering Sciences: Curricula Interfacing and Innovation, August, 2010, Epanomi, Greece.

## 8.3 PATENTS

1. "*Imaging of Nanodevices and Nanostructures with Electrical Atomic Force Microscopy Complemented with Femtosecond Laser Illumination*" C. P. Grigoropoulos, N. Misra, D. J. Hwang C. Fotakis, P. Tzanetakis, **E. Stratakis**, E. Spanakis, UC case number B08-092, USA. Filed January 2008.
2. *'ABLATING SiC WAFER CONFIGURATIONS AND MANUFACTURING LIGHT EMITTING DIODE (LED) DEVICES'* **E. Stratakis**, E. V. Barmina, G. A. Shafeev, C. Fotakis, File number, 20140100424 , Hellenic Industrial Property Organisation.
   PCT Publication number: WO 2016016670 A1.

## 8.4 SCIENTIFIC BOOKS AND ARTICLES

1. **E. Stratakis** and G. A. Shafeev: "*Phase Transformations in the UV laser Irradiation of Molecular Solids*", in "Laser Induced Phase Transitions" edited by G. Shafeev, NOVA Scientific Publishers, 2009.
2. **E. Stratakis**, and V. Zorba, "*Biomimetic Artificial Nanostructured Surfaces" in "Nanotechnologies for the Life Sciences*" edited by C. Kumar, Wiley-VCH, 2010.
3. **E. Stratakis** "Infrared Photodetectors" in Sensors for Machine Vision. Published by Greek Secretariat of Research and Technology. 2005
4. **Emmanuel Stratakis,** Vassilia Zorba, Marios Barberoglou, Emmanuel Spanakis, Sophia Rhizopoulou, Panagiotis Tzanetakis, Spiros Anastasiadis, and Costas Fotakis "*Laser structuring of water-repellent biomimetic surfaces*" SPIE Newsroom, Optics and Photonics technical articles. DOI: 10.1117/2.1200901.1441, January 2009.
5. **E. Stratakis** and G. A. Shafeev: "*Nanostructures' formation under laser ablation of solids in liquids*" in "Laser Ablation in Liquid: Principles, Methods and Applications in Nanomaterials: Preparation and Nanostructures Fabrication" edited by G. W. Yang, Pan Stanford publ., (2012).
6. **E. Stratakis**, E. V. Barmina, P. A. Loukakos, G.A. Shafeev and C. Fotakis, '*Ultrafast laser assisted surface micro and nanostructuring'* in "Ultrafast Laser Processing: From Micro- to Nanoscale", Pan Stanford Publishing Pte Ltd, (2013).
7. **E. Stratakis**, A. Ranella and C. Fotakis, '*Laser based biomimetic tissue engineering'* in "The application of laser technology in the field of biomimetics", Editors: Volker Schmidt, Maria Regina Belegratis Springer-Verlag, (2014).
8. **E. Stratakis,** *'Hierarchical field emission devices'* in "Hierarchical Nanostructures for Energy Devices", edited by Seung H Ko and Costas P Grigoropoulos, RSC publishing (2014).
9. A. Ranella and **E. Stratakis** *"Laser based fabrication of biomimetic surfaces"*, WILEY VCH, (2015).
10. P. Loukakos, G. D. Tsibidis and **E. Stratakis** "*ULTRAFAST PROCESSES ON SEMICONDUCTOR SURFACES INITIATED BY TEMPORALLY SHAPED FS LASER PULSES"*

in "Pulsed Laser Ablation: Advances and Applications in Nanoparticles and Nanostructuring Thin Films", Pan Stanford Publ. (2017)

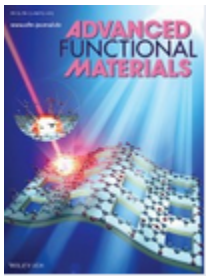
## 8.5 REVIEW PAPERS

1. *'Laser baser micro/nano-engineering for biological applications'* **E. Stratakis**, A. Ranella, M. Farsari and C. Fotakis, Progress in Quantum Electronics, **33** (2009) 127.
2. "*Biomimetic micro/nanostructured functional surfaces for microfluidic and tissue engineering applications*", **E. Stratakis*,** A. Ranella, C. Fotakis, Biomicrofluidics, **5**, (2011) 013411. **Among the top 20 most downloaded articles (05/2011-09/2011)**
3. '*Nanoparticles-based Plasmonic Organic Photovoltaic Devices'* (2013), **E. Stratakis*,** E. Kymakis**,** Materials Today, **16** (4), 133-146 (2013).
4. *'Controlled ultrashort-pulse laser-induced ripple formation on semiconductors'* GD Tsibidis, **E. Stratakis**, PA Loukakos, C Fotakis, Applied Physics A 114 (1), 57-68.
5. *'Laser-Assisted Reduction of Graphene Oxide for Flexible, Large-Area Optoelectronics'* E. Kymakis, C. Petridis, T.D. Anthopoulos, **E. Stratakis*,** IEEE JOURNAL OF QUANTUM ELECTRONICS (2014) **20** (1), art. no. 6573325.
6. *'Solution-Processed Reduced Graphene Oxide Electrodes for Organic Photovoltaics'* Petridis C., Konios D., Stylianakis M.M., Kakavelakis G., Sygletou M., Savva K., Tzourbakis P., Krassas M.,Vaenas N., **Stratakis E,** Kymakis E (2016) Nanoscale Horizons, 1 (5), 375-382.
7. '*Graphene and transition metal dichalcogenide nanosheets as charge transport layers for solution processed solar cells',* Balis, **E. Stratakis*,** E. Kymakis (2016) Materials Today 19 (10), 580-594
8. *'Structures for biomimetic, fluidic, and biological applications',* **E. Stratakis***, H Jeon, S Koo, MRS Bulletin 41 (12), 993-1001 (2016).
9. '*Controlling the morphology and outgrowth of nerve and neuroglial cells: The effect of surface topography*', C Simitzi, A Ranella, **E. Stratakis***, Acta Biomaterialia, 51, 21 (2017).
10. *'Advanced Photonic Processes for Photovoltaic and Energy Storage Systems'* M Sygletou, C Petridis, E Kymakis, **E. Stratakis***, Advanced Materials, DOI:10.1002/adma.201700335 (2017).
11. *'Laser generated nanoparticles based photovoltaics'* C Petridis, K Savva, E Kymakis, **E. Stratakis***, Journal of colloid and interface science 489, 28-37 (2017).

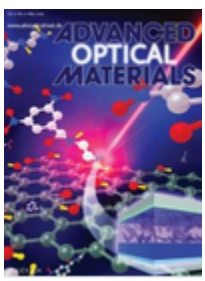
## 8.6 MONOGRAPHS

- *'Nanomaterials by Ultrafast Laser Processing of Surfaces*', **E. Stratakis*,** Science of Advanced Materials **4** (2012), 407-431

## 8.7 COVERS



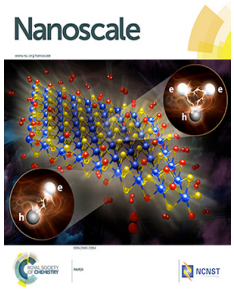

**Inside Front Cover:** Reduced Graphene Oxide Micromesh Electrodes for Large Area, Flexible, Organic Photovoltaic Devices (Adv.Funct.Mater. 25,15, page 2206) APR 2015 | DOI: 10.1002/adfm.201570101




**Inside Front Cover:** Photochemical Synthesis of Solution-Processable Graphene Derivatives (Adv. Optical Mater. 3, 5, page 596) MAY 2015 | DOI: 10.1002/adom.201570027


**Back Cover:** Ternary Organic Solar Cells with Reduced Graphene Oxide–Sb2S3 Hybrid Nanosheets as the Cascade Material (ChemNanoMat 1,5, page 364) SEP 2015 | DOI: 10.1002/cnma.201500117


**Back Cover:** Plasmonic Backscattering Effect in High Efficient Organic Photovoltaic Devices (Adv. Energy Mater 6, 2 2016) JAN 2016 | DOI: 10.1002/aenm.201670013.




**Front Cover:** Spatial Non-Uniformity in Exfoliated WS2 Single layers Nanoscale (2016) DOI: 10.1039/C6NR03597C

## 8.8 PUBLICATIONS IN PEER-REVIEWED JOURNALS

1. "*Stress and internal friction associated with light-induced structural changes of a-Si:H deposited on crystalline silicon microcantilevers,* **E. Stratakis**, E. Spanakis, H. Fritzsche, and P. Tzanetakis, J. Non-Cryst. Solids **266-269** (2000) 506-510.
2. "*Elastic properties, intrinsic and photo-induced stress in a-Si:H thin films with different hydrogen content*, E. Spanakis, **E. Stratakis**, P. Tzanetakis and Qi Wang, J. Appl. Phys. **89** (2001) 4294.
3. '*Light induced stress in a-$Si_{1-x}Ge_x$:H alloys and its correlation with the Staebler-Wronski effect,* E. Spanakis, **E. Stratakis**, P. Tzanetakis, H. Fritzsche, S. Guha and J. Yang, J. Non-Cryst. Solids **299-302** (2002) 521-524.
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109. Viskadouros G., Konios D., Kymakis E., **Stratakis E.***, '*Electron Field Emission from Graphene Oxide Wrinkles'* RSC Advances (2016), 6, 2768-2773.
110. Tsibidis, G.D., Skoulas, E. Papadopoulos, A. Stratakis, E. '*Convection roll-driven generation of supra-wavelength periodic surface structures on dielectrics upon irradiation with femtosecond pulsed lasers',* Physical Review B 94 (8), 081305.
111. Paradisanos, I. Pliatsikas, N. Patsalas, P. Fotakis, C. Kymakis, E. Kioseoglou, G., **Stratakis E.***, *Spatial Non-Uniformity in Exfoliated WS2 Single layers,* Nanoscale (2016) 8, 16197-16203 [**Appeared in the Front cover**]
112. '*High steady-state column density of I (2P3/2) atoms from I2 photodissociation at 532 nm: Towards parity non-conservation measurements'*, GE Katsoprinakis, G Chatzidrosos, JA Kypriotakis, **E Stratakis**,TP Rakitzis, Scientific reports 6, 33261 (2016).
113. *'Stainless steel surface wettability control via laser ablation in external electric field'*, AA Serkov, GA Shafeev, EV Barmina, A Loufardaki, **E Stratakis**, Applied Physics A 122 (12), 1067 (2016).
114. *'Efficiency and stability enhancement of inverted perovskite solar cells via the addition of metal nanoparticles in the hole transport layer'*, G Kakavelakis, K Alexaki, **E Stratakis**, E Kymakis, RSC Advances 7 (21), 12998-13002 (2017).
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116. *'Size-Tuning of WSe2 Flakes for High Efficiency Inverted Organic Solar Cells'* G Kakavelakis, A E Del Rio Castillo, V Pellegrini, A Ansaldo, P Tzourmpakis, R Brescia, M Prato, **E Stratakis**, E Kymakis, F Bonaccorso, ACS nano 11 (4), 3517-3531 (2017).
117. '*Biomimetic surface structuring using cylindrical vector femtosecond laser beams*' E Skoulas, A Manousaki, C Fotakis, **E Stratakis***, Scientific Reports 7, 45114 (2017).
118. *'Efficient and Highly Air Stable Planar Inverted Perovskite Solar Cells with Reduced Graphene Oxide Doped PCBM Electron Transporting Layer'*, G. Kakavelakis, T. Maksudov, D. Konios, I. Paradisanos, G. Kioseoglou, **E Stratakis**, E. Kymakis, Advanced Energy Materials 7, 1602120 (2017).
119. *'Ripple formation on silver after irradiation with radially polarised ultrashort-pulsed lasers'* GD Tsibidis, **E Stratakis**, Journal of Applied Physics 121 (16), 163106 (2017).

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121. *Cell patterning via laser micro/nano structured silicon surfaces*, C Yiannakou, C Simitzi, A Manousaki, C Fotakis, A Ranella, **E Stratakis***, Biofabrication 9, 025024 (2017)
122. *'Short Pulse Laser Synthesis of Transition-Metal Dichalcogenide Nanostructures under Ambient Conditions',* K Savva, B Višić, R Popovitz-Biro, **E Stratakis***, R Tenne ACS Omega 2 (6), 2649-2656 (2017).
123. *'Mimicking lizard-like surface structures upon ultrashort laser pulse irradiation of inorganic materials' U Hermens, SV Kirner, C Emonts, P Comanns, E Skoulas, A Mimidis, H Mescheder, K Winands, Jörg Krüger,* **E Stratakis***, Jörn Bonse*, Applied Surface Science 418, 499-507 (2017).
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## 8.9 CONFERENCE PAPERS IN PEER-REVIEWED JOURNALS

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2. *Light induced stress in a-$Si_{1-x}Ge_x$:H alloys and its correlation with the Staebler-Wronski effect,* E. Spanakis, **E. Stratakis**, P. Tzanetakis, H. Fritzsche, S. Guha and J. Yang, 19th International Conference on Amorphous and Microcrystalline Semiconductors (ICAMS 19), August 2001, Nice, France, J. Non-Cryst. Solids **299-302** (2002) 521-524.
3. '*Novel Aspects of Materials Processing by Ultrafast Lasers: From Electronic to Biological and Cultural Heritage Applications*' C. Fotakis, V. Zorba, **E. Stratakis**, P. Tzanetakis, I. Zergioti, D. G. Papagoglou, K. Sambani, G. Filippidis, M. Farsari, P. Pouli, G. Bounos, S. Georgiou, COLA 2005, Banff, Canada, Journal of Physics: Conference Series, **59** (2007) 266.
4. *'Tailoring the wetting response of silicon surfaces via fs laser structuring'* V. Zorba, **E. Stratakis**, M. Barberoglou, E. Spanakis, P. Tzanetakis, C. Fotakis. COLA 2007, Tenerrife, Spain, Appl. Phys. A, **93** (2007), 819–825.
5. *'Bio-inspired water repellent surfaces produced by ultrafast laser structuring of silicon',* M. Barberoglou, V. Zorba, **E. Stratakis***, E. Spanakis, P. Tzanetakis, S. H. Anastasiadis and C. Fotakis, EMRS 2008, Strasbourg, France, Applied Surface Science **255** (2009) 5425.
6. 'Femtosecond laser writing of nanostructures on bulk Al via its ablation in air and liquids' **E. Stratakis***, V. Zorba, M. Barberoglou, C. Fotakis and G. A. Shafeev, EMRS 2008, Strasbourg, France, Applied Surface Science **255** (2009) 5346.
7. '*Laser control of the properties of nanostructures on Ta and Ni under their ablation in liquids'* E. V. Barmina, M. Barberoglou, V. Zorba, A. V. Simakin, **E. Stratakis**, C. Fotakis and G. A Shafeev, EMRS 2009, Strasbourg, France, J. Optoelectronics and Advanced Materials **12**, (2010) 496-499.
8. '*Porous nanoparticles of Al and Ti generated by laser ablation in liquids*', Kuzmin, P.G., Shafeev, G.A., Viau, G., Warot-Fonrose, B., Barberoglou, M., **Stratakis**, **E.,** Fotakis, C., 2009, Strasbourg, France, Applied Surface Science **258** (2012) 9283.
9. '*3-Dimensional Laser Structured Scaffolds Improve Macrophage Adherence and Antigen-specific Response*' I Zerva, C Simitzi, A Ranella, **Stratakis E**, C Fotakis, I Athanassakis, PROCEDIA ENGINEERING **59**, 211-218 (2013).
10. '*Generation of nanoparticles of bronze and brass by laser ablation in liquid'* IA Sukhov, GA Shafeev, VV Voronov, M Sygletou, **E Stratakis**, C Fotakis, Applied Surface Science 302, 79-82 (2014).

## 8.10 PAPERS IN REFEREED CONFERENCE PROCEEDINGS

More than 10: Most recent ones:

1. '*Two recent advances in materials structuring and diagnostics at the nanoscale employing ultra fast pulsed lasers*', **E. Stratakis**, M. Barberoglou V. Zorba, E. Spanakis, S. H. Anastasiadis, N. Misra D. Hwang C. Grigoropoulos P. Tzanetakis and C. Fotakis, PROCEEDINGS OF THE 27th INTERNATIONAL CONGRESS ON APPLICATIONS OF LASERS & ELECTRO_OPTICS (ICALEO), October 20-23 2008, Temecula, CA.
2. '*Applications of ultrafast lasers in materials processing: fabrication on self-cleaning surfaces and scaffolds for tissue engineering*' C. Fotakis, M. Barberoglou, V. Zorba; **E. Stratakis**; E. L. Papadopoulou; A. Ranella; K. Terzaki; M. Farsari 15th International School on Quantum Electronics: Laser Physics and Applications Proceedings of SPIE 7027 DOI: 10.1117/12.822435 (2008).
3. '*Imaging Dielectric Properties of Silicon Nanowire Oxide by Conductive Atomic Force Microscopy Complemented with Femtosecond Laser Illumination*' Nipun Misra, **Emmanuel Stratakis**, David J Hwang, Emmanuel Spanakis, Costas Fotakis, Panagiotis Tzanetakis and Costas P Grigoropoulos.. MRS PROCEEDINGS 2008, December 1-5, Boston MA.
4. '*Multifunctional and responsive surfaces based on fs laser micro/nano structuring of silicon*' **Stratakis E.,** Barberoglou, M., Pagkozidis, A., Zorba, V., Mateescu, A., Achilleos, D.S., Vamvakaki, M., Anastasiadis, S.H., Fotakis, C. (CLEO/Europe - EQEC 2009) - European Conference on Lasers and Electro-Optics and the European Quantum Electronics Conference , art. no. 5192319.
5. '*From superhydrophobicity and water repellence to superhydrophilicity: Smart polymer-functionalized surfaces*' Anastasiadis, S. H., **Stratakis E.,** Barberoglou, M., Zorba, V. Mateescu, A. ,Achilleos, D.S. Vamvakaki, M., Fotakis, C. ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY, 240 , 151-COLL (2010).
6. '*Ultrafast laser micro/nano processing for microfluidic and tissue engineering applications'*, **Stratakis E.,** 'European Conference on Lasers and Electro-Optics and the XIIth European Quantum Electronics Conference (CLEO®/Europe-EQEC) May (2011), Munich Germany.
7. *'Pulsed laser generation of novel nanomaterials for organic electronics'* **E. Stratakis**, MM Stylianakis, K Savva, C Fotakis, E Kymakis'European Conference on Lasers and Electro-Optics and the XIIth European Quantum Electronics Conference (CLEO®/Europe-EQEC) May (2013), Munich Germany.
8. *'Pulsed Laser Processing of Graphene and related Two-Dimensional Materials'* K Savva, G Kakavelakis, M Sigletou, D Konios, I Paradissanos, MM Stylianakis, C Petridis, G Kioseoglou, C Fotakis, E Kymakis, **E. Stratakis,** European Conference on Lasers and Electro-Optics and the XIIth European Quantum Electronics Conference (CLEO®/Europe-EQEC) June 2015, Munich Germany, Page CM_7_3.

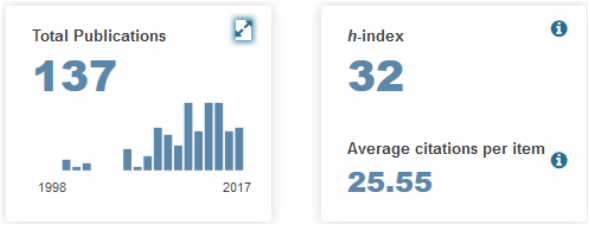
## 9. SELECTED PUBLICATIONS (IF > 6.0, SCI-2015)

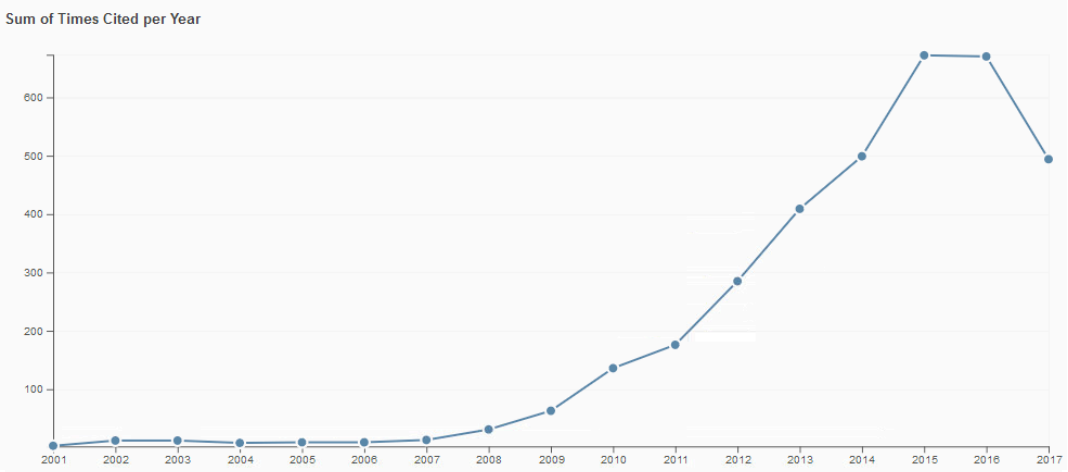
| Journal | IF, SCI-2016 | Number of publications |
|---|---|---|
| *Advanced Materials* | 19.791 | 3 |
| *Advanced Energy Materials* | 16.721 | 2 |
| *Materials Today* | 21.695 | 2 |
| *ACS Nano* | 13.942 | 1 |
| *NanoLetters* | 12.712 | 1 |
| *Advanced Functional Materials* | 12.124 | 6 |
| *Nanoscale Horizons* | 10.706 | 1 |
| *Advanced Science* | 9.034 | 1 |

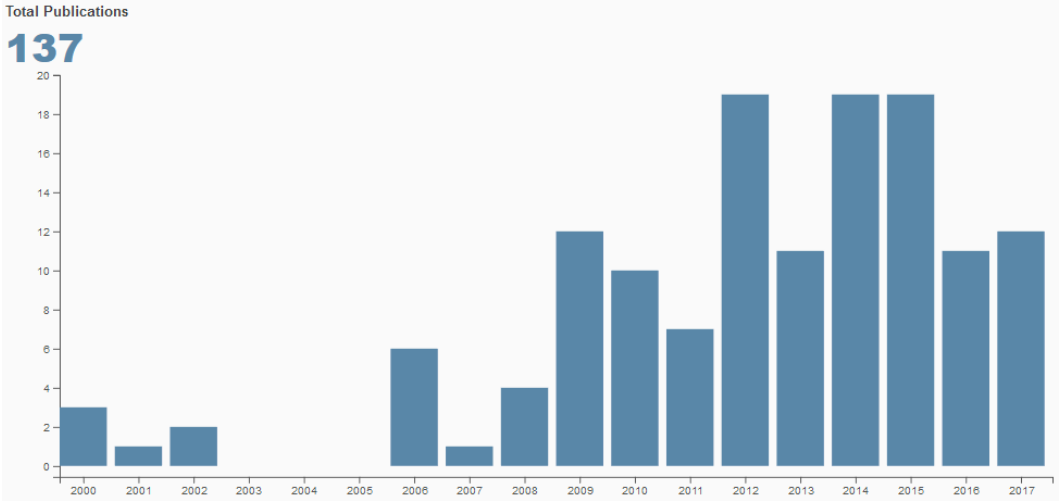
| | | |
|---|---|---|
| *Journal of Materials Chemistry A* | 8.867 | 4 |
| *Small* | 8.643 | 1 |
| *Biomaterials* | 8.402 | 1 |
| *Chemistry of Materials* | 8.354 | 1 |
| *ACS Applied Materials & Interf.* | 7.504 | 3 |
| *Nanoscale* | 7.367 | 5 |
| *Advanced Optical Materials* | 6.875 | 1 |
| *ACS photonics* | 6.756 | 1 |
| *Carbon* | 6.337 | 1 |
| *Acta Biomaterialis* | 6.319 | 1 |
| *Chemical Commun.* | 6.319 | 1 |
| | | **TOTAL = 37** |

## 10. CITATIONS METRICS / RESEARCH IMPACT (21 Sept. 2017)

## A) Web of Science:

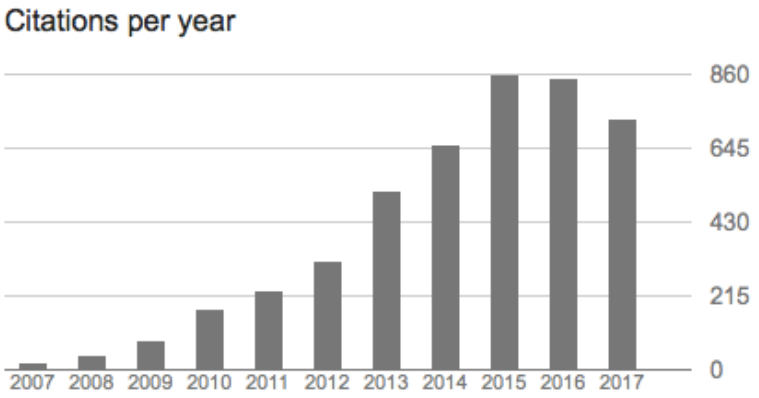


## B) Google Scholar

| Citation indices | All | Since 2012 |
|---|---|---|
| Citations | 4529 | 3925 |
| h-index | 38 | 37 |
| i10-index | 97 | 90 |




## 11. RESEARCH TEAM INFORMATION

### Ultrafast Laser Micro- and Nano- Processing Laboratory

#### RESEARCH TEAM

| RESEARCH GROUP PARTICIPANT | POSITION |
|---|---|
| Dr. Emmanuel Stratakis | Research Director |
| Dr. George Tsibidis | Research Associate |
| Mr. Sotiris Psilodimitrakopoulos | Postdoc Researcher |
| Dr. Evi Kavatzikidou | Postdoc Researcher |
| Dr. Ioannis Konidakis | Postdoc Researcher |
| Dr. Kanelina Karali | Postdoc Researcher |
| Dr. Athanassia Kostopoulou | Postdoc Researcher |
| Dr. Leonidas Mouhliadis | Postdoc Researcher |
| Dr. Maria Sygletou | Postdoc Researcher |
| Mrs Aleka Manousaki | Technical Scientific Personnel |
| Mr Giannis Labrakis | Technical Scientific Personnel |
| Mr Andeas Lemonis | Technical Scientific Personnel |
| Ms Ioanna Demeridou | PhD candidate |
| Mr Ioannis Paradisanos | PhD candidate |
| Ms Kyriaki Savva | PhD candidate |
| Ms Despoina Angelaki | PhD candidate |
| Mr Antonis Papadopoulos | PhD candidate |
| Mrs Ritsa Babaliari | PhD candidate |
| Mr Alexandros Mimidis | PhD candidate |
| Mr Dionisis Xydias | PhD candidate |
| Mr Evangellos Skoulas | PhD candidate |
| Mr Eythimis Serpetzoglou | PhD candidate |

| | |
|---|---|
| Mr Kourmoulakis Mixalis | MSc candidate |
| Ms Christina Yannakou | MSc candidate |
| Ms Athanasia Pylostomou | MSc candidate |
| Ms Christina Lanara | MSc candidate |
| Mr Mihalis Labrinoudakis | MSc candidate |

## ALUMNI

| RESEARCH GROUP PARTICIPANT | POSITION |
|---|---|
| Dr. Vassilia Zorba | Staff Scientist Lawrence Berkeley National Laboratory CA US |
| Dr. Evie Papadopoulou | PostDoc at IIT - Istituto Italiano di Tecnologia |
| Dr. Marios Barberoglou | Application Engineer at Technotion GMBh |

## RESEARCH DIRECTIONS / OBJECTIVES

In the Ultrafast Laser Micro- and Nano- processing group (ULMNP) of IESL, research is focused on the development of novel ultrafast pulsed laser processing schemes for controlled structuring at micro- and nano- scales of a variety of materials, including biopolymers. By applying ultrafast UV and IR laser pulses novel surface structures with sub-micron sized features are produced while the physical properties of semiconductor, dielectric and metallic surfaces are significantly modified. Developed methods include laser micro/nano surface structuring performed in different media, laser-induced forward transfer deposition and combination of those. Further control over the surface topology is achieved by proper functionalization of the 3D structures obtained with well-defined nanostructures. In particular, the artificial surfaces developed by processing under gaseous environments exhibit controlled dual-scale roughness, that mimics the hierarchical morphology of natural surfaces with exciting properties (i.e. the Lotus leaf), comprising micro-conical structures decorated with nanometre sized protrusions. The biomimetic morphology attained gives rise to notable multifunctional properties when combined with methods of tailoring the surface chemistry. Research shows that appropriate combination of topography and chemistry can lead to artificial surfaces that are: (a) of extremely low surface energy, thus water repellent and self-cleaned (b) smart, i.e show the ability to change their surface properties in response to different external stimuli and (c) functional in the sense that exhibit remarkable physical properties compared to the bulk. The ability to tailor the morphology and chemistry is an important advantage for the use of such structures as models to study the dependence of growth, division and differentiation of cells on the surface energy of the culture substrate and as scaffolds for tissue regeneration. At the same time, ULMNP focuses on the ultrafast laser syntheses of various types of nanomaterials including nanolayers. In particular, laser processing in liquid media results in the formation of self-organized surface nanostructures and colloids of surfactant-free nanoparticles used for photovoltaic applications. Additionally, the exploitation of ultrafast laser processing schemes for the synthesis and functionalization of graphene derivatives and other 2D materials for organic electronic applications is investigated.

## MAJOR RESEARCH INFRASTRUCTURE

| INSTRUMENTATION |
|---|

| |
|---|
| Various short (nanosecond, picosecond) and ultrashort (femtosecond) UV, VIS and NIR laser sources |
| Laser patterning workstations |
| Time resolved absorption (250-2500 nm) spectroscopy workstation |
| Photoluminescence spectroscopy (250-2500 nm/4K-380K) workstations |
| Reflectivity (250-2500 nm/4K-380K) workstations |
| Valley Polarization (4K-380K) workstation |
| Laser nanomaterials synthesis workstation |
| Laser materials and devices processing in controlled atmosphere workstation |
| Non Linear Microscopy and Imaging workstation |

## COLLABORATIONS

**Academic**:
- R. Tenne, Weizmann Institute of Sciences
- T. D. Anthopoulos, Imperial College London, UK
- F. Bonaccorso, IIT, Italy
- C. P. Grigoropoulos, Mech. Eng. University of California Berkeley
- M. Chhowalla, Mat. Sci. Rutgers University
- G. A. Shafeev, A.M. Prokhorov General Physics Institute, Russian Academy of Sciences
- B. Paci, ISM-CNR, Italy
- A. Kanaras, Univ. of Southampton, UK
- Y. Hosokawa Nara Institute of Science and Technology, Ikoma, Nara, Japan
- S. H. Anastasiadis, FORTH-IESL and UoC Chemistry
- E. Kymakis, TEI of Crete
- A. Gravanis, FORTH-IESL and UoC Medicine
- G. Kioseoglou, UoC Crete
- I. Athanassakis, FORTH-IESL and UoC Biology
- M. Vamvakaki, FORTH-IESL and UoC Materials
- P. Tzanetakis, FORTH-IESL and UoC Physics
- A. Mitraki, FORTH-IESL and UoC Materials
- M. Farsari, FORTH-IESL
- P. A. Loukakos, FORTH-IESL

**Industry**:
- PV Nanocell Ltd. Israel
- Energomashtechnica, Russia
- HTC Gmbh Austria
- ONNEX Hellenic, Greece
- Glonatech S. H., Greece

## SOCIO-ECONOMIC IMPACT

In principle advanced laser micro/nano processing may be realized as universal, compact and low cost facility that can be easily customized to the requirements of the end user. As a result the number of applications of various products in science and technology should potentially rise sharply. The following benefits are expected: (a) Upgrading the RTD capacity (human potential: number of new researchers and training of all research staff, scientific equipment) and the quality of research carried out by the group. In particular, the group focuses on applied research in which they will contribute graduate students and young scientists, acquiring training and education that makes them useful for industry. It is obvious that training of young scientists in cutting edge technologies developed in the country, has social

and economic impact (against unemployment for employees with university education, maintenance of existing jobs, etc); (b) Better integration of Greek research teams and Industries in the emerging field of nanotechnology and advanced materials at the European level; (c) Research synergies between less favored regions to improve economic and social cohesion; (d) Providing employment for highly skilled research personnel and therefore contribute to the reversal of the brain-drain trend. The innovative approach adopted in the group is based on interdisciplinary activities that will potentially provide opportunities to transfer technology from the area of advanced materials to real-life applications. The group aims at exploiting the new products that will be developed in cooperation with industrial collaborators (there are already extensive discussions on that issue).

## PERSPECTIVES (RUNNING PROJECTS)

- Laser fabrication of biomimetic micro/nano surfaces
- Combined electro- and hydro- dynamics model to account for microgrooves and microspikes formation on conductive surfaces
- Si spikes-based NeuronChip for neuronal networks interface
- Laser-based synthesis of nanostructures in liquids
- Development of laser-based spectroscopic schemes for OPV diagnostics
- Laser synthesis of graphene and other 2D materials derivatives for photovoltaic and composite materials applications
- Intense Optical Excitation of 2D materials