



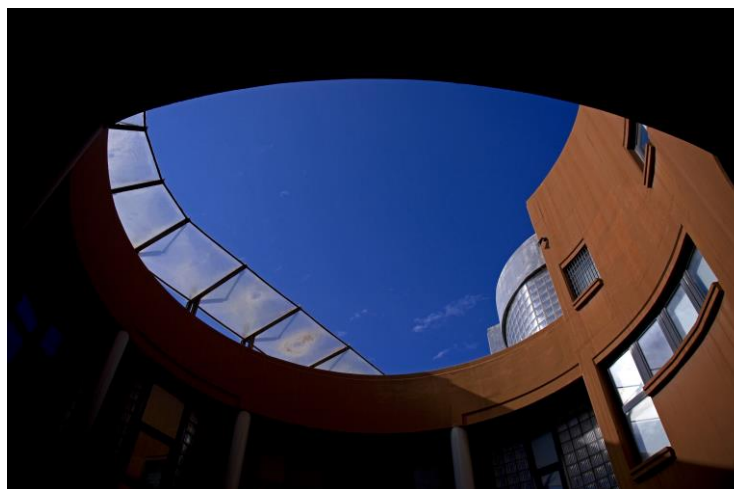
**TECHNICAL
UNIVERSITY
OF CRETE**

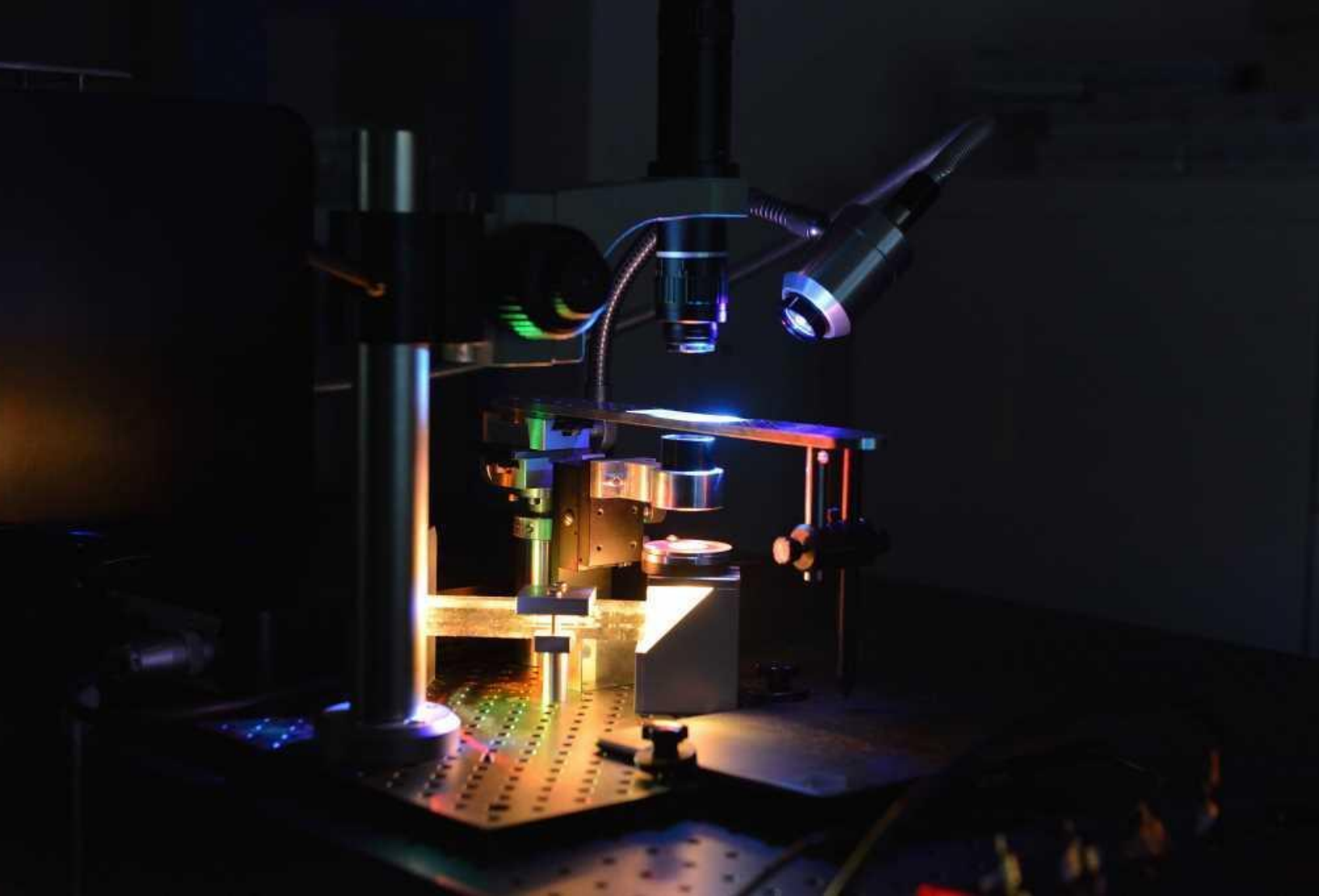
In the spotlight

Awards & Distinctions

January 2019 – December 2019

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Research is a core mission of the Technical University of Crete



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The contribution of the Technical University of Crete in research is broadly appreciated, as the Institution is recognized as one of the most prestigious research institutions in Greece with hundreds of research programs in progress. In March 2016, the External Evaluation Committee of the Hellenic Quality Assurance & Accreditation Agency (HQA) [www.hqaa.gr] evaluated the Technical University of Crete at the highest possible rank: **“Worthy of Merit”**. *“Research is a core mission of the Institution and as a result, TUC delivers scientific output of high calibre and volume. In terms of research publications, TUC is one of the most productive research institutions in Greece and compares very favorably with peer institutions in Europe and North America. The number of grant-funded projects has more than doubled since 2012.”* With these words, the HQA External Evaluation Report confirms the high-level research produced by the Technical University of Crete.

In this direction, the pursuit of excellence is the driving force. This booklet describes selected international distinctions of our institution during the year of 2019, beginning with the most recent ones.

TUC was selected to host three Greek Diaspora Fellows



Technical University of Crete was selected by the [Greek Diaspora Fellowship Program \(GDFFP\)](#) to host **two scholars from the United States** and **one scholar from South Africa** to work with on **three collaborative projects**:

- GDFFP Host, [Prof. Nicolas Kalogerakis](#) (School of Environmental Engineering) will lead the project entitled: **Collaborative Research to Advance Deep-Sea Biosurfactant-Assisted Bioremediation and Mentoring of Graduate Students and Junior Researchers**, together with [Professor Paschalis Alexandridis](#), a GDFFP Fellow from the [University at Buffalo](#) (UB), The State University of New York (SUNY), USA
- GDFFP Host, [Prof. Markos Papageorgiou](#) (School of Production Engineering and Management) will lead the project entitled: **Collaborative Research and Graduate Student Mentoring in Sustainable Multimodal Traffic Control with Automated Vehicles**, together with [Associate Professor Eleni Christofa](#), a GDFFP Fellow from the [University of Massachusetts Amherst](#), USA
- GDFFP Host, [Prof. Georgios Stavroulakis](#) (School of Production Engineering and Management) will lead the project entitled: **Collaborative Research and Postgraduate Student Mentoring in the Field of Graphene-Reinforced Nanocomposite Materials, Design and Optimization, enhanced with Shunted Piezoelectric Components, using Functionally-Graded Concepts and Innovative Optimization Techniques** together with [Senior Lecturer Georgios Drosopoulos](#), a GDFFP Fellow from the [University of KwaZulu-Natal](#), South Africa.

TUC projects are three of 37 projects that will pair 38 members of the Greek and Cypriot academic diaspora with higher education institutions and collaborators in Greece to work together on curriculum co-development, collaborative research, graduate and undergraduate research training and mentoring activities in the coming months.

The GDFP, now in its third year, is designed to enable brain circulation between Greek universities and universities abroad, strengthen capacity at the host institutions, and develop long-term, mutually-beneficial collaborations.

TUC's School of Architecture is a new member of UNITWIN - UNESCO network



On December 16, 2019 during the [UNITWIN - UNESCO's Network Conference in Paris](#), the [School of Architecture of the Technical University of Crete](#) has been accepted unanimously as a member of the network. The candidature of the School has been presented and supported by TUC Associate Professor **Amalia Kotsaki**, and TUC Assistant Professor **Alexandros Vazakas** in Paris. Both professors, in collaboration with **Klimis Aslanides** and **Panita Karamanea**, Assistant Professors of the School of Architecture, prepared the submission of the School's candidature.

Prof. Costas Balas, Distinguished Lecturer at the Beijing Institute of Technology, China



Professor [Costas Balas](#), Director of the [Electronics Lab](#) in the School of Electrical and Computer Engineering of the Technical University of Crete, was invited as a distinguished lecturer at the School of Information and Electronics, Beijing Institute of Technology (China) to present two lectures, entitled:

- “Smart, ultra-wide band hyperspectral imaging for chemical/pathology mapping: Emerging applications in microscopy and in nondestructive analysis of artwork” and
- “Video-Rate Hyperspectral Imaging Enables Spectral Hyper Vision: A Game-Changing Technology in Clinical Diagnosis and Surgery” (BIT Distinguished Lecture Series)

on November 20 and November 21, 2019, respectively.

1st place for SenseLab at the Airbus Global Earth Observation Challenge



The **Spatial Informatics research group** of TUC (SenseLab) in collaboration with TaQadam (USA) took the 1st place in the context of Airbus Global Earth Observation Challenge 2019 for their research work on deep learning for object detection from satellite imagery. **Georgios Petrakis**, Ph.D. candidate and member of SenseLab, participated at the AIRBUS HQ in Toulouse, where all finalists pitched their solutions in front of AIRBUS satellite experts, on November 15, 2019. The service proposed finds application in a number of areas, for example the detection of school units in non-mapped areas of Africa for student safety purposes (e.g. human trafficking).

Prof. Nicolas Kalogerakis, Distinguished Lecturer at the University of Toronto and McGill University



On October 30, 2019, **Professor Nicolas Kalogerakis**, Director of the Biochemical Engineering and Environmental Biotechnology Laboratory in the School of Environmental Engineering at TUC, gave an invited lecture at the **University of Toronto** in the Department of Chemical Engineering and Applied Chemistry.

The one-hour public presentation was part of the [“Lectures at the Leading Edge”](#) which enhance University of Toronto’s culture of excellence by providing a rich view of the broad landscape and far-reaching horizons of chemical engineering and applied chemistry education and research. The lecture was co-hosted with the [Institute for Water Innovation \(IWI\)](#).

The highly popular presentation by Professor Kalogerakis was on **Biodegradation of C-C Backbone Plastics and Microplastics in the Marine Environment**. The breakthrough research conducted at TUC on the **biodegradation of marine plastic debris** attracted scientists from several other faculties as the biodegradation of polyethylene and polystyrene plastics (the main type of plastics in the marine environment) has been considered as nearly impossible. The pioneering findings were reported in the several recent journal publications (see most [downloaded articles in the journal of Hazardous Materials](#)) and were reproduced by social media ([PlumX metrics](#)).

In addition, on October 23, 2019, Professor Kalogerakis was invited as a **distinguished lecturer** at **McGill University** in the Department of Chemical Engineering “**EUL seminar series**” where he presented the problem of microplastics and nanoplastics in the marine environment.

IWWG "Waste Vision 2100" for Dr. Savvilotidou



Further to the recent creation of the IWWG Young Task Group, IWWG announced the establishment of the Biennial Award “**Waste Vision 2100**”, addressed to early career researchers developing groundbreaking ideas and innovative solutions for big challenges in the area of waste management. For 2019, the Award winner, selected by a jury consisting of members of the IWWG-MB, was **Dr. Vasiliki Savvilotidou**, a principal research engineer at the **Laboratory of Toxic and Hazardous Waste Management** of the Technical University of Crete. “Waste Vision 2100” was awarded to Dr. Savvilotidou during IWWG Sardinia Symposium 2019.

Dr. Savvilotidou has 7-years laboratory experience in innovative recycling of electrical and electronic equipment and received her Ph.D. for the research on the "Development of recycling techniques in 1st and 2nd generation waste photovoltaic panels" in 2019. In her thesis she developed groundbreaking ideas and innovative solutions in the very complex and emerging topic of management of photovoltaic waste. In particular, she investigated approaches for the recovery of bulk and critical raw materials as well as reuse options of glass and plastic in the construction sector.

ESSDERC Best Paper Award for TUC Electronics Laboratory



Nikos Makris, Ph.D. student and Associate Professor **Matthias Bucher** of the Electronics Laboratory (School of Electrical and Computer Engineering) were selected for the [European Solid-State Device Research Conference](#) (ESSDERC) “**Best Paper Award**” for the paper:

Nikolaos Makris, Matthias Bucher, Farzan Jazaeri, Jean-Michel Sallese. [A Compact Model for Static and Dynamic Operation of Symmetric Double-Gate Junction FETs](#). Proceedings of the 48th European Solid-State Device Research Conference (ESSDERC), 2018.

The award was announced at the ESSDERC conference, Cracow, Poland, September 23-26, 2019. ESSDERC is the premier conference in solid-state devices in Europe. The paper is about a novel, analytical and charge-based compact model, which describes in an elegant way the static and dynamic behavior of the double gate Junction Field Effect Transistor (JFET). The model aims at the efficient and accurate design and simulation of JFET integrated circuits. JFETs are used in low-noise electronics, with applications in bioelectronics, astronomy etc., but also in applications under harsh conditions such as radiation, high/low temperatures, and power electronics for energy saving. The paper was presented in September, 3-6, 2018, in Dresden, Germany and is the result of a cooperation of the group of Prof. M. Bucher with the group at EPFL, Lausanne, Switzerland.

Vassilis Digalakis is the new Deputy Minister of Education responsible for Higher Education



Professor **Vassilis Digalakis**, former Rector of the Technical University of Crete and elected MP of Chania, is the new Deputy Minister of Education responsible for Higher Education issues. He was a candidate in the prefecture of Chania with the New Democracy Party and was elected to the national elections of July 7, 2019 as one of the four MPs of Chania.

IEEE Technical Field Award for Professor Markos Papageorgiou



The Institute of Electrical and Electronics Engineers (IEEE) on a yearly basis presents 32 Technical Field Awards (TFAs) for contributions to or leadership in a specific field of interest of the IEEE. Each year the IEEE Awards Board recommends a select group of recipients to receive IEEE's most prestigious honors.

TUC Professor [Markos Papageorgiou](#) was the recipient of the [2020 IEEE Transportation Technologies Award](#), with the following citation ***"For contributions to traffic flowing modelling and operations"***.

The IEEE Transportation Technologies Award was established in 2011 and is presented to an individual, a team, or multiple recipients up to three in number, recognizing advances in technologies within the fields of interest to the IEEE as applied in transportation systems. The award is sponsored by the following IEEE Societies: IEEE Industry Applications Society, IEEE Industrial Electronics Society, IEEE Intelligent Transportation Systems Society, IEEE Microwave Theory and Techniques Society, IEEE Power Electronics Society, IEEE Power & Energy Society and IEEE Vehicular Technology Society.

Prof. Elia Psillakis appointed Head of the EuChemS "Sample Preparation Task Force"



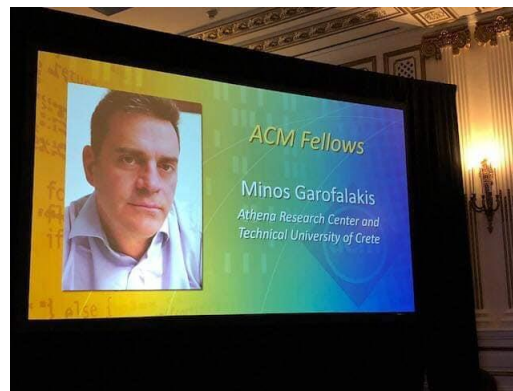
The [European Chemical Society \(Division of Analytical Chemistry\)](#), appointed [Elia Psillakis](#), Professor at the School of Environmental Engineering of TUC, as the head of the **"Sample Preparation Task Force"**. The aims of the task force will be the promotion of Sample Preparation in Europe through the facilitation of communication, information exchange and networking, the promotion of fundamental studies and cross-disciplinary collaboration and the organization of scientific events. To further benefit the area, efforts will be placed on promoting innovation and entrepreneurship and the active involvement of early stage researchers.

3rd place for MechatronicTeam at EBEC 2019 in Turin



MechatronicTeam won the 3rd place in the final round of the **European BEST Engineering Competition 2019** in the Team Design category. The European BEST Engineering Competition (EBEC) is the biggest engineering competition for students in Europe, organized by the Board of European Students of Technology, with nearly 6.500 students involved. This year's competition took place in Turin, Italy, from 25th to 31st July 2019. MechatronicTeam represented the Technical University of Crete, as well as all the Greek Universities, after winning the first place in the Local Round in Chania and the National-Regional Round in Patras. TUC students, Evangelos Dousakis, Epameinondas Goumenakis, Ioannis Blazogiannakis and Konstantinos Sigalas, had to compete among the best 120 finalists, highly talented and skilled students from all over Europe, on two team design subjects, assigned by Danieli Group. The competing teams had to work within a limited time space, with specific materials, in order to develop an automatic machine for mounting bars as well as a simple fire extinguisher.

Minos Garofalakis was honored 2018 ACM fellow



[Minos Garofalakis](#), Professor at TUC School of Electrical and Computer Engineering and Director of Information Management Systems Institute (IMSI) /Athena Research Center, was formally honored ACM fellow for his contribution to data processing and analytics, particularly data streaming, approximation, and uncertainty, during the annual **Awards Banquet**, which was held in San Francisco on **June 15, 2019**. ACM, the [Association for Computing Machinery](#), has named 56 members ACM Fellows for significant contributions in areas including computer architecture, mobile networks, robotics, and systems security, on December 2018. The accomplishments of the 2018 ACM Fellows underpin the technologies that define the digital age and greatly impact our professional and personal lives. ACM Fellows are composed of an elite group that represents less than 1% of the Association's global membership. The 2018 Fellows have been cited for numerous contributions in areas including accessibility, augmented reality, algorithmic game theory, data mining, storage, software and the World Wide Web.

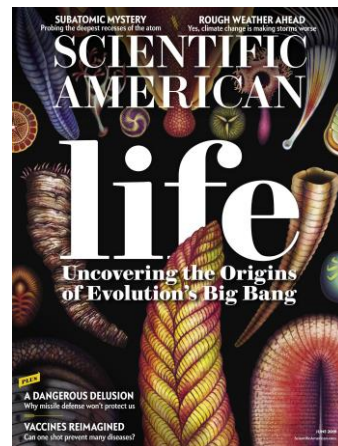
MCDM Gold Metal for Professor Michalis Doumpou



Professor [Michalis Doumpou](#) was awarded the **Gold Medal** by the International Society on Multiple Criteria Decision Making (MCDM), on the occasion of the [25th Conference of the Society](#), which was held in Istanbul, Turkey, during June 16-21, 2019.

The [MCDM Gold Medal](#) is the highest honor that the International Society on Multiple Criteria Decision Making bestows upon a scholar who, over a distinguished career, has markedly contributed to the theory, methodology, practice and professional development of MCDM. Since its establishment in 1992, 16 scholars have received this distinction. Professor Doumpou is the second Greek researcher to receive this award.

TUC's "Internet of Plants" at Scientific American



Scientific American science magazine (June 2019 Issue) introduces the article entitled [The Internet of Plants: Scientists turn lemons into tiny "radio stations" that signal when a tree needs watering](#), under the ADVANCES/Environmental Tech category. The article refers to the research of [Aggelos Bletsas'](#) brilliant student group (School of Electrical and Computer Engineering).

About the research: Existing electromagnetic signals are recycled and re-modulated with scatter radio, conveying environmental sensing information that can be picked up by commodity receivers, including existing smartphones, without any modifications. Sensors are so simple and thin in terms of hardware (due to recycling of existing signals), that can be powered by a lemon.

Yannis A. Phillis | Distinguished Lecturer at HKIAS



Yannis A. Phillis, Professor Emeritus and former Rector of the Technical University of Crete, was invited at the [Institute for Advanced Study of City University of Hong Kong](#), to present a distinguished lecture titled **"A Mathematical Model of National Sustainability: Where the World is Heading"**, on March 29, 2019. At the lecture, Professor Yannis A. Phillis, a Fellow of American Association for the Advancement of Science, discussed a mathematical model that defines and measures national sustainability, called SAFE: Sustainability Assessment by Fuzzy Evaluation.

Professor Evangelos Gidarakos as a keynote speaker at the 14th ICWMT, China



Prof. Evangelos Gidarakos (School of Environmental Engineering) was invited as a keynote speaker at the opening of the [14th International Conference on "Waste Management and Technology"](#), Beijing, China (March 2019). Themed with **"To Build A No-Waste Society"**, prominent researchers and government officials were invited to give keynote speeches on the pressing issues of solid waste management, chemicals and circular economy during the conference. Prof. Gidarakos's speech entitled **"Industrial Waste Management and Circular Economy"** focused on presenting the current situation of industrial waste management in Europe as well as, the possibilities resulting from the incorporation of basic principles of sustainability and in particular, the circular economy into this sector. At the same time, Prof. Evangelos Gidarakos accepted a formal proposal to become a member of the Scientific Committee of the Conference and Guest Editor in order to prepare a special issue of the journal **"Frontiers of Environmental Science and Engineering"**.

Second ERC Advanced Grant for Prof. Markos Papageorgiou



The [European Research Council – ERC announced](#) that the proposal **TrafficFluid** submitted by [Prof. Markos Papageorgiou](#) is one of the 222 proposals (out of 2,052 proposals submitted) that will be funded all over Europe and in all scientific disciplines, in the frame of the **ERC-2018-ADG (ERC Advanced Investigator Grants)**. TrafficFluid is the only project that will be funded in Greece. This is the second time, that ERC funds one of Prof. Papageorgiou projects, the first ERC Advanced Grant being the project [TRAMAN21 \(2013-2018\)](#).

The project entitled “**Lane-free Artificial-Fluid Environment for Vehicular Traffic**” has a duration of 5 years and a budget of 2.495.500 €. Traffic congestion is a serious threat for the economic and social life of modern societies as well as for the environment, which calls for drastic and radical solutions. The project puts forward an utterly original idea that leads to a novel paradigm for vehicular traffic in the era of connected and automated vehicles (CAVs). TrafficFluid combines lane-free traffic with vehicle nudging to provide, for the first time since the automobile invention, the unprecedented possibility to design (rather than merely describe or model) the traffic flow characteristics in an optimal way, i.e. to engineer the future CAV traffic flow as an efficient artificial fluid. To this end, the project will develop and deliver the necessary vehicle movement strategies for various road infrastructures (motorways and urban roads), along with microscopic and macroscopic simulators and traffic management actions.

Pioneering research from TUC at “Research Outreach”



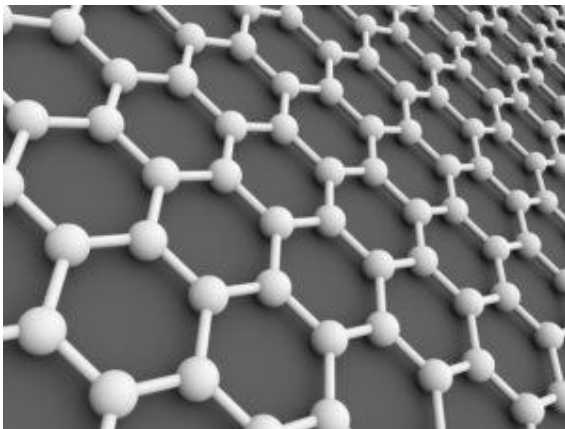
Hyperspectral imaging in art restoration and identification

Pioneering research by members of the Technical University of Crete and its associates are included in the [Research Outreach](#) e-publications, underlining the importance and the impact on international level.

Professor [Costas Balas](#), Director of the **Electronics Laboratory** (School of Electrical and Computer Engineering, TUC), and his research group, are experts in improving and developing hyperspectral imaging technologies for both medical and art conservation applications. As far as it concerns art conservation, hyperspectral imaging devices can be used to identify not just what chemicals are present in pigments on the surface layers of paintings, but also what lies underneath.

Professor Balas' interest in hyperspectral imaging was originally motivated by his work in the field of cancer diagnosis and biomedicine. In this field, there is a need for devices that can successfully and accurately profile and image tumors within the body as part of the diagnostic process, but there are a number of features of the technique that can be applied to a diverse range of applications, including art restoration and identification. Professor Balas and his team used this technology to study one of **Doménikos Theotokópoulos' (El Greco)** masterpieces, "The Baptism of Christ".

The goal of the project coordinated by the Benaki Museum was to provide technical information to art historians to allow them to date and authenticate the painting and to determine what the physical condition of the painting was to aid with conservation work. During this process, the team found a number of surprising results that only hyperspectral imaging could have unearthed, including the numerals 'MDLXVI', indicating the year 1566.



A model of a crystal lattice

In their recent paper, "**Nonlinear Kinetics on Lattices Based on the Kinetic Interaction Principle**", Professor **Giorgio Kaniadakis** (Polytechnic University of Turin) and Professor [Dionissios Hristopoulos](#) (School of Mineral Resources Engineering, TUC) investigate whether the Master Equations or Fokker–Planck Equations are better for understanding how atoms move between lattice points within solid materials. The Master Equations are discrete in nature by construction, but the Fokker-Planck Equations are not. The motion of particles in lattices involves discrete jumps between the lattice sites. Master equations are the mathematical tool used to describe the dynamic evolution of physical processes on lattices [and] their solutions determine the probability of finding a particle at any time at a specific lattice site. On the other hand, the Fokker–Planck Equations assume that space is continuous. However, space and time must be discretised in order to achieve a mathematical solution of these equations on electronic computers. An interesting result is that the method used to discretise the Fokker-Planck Equations has an effect on their final outcome. Professors Kaniadakis and Hristopoulos used a Statistical Physics approach, which encompasses particles that behave as fermions, bosons or anyons, to tackle the problem. The main result of this research is that physical processes on crystal lattices are more correctly described by means of master equations, which take into account the lattice structure. In contrast, the discretization of the Fokker-Planck equations depends on the chosen mathematical approximation. As a result, it is possible to obtain terms that change the physics of the studied process, especially in the case of nonlinear phenomena.

International distinction for Yannis A. Phillis



Yannis A. Phillis, Professor Emeritus and former Rector of the Technical University of Crete, was elected as member of the [Academia Scientiarum et Artium Europaea](#) (European Academy of Sciences and Arts) (class VI – Technical Sciences), in November 2018. On March 2nd, 2019, the Academy celebrated its 29th Festive Session, in Salzburg, Austria, with a welcome ceremony honoring around 80 new members from 26 different countries, who were inaugurated as ordinary Academy members.

The Academy's mission is to stimulate cross-disciplinary collaboration between reputable scientists of all disciplines, leading artists and practitioners of governance. Their purpose is to analyze important societal challenges and to help solving complex issues for the wellbeing of Europeans' future. The Academy brings together over 2000 eminent scholars and practitioners, among them 34 Nobel Prize winners, from across Europe. They are divided into 8 classes: Humanities, Medicine, Arts, Natural Sciences, Social Sciences, Law and Economics, Technical and Environmental Sciences, World Religions, Corporate and Public Governance.

"Drones4Refugees" finalist at the "Innovate for Refugees" Competition



The idea "**Drones4Refugees**" by [SenseLab](#) (TUC's Space Informatics research group) has been selected within the **5 finalists** (*Ideas Track*) of the international [MIT Enterprise Forum Pan Arab "Innovate for Refugees"](#) Competition. "**Innovate for Refugees**" Competition (IFR) is a global competition for the best tech-driven solutions addressing the challenges faced by refugees across the globe. Launched on "World Refugee Day" three years ago, IFR had been at the forefront of the efforts alleviating the plight for many refugees in the world.

In its third edition, "Innovate for Refugees" received applications from over 50 countries from around the world, highlighting the competition's popularity, and the universality of the issue at hand. Judges chose 10 finalists, 5 for each track (Ideas track and Startups Track), with TUC's SenceLab as **the only European team at the finalists' list**.

Representing "Drones4Refugees", Assoc. Prof. **Panagiotis Partsinevelos**, together with TUC alumni, **Dimitrios Chatziparashis** and **Stylianos Manoudakis**, have attended the final event ceremony which took place at King Hussein Business Park, Amman, Jordan. The members of the Sence Lab participated in a 3-day [MIT Bootcamp](#) training, administered by MIT experts who prepared the finalists to the final round of judging.

Drones4Refugees is the first low cost Unmanned Aerial System that can geolocate several moving objects in the sea on real time, providing continuously precise coordinates of people in need to the authorities.

Team members: Assoc. Prof. Panagiotis Partsinevelos, Achilles Tripolitsiotis, Asst. Prof. Hamdan Ali M. Hamdan, Aggelos Antonopoulos, Dimitrios Chatziparashis, Stylianos Manoudakis and Dr. Phoebe Spei.





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