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GREECE INNOVATES

SEPTEMBER 2013



GREECE INNOVATES!

2nd COMPETITION FOR APPLIED
RESEARCH & INNOVATION



INTRODUCTION

8
Introductory note by Dimitris Daskalopoulos,
president of SEV

9
Introductory note by Christos Megalou,
CEO of Eurobank

THE FINALISTS

APPLIED RESEARCH

12
A CHEMICAL LABORATORY ON THE GO

16
SAVING ENERGY IN SHIPPING

20
IMPROVING THE LIFE OF PATIENTS

24
NEW GENERATION NANOTECHNOLOGY MATERIAL

28
A DIGITAL MAGAZINE THAT KNOWS YOU

32
SMART NANOSTRUCTURED WATER, OIL AND
DIRT-REPELLENT SURFACES

36
NANOPARTICLES: A NEW WEAPON IN THE FIGHT
AGAINST THE INVISIBLE ENEMY

40
IMPROVING THE QUALITY OF LIFE OF PEOPLE WITH
MOVEMENT DISORDERS

44
HYPER-VISION FOR PHYSICIANS

48
SMART AND ADJUSTABLE MOBILE TELEPHONY
ANTENNAS

INNOVATION

54
THE FIRST NATURAL DETERGENT IN EUROPE

58
PORTABLE SYSTEM FOR DNA ANALYSIS USING
SOUND WAVES

62
SHIELDING THE SEAS AGAINST INVASIVE SPECIE

66
THE PACK THAT TURNS OLIVES INTO A SNACK FOR
ANY HOUR OF THE DAY OR NIGHT

70
SUN-SHIELDING PROPOLIS

74
TURNING OIL MILL WASTE INTO A VALUABLE RAW
MATERIAL

78
ONE CHASSIS FOR EVERY TYPE OF VEHICLE

82
NEW HOPE IN THE FIGHT AGAINST INFERTILITY

86
ACCESS TO THE SEA FOR PEOPLE WITH PHYSICAL
DISABILITIES

90
MEASURING THE QUALITY OF VISION

UNIVERSITIES

94
ARISTOTLE UNIVERSITY OF THESSALONIKI

98
UNIVERSITY OF PATRAS

102
TECHNICAL UNIVERSITY OF CRETE

106
TECHNOLOGICAL EDUCATIONAL INSTITUTE OF
CRETE

110
UNIVERSITY OF IOANNINA

114
NTUA INNOVATION AND ENTREPRENEURSHIP UNIT

THE RUNNERS-UP

119
THE 91 COMPETITION QUALIFIERS

GREEK INNOVATION IN THE LIMELIGHT

With 216 high-level and internationally innovative proposals from all over Greece, the second Greece Innovates! competition organized by SEV and Eurobank goes one step beyond awarding and showcasing important efforts for the future in the fields of scientific and technological research: it contributes towards making knowledge part of the Greek culture and creating a critical number of innovations that will generate new sources of income for the national economy.

By Kostas Deligiannis

THE FIRST Greece Innovates! competition, jointly held by SEV and Eurobank two years ago, showcased Greek scientists conducting cutting-edge research. Repeating this success was no coincidence: the second competition confirms that despite adversities, innovation has deep roots in Greece and, in this sense, it can become part of the national culture, provided that it is brought to the limelight, it can inspire and it may become an example. With an even more dynamic presence this year, Greek researchers proved yet again that they are global leaders, developing model technologies and services that are ready to be launched in the market.

The 20 finalists in the categories of Applied Research and Innovation cover a wide range of technologies that can improve our everyday life. As an indication, the 20 shortlisted proposals include an advanced seawater filtration system, as well as a portable laser device for direct and accurate determination of chemical elements in solid materials. Furthermore, there is a structure offering autonomous access to the sea for people with lower-limb disabilities, as well as a healthy all-Greek olive snack in innovative packaging. Finalists were singled out among 216 proposals that met

typical competition requirements (161 in innovation and 52 in applied research). The written assessment was carried out by 159 scientists, experts in the respective fields. The two winners per category were selected in Athens in end June via the open public oral assessment procedure, which counted for 25% of the final score.

Similarly to the first competition two years ago, the level of participants was particularly high. Another feature all these proposals had in common was that they concerned fields that attract international research and business interest, such as medicine, the environment, mobile communications, informatics and microelectronics. Therefore, if these technologies are turned into commercial applications, they will address the global market, thus forming the conditions for the Greek economy to become more competitive and extrovert.

Besides, one main goal of the Greece Innovates! competition is to encourage cooperation between the research and the business world, in order to attract investors willing to invest in Greek innovations. Thus, the high participation rate proved for a second time that Greek researchers are on the lookout for opportunities, so that their ideas do not end up unused in some laboratory drawer.



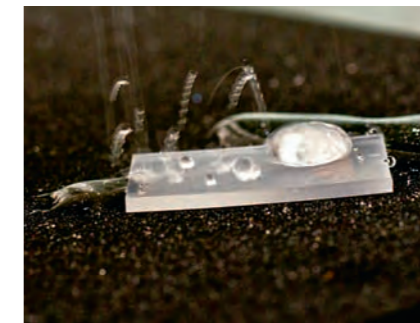
CANDIDATE GEOGRAPHIC DISTRIBUTION

Out of the 216 participants assessed, it is notable that only 45% came from Attica, which shows that regional Greece plays a leading role in producing innovation. As a matter of fact, 21% of the proposals were submitted from Thessaloniki and the broader Macedonia region, 10% from Patras and the rest of the Peloponnese and 8% from Crete. The rest of the country accounted for 16% of proposals, coming from Larissa, Volos, Livadia, Evia, Epirus, Corfu, the Cyclades and Thrace. The geographical breakdown applies for both competition categories, namely Applied Research and Innovation.

Furthermore, proposals were submitted by almost all types of organizations conducting research in Greece, e.g. universities and technical universities, small and large companies, as well as independent research centres and foundations.



Innovative olive packaging by GAEA.



Drops bouncing on a superhydrophobic surface at the Demokritos Microelectronics Institute.



Fertility and sperm infectious agent studies at the LOCUS laboratories.



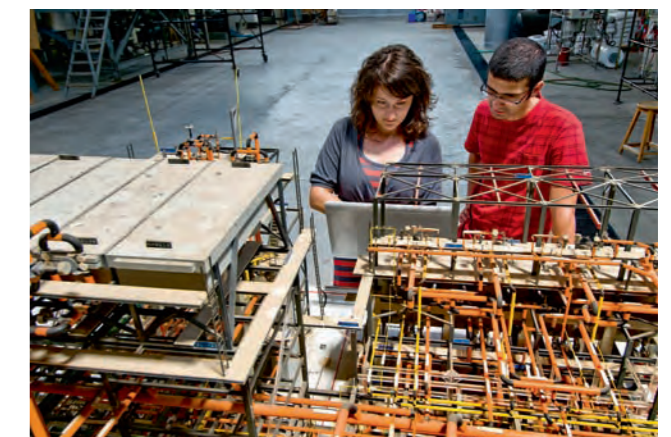
SeaTrac makes the sea accessible to people with disabilities.



Testing the phasmatic supervision endoscope at the Electronics Laboratory of the Technical University of Crete.



Propolis is turned into a sun-blocking agent in Apivita products.



View of the National Technical University of Athens laboratories.

THE AWARDS CREATED MARKET OPENINGS

Two years after the first Greece Innovates! competition, the benefits for those who were distinguished are more than tangible.

■ **SHOWCASING** the originality of the 21 proposals that were shortlisted in the second stage of the first Greece Innovates! competition contributed to their moving from theory to practice and becoming commercially available. Furthermore, with regard to several proposals that were already available in the market, the competition helped highlight their unique and innovative features. Overall, out of the 21 teams, 8 have signed business deals for the commercial development of their technologies, while 7 innovations have evolved into marketed products. These include the biological water filtering system developed by Dimitrios Vagenas, Professor of Environmental Systems at the

University of Ioannina, together with Athanasia Tekerlekopoulou. According to Mr Vagenas, had it not been for the competition, the filter would never have been made commercially available. The competition gave him the opportunity to establish a company which generated profits from the very first year, by selling the product to Greek exporting companies that required certification for industrial waste recycling.

At the same time, four of the innovation companies that participated in the first competition were included in the Go International business delegation to Moscow on 27 and 28 May 2013.



APPLIED RESEARCH

1st prize: The Raycap research team for the “High tech solution to protect modern electronic devices or equipment from surges in the power network”. The team consisted of Dr Zafiris Politis (representative), Dr Fotis Xepapas, Dr Grigoris Kostakis, Mr Spyros Pappas, Ms Eleni Dimou, Mr Dimitris Ioannidis and Ms Eva Giannelaki.

Two years later: Although the system was intended solely for professional applications, the impression it made prompted Raycap to readjust its strategy. Since 2012, the company has also been successfully selling it to simple consumers, both in Greece and abroad.

2nd Prize: The Danaos Management Consultants SA research team for the “Advanced Enterprise Resources Planning System designed for supporting shipping enterprises”. The team consisted of Mr Takis Varelas (representative), Ms Sophia Archontaki, Mr Ioannis Dimotikalas and Ms Dimitra Moutsikopoulou.

Two years later: Danaos has sold its award-winning software to more than 15 companies all over the world.

THE COMPETITION HITS THE MEDIA

Internet, social media, other print and electronic media (led by communication sponsors Kathimerini and SKAI) contributed to making this effort known and inspirational

As stated by many participating scientists in their interviews for the album you are holding in your hands, the best publicity for the second Greece Innovates! Competition was the first competition and the exceptionally positive impression it left them with. In addition to that, SEV and Eurobank executives literally travelled all over the country, holding more than 130 events to present the competition to representatives of academic institutions, science parks or business innovation clusters.

The events continued even after the shortlisted proposals entered the second stage of the competition, with exhibitions and presentations in several cities. In this context, and with the aim of unveiling these 20 proposals to local communities, events were held in Thessaloniki (Noesis Science Center and Technology Museum), Patras (Politeia Event Hall) and Heraklion (Foundation for Research and Technology – Hellas).

All 20 finalists were featured in newspaper Kathimerini, in K magazine and on SKAI channel, the communication sponsors for the competition yet again. In addition, all news relevant to the Greece Innovates! Competition was also posted on www.kainotomeis.gr. Furthermore, a Facebook campaign that commenced around mid-May was met with great success.

The number of visits to the site increased by 7% within just 15 days, while by early September, the competition had received 17,500 Likes on its social network page. The users who saw the advertisements performed 35,406 actions (Likes, Shares, Comments, etc.), 13,064 of which came from non fans – yet one more element that demonstrates the effectiveness of the campaign. In fact, friends of friends amounted to 2,036,689 social media users.

At the same time, 92 videos were uploaded on YouTube, with a total of 18,676 views, while the Twitter account attracted 580 followers.



INNOVATION

1st prize: The Aristotle University of Thessaloniki research team for “AquAsZero: a highly efficient and low cost granular solid material that removes both trivalent and pentavalent arsenic from drinking water”. The team consisted of Dr Manasis Mitrakas (representative), Ms Sofia Tresintsi, Dr Konstantinos Symeonidis, Mr Iosif Georgiou, Mr Georgios Stavropoulos, Mr Anastasios Zoumboulis, Mr Ioannis Tsioulos and Ms Maria Katsikini.

Two years later: The team has started launching the product into the Greek market via the company Loufakis Chemicals, with more than six municipalities and one hotel having already bought it.

2nd Prize: The Centre for Research and Technology (CERTH) research team for “Second-generation biodiesel fuel production through the catalytic hydro-processing of waste cooking oil”. The team consisted of Dr Stella Bezergianni (representative), Ms Aggeliki Kalogianni and Mr Athanasios Dimitriadis.

Two years later: The innovation is at the pilot application stage, in cooperation with Hellenic Petroleum SA. In fact, a garbage truck in the city of Thessaloniki already runs on frying-pan diesel.





TRANSPARENCY, MERITOCRACY, EXTROVERSION

SEV and Eurobank have set as the highest priority to ensure the credibility of the competition, so as to safeguard its high status.

■ LAST APRIL, the Greece Innovates! Competition was awarded a distinction in the Large Companies category at the European Corporate Social Responsibility Award Scheme out of a total of 30 candidates. This distinction confirms that this competition was embraced by both the scientific community and society in general as an initiative that makes people a priority in the business world.

To achieve this goal, SEV and Eurobank set up three distinct committees, with the Honouring Committee consisting of SEV and Eurobank representatives, who safeguarded the high status of the competition yet again this year. Of course, one main reason why the Greece Innovates! Competition has made an impression both times is that the process of shortlisting the proposals and finally selecting the winners was fully transparent and based solely on meritocracy. This is due to the fifteen-member Scientific Council, which yet again consisted of distinguished scientists, who in turn

appointed the researchers-evaluators who graded each proposal. One detail that shows just how credible this process was relates to the case of the written assessments. When the difference in the score between the first two evaluators exceeded 5 points, a third assessment was conducted.

The unsung hero of the Greece Innovates! Competition was yet again its Organizing Committee, consisting of seven SEV and Eurobank executives. The Committee coordinated everything competition-related – from the purely competitive part to its promotion and event organizing – and contributed to this competition meeting with even greater success than the first one. Besides, it is no secret that the Committee members were pleasantly surprised by several of the participants as to the level of research conducted in Greece. Thus, it became their ambition to pass on to the widest audience possible the optimism they initially felt themselves.

THE ORGANIZING COMMITTEE

Chairman: Ioannis Kyriakou, SEV Deputy General Director

Members: Dimitris Vergados, Coordinator of the SEV Media and Communications Network. Fokion Deligiannis, Director of Infrastructures and Business Environment Unit of SEV. Michalis Mitsopoulos, Senior Advisor of Infrastructures and Business Environment Unit of SEV. Rallis Spandonidis, Management Consultant at Eurobank, member. Natalia Christodoulou, Assistant General Manager, Head of Communication & Marketing Sector at Eurobank. Rozi-Anthi Athanasiou, Head of Marketing, Wholesale Banking at Eurobank.



Members of the Organizing Committee

From left to right: Standing: Dimitris Vergados, Michalis Mitsopoulos, Rallis Spandonidis, Ioannis Kyriakou. Seated: Natalia Christodoulou, Fokion Deligiannis, Rozi-Anthi Athanasiou

THE SCIENTIFIC BOARD

1. Despina Alexandraki, Director, Biology Department, University of Crete
2. Constantinos Vayenas, Professor, Department of Chemical Engineering, University of Patras
3. Georgios Vassilikogiannakis, Associate Professor, Department of Chemistry, University of Crete
4. Evangelos Dialiynas, Professor, School of Electrical and Computer Engineering, National Technical University of Athens (NTUA)
5. Georgios Doukidis, Professor of e-Business, Athens University of Economics and Business (AUEB)
6. Doros Theodorou, Professor, School of Chemical Engineering, NTUA, Member of the National Council of Research and Technology of Greece (NCRT)
7. Emmanuel Kakaras, Professor, School of Mechanical Engineering, NTUA
8. Yiannis Caloghirou, Professor of Economics of Technology and Industrial Strategy, NTUA
9. Pantelis Kapros, Professor, Energy Economics, NTUA
10. Athanasios Konstantopoulos, Professor, Chairman of the Board of Directors of the National Centre for Research & Technology (CERTH)
11. Spyros Lioukas, Professor, Department of Management Science & Technology, AUEB
12. Nikolaos Melanitis, Professor, Hellenic Naval Academy, and Associate, Foundation for Research & Technology (FORTH) / PRAXI Network
13. Babis Savvakis, Professor of Molecular Biology, Faculty of Medicine, University of Crete, and President and Scientific Director of the Alexander Fleming Biomedical Sciences Research Centre
14. Nickolaos Travlos, The Kitty Kyriacopoulos Chair in Finance, Dean, ALBA Graduate Business School, at the American College of Greece
15. Fokion Deligiannis, Director of Infrastructures and Business Environment Unit of SEV and Coordinator of the Scientific Council

DIMITRIS DASKALOPOULOS

SEV Chairman

“We should encourage young people and small enterprises”

The innovation competitions jointly held by SEV and Eurobank aim at showcasing those brilliant ideas that are cultivated in the minds of young people in Greece and contributing to their implementation.

Innovation is the main axis for economic diversification and diversification is the main factor for progress. More than 65% of global development in the second half of the 20th century was the result of technological progress and innovation.

Contrary to other countries, Greece does not offer the necessary incentives that will encourage the younger generation to seek something new and original. In fact, it discourages them. At the same time, institutions in Greece favour maintaining the status quo rather than supporting efforts for change. Our educational system sticks to fields that are not related to modern economic requirements and applies learning methods that discourage independent and critical thinking.

The institutional framework in Greece forces the banking system to operate on the basis of tangible collateral and it does not let it recognize the economic value and inherent guarantees offered by a novel idea. Social mechanisms greatly hinder young people's attempts to climb the ladder and favour more advanced ages – even if the latter have lost their momentum.

However, experience has shown that radical thinking and action in the economy and business come from young people and small businesses. It is they who are bold. And it is they who dare take chances in order to succeed.

These innovation competitions and the support offered to the winners aim precisely at encouraging this boldness and finding ways of turning these innovations into products and successful businesses.

It will take many years of hard and strenuous effort for Greece to restore what was lost in its economy. And in this effort, new ideas and young people must have the first say.



Contrary to other countries, Greece does not offer the necessary incentives that will encourage the younger generation to seek something new and original. In fact, it discourages them.

CHRISTOS MEGALOU

Chief Executive Officer of Eurobank Group

“The competition builds bridges of cooperation for the creative forces of the country”

Although we are already in the fourth year of a deep economic crisis that is affecting every aspect of society, for the second year running, Eurobank and SEV have managed to discover a part of Greece that is undertaking entrepreneurial activities and is investing in research and innovation, through the Applied Research and Innovation Competition initiative. Investing in innovation is a long-term strategy, so its results are not evident right from the start. However, it is necessary in order to improve the business and investment conditions Greece so desperately needs. The participation of so many notable researchers and scientists in the second consecutive Competition reinforces our belief that the times we are going through can and should mark a new beginning for everyone and create optimistic prospects for the country's future and its ability to turn over a new leaf. This is the greatest challenge of the last decades and can be addressed only through setting in motion new and innovative entrepreneurial forces.

Restarting the economy and placing it on a growth track should be achieved by expanding our production base, taking advantage of our competitive strengths, and creating an extrovert and export-oriented economy, focusing on producing quality services and products with special emphasis on innovation, research and knowledge. This is the only way to strengthen our competitiveness and create an entrepreneurship-friendly environment that will attract investors and create opportunities and jobs.

The Competition provided the opportunity to showcase proposals that can lead to unique technological applications and innovative services on an international level, thus assuming a national role, by contributing to the extroversion of the Greek economy.

During an economic recession, when people are dominated by feelings of disappointment and fear for the future, the Competition brought to the forefront the contrast between prospect and uncertainty. It is the people themselves who attest to that; scientists and researchers dedicated to science and their vision, people who work systematically, consistently and with unflinching dedication, people who develop pioneering ideas and dare to apply them in order to produce cutting-edge technology.

We have discovered another world, which creatively opts to envision coming out of the crisis: a business community that is ready to undertake initiatives, contribute to developing ideas that stand out and move forward, going against the overall feeling of pessimism. It is precisely this world of sound private entrepreneurship that can become the tip of the spear in Greece's efforts for growth.

These two communities must meet so that innovative ideas can be applied and turned into productive applications. This is precisely the objective of the Greece Innovates! Competition: to build bridges of creative cooperation in order to showcase the creative and productive forces of the country and contribute to strengthening competitiveness, so as to restore credibility, return to positive growth and prosperity rates and exit the crisis.

Sticking to past mentalities does not work; the need for substantial change has never been more urgent. Greece has the human resources to come out stronger from this unprecedented crisis. We just need to join forces and believe in this national effort. Eurobank has made the strategic choice to support this new Greece and invest in ideas of the future, in people who create and dare envision a better tomorrow.



**APPLIED
RESEARCH**

A CHEMICAL LABORATORY ON THE GO

A device that can be conveniently transferred in a small case and conduct chemical analysis of solid materials (from industrial products to archaeological findings) in a flash.

By Kostas Deligiannis

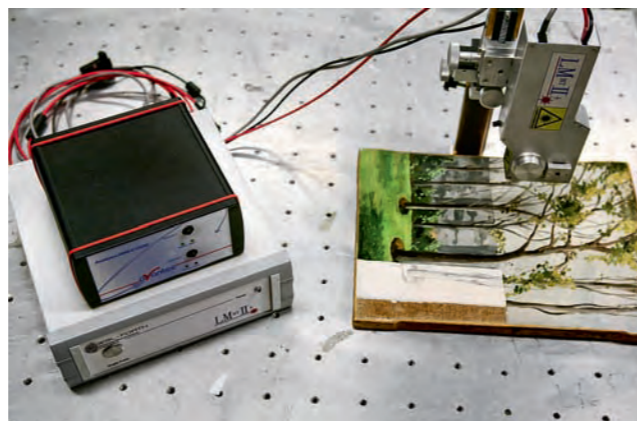
APPLIED RESEARCH: LMNT II portable laser device for rapid and direct identification of chemical elements in solid materials

ORGANIZATION: Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology – Hellas (FORTH), www.iesl.forth.gr

CONTACT EMAIL: psiozos@iesl.forth.gr

RESEARCH TEAM REPRESENTATIVE: Dr Panagiotis Siozos, postdoctoral researcher

ASSOCIATE: Dr Demetrios Anglos, Associate Professor at the University of Crete Department of Chemistry and FORTH researcher



To conduct the chemical analysis, the object needs to be placed a few centimetres in front of the head of the device, which will irradiate it with a laser pulse.

□ “GIVEN THE CURRENT practice regarding chemical analysis, which involves collecting samples from a worksite and sending them to the laboratory, our aim was to reverse the process and bring the laboratory to the worksite, so that the analysis may be conducted on the spot,” explained Panagiotis Siozos, postdoctoral researcher at FORTH. Together with Demetrios Anglos, Associate Professor at the University of Crete Department of Chemistry and FORTH researcher, Dr Siozos has developed a portable device which can examine any solid object and determine its exact elemental composition.

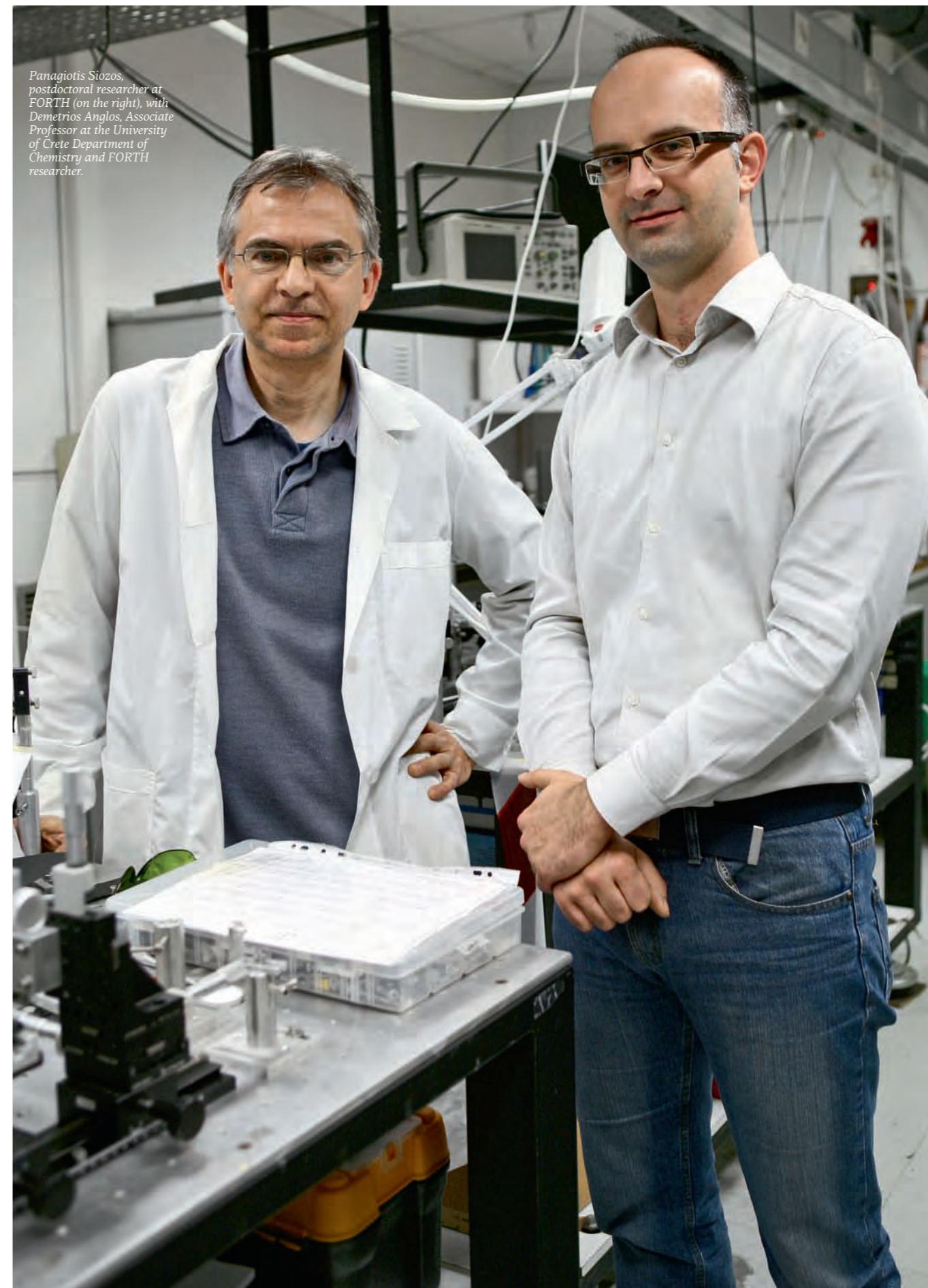
As this essentially translates into less time-consuming and cheaper chemical analyses, there are numerous potential applications for the device. “For starters, it could be used by various industries that do not have a specialized laboratory to analyze raw materials, products or a specific stage in their production,” stated Dr Anglos. Furthermore, the device could be used in recycling plants and scrap

processing units for material sorting.

The device could also provide valuable help to archaeologists and conservation experts, by immediately analyzing the elemental composition of art works or excavation findings. “At the same time, it could become a useful tool in environmental preservation, as it may be used to examine the presence of toxic metals in solid samples,” added the Associate Professor.

In all these cases, the only thing one needs is a laptop to connect to the device. To conduct the chemical analysis, the object must be placed a few centimetres in front of the head of the device, which will bombard it with a laser pulse. As the pulse focuses on an infinitesimal area, it overheats the spot and produces plasma that emits radiation.

“The operating principle lies in the fact that the properties and intensity of the emitted light depend on the chemical elements quantity within the object,” noted Dr Siozos. The light is collected by an optical fibre and is delivered to the



Panagiotis Siozos, postdoctoral researcher at FORTH (on the right), with Demetrios Anglos, Associate Professor at the University of Crete Department of Chemistry and FORTH researcher.

A FEW WORDS ABOUT THE RESEARCH

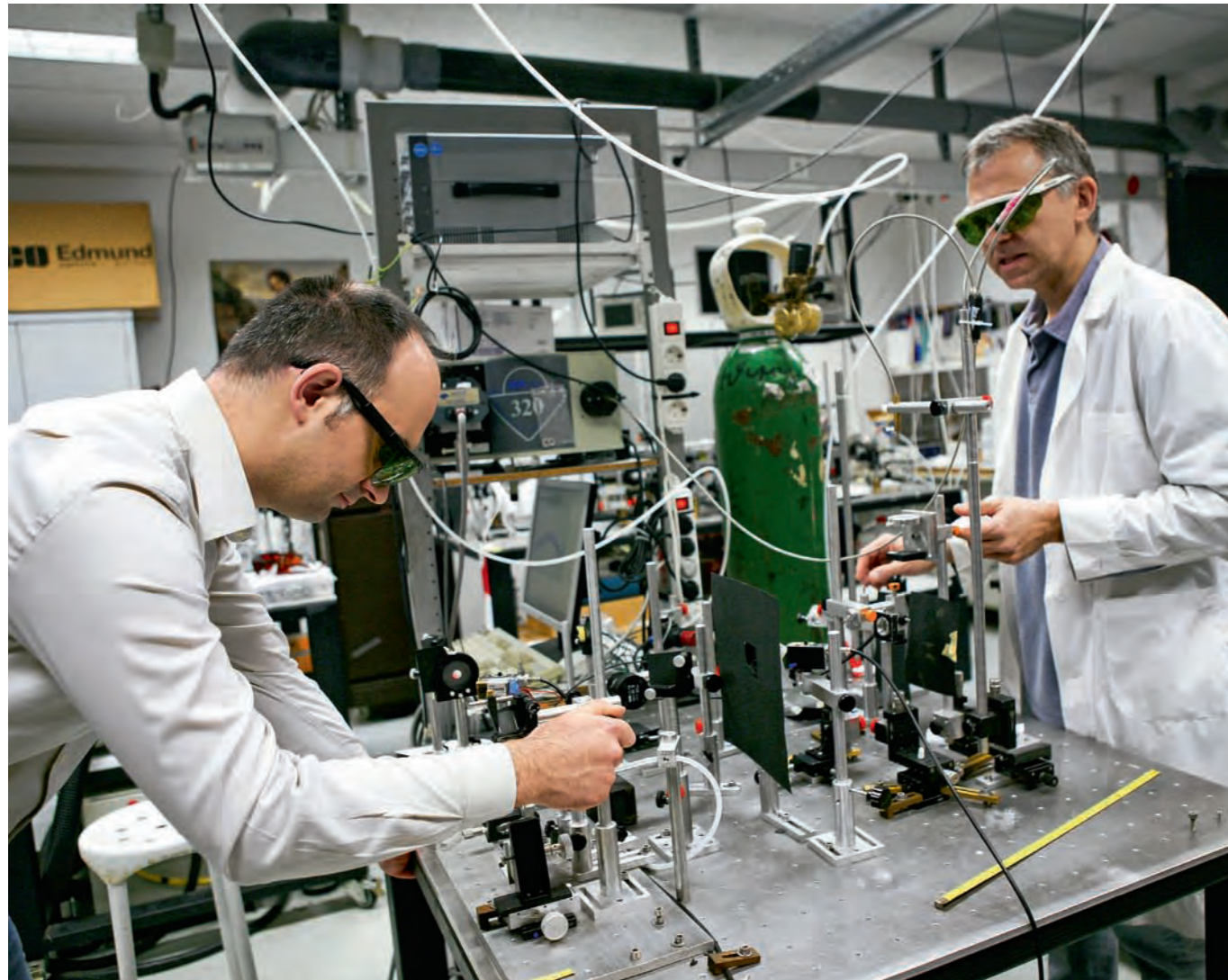
The ability to detect chemical elements and determine their quantity is vital in various industrial sectors (real-time monitoring of processes, raw material and product control), in environmental protection (toxic waste, recycling), as well as in cultural heritage applications (labelling materials in archaeological findings, works of art and monuments).

The LMNT II is based on laser-induced breakdown spectroscopy (LIBS) and can detect nearly all the elements of the periodic table. It is portable, which makes it suitable even for use outdoors, and presents all the advantages usually found only in laboratory-based analysis devices, such as sensitivity and selectivity.

The time required to perform the analysis is minimal, allowing for a large number of measurements, while no sample preparation or use of chemical reactors is required. Furthermore, the special software that has been developed makes it possible even for non-specialised personnel to use the device in a variety of applications.

detector, where it is analyzed. The recorded spectra are then transferred to the laptop. Special software processes these measurements and displays the results on the computer screen. The whole process does not last longer than a fraction of a second.

Much bulkier systems that are already available in the market operate in a similar manner. However, these cater for large industries and are permanent installations. "What we have managed to do is fit this technology in a small case. The device is in fact smaller than similar devices developed abroad and we estimate that the cost will also be lower," noted the researcher. Apart from the fact that it is portable and provides results almost instantly, the device also has the advantage of being safe, as it is not based on ionizing radiation, and fairly simple to use by anyone with minimal training.



This technology started being developed 10 years ago and now it is ready to be converted into a commercial product.



In just a few seconds, the device not only identifies the elemental composition of any solid material, but also determines the quantity of each chemical element contained in the sample.

ABOUT THE COMPETITION

"An opportunity to build bridges connecting research to companies"

Given that there are not many opportunities for scientists to come into contact with the industrial and business sector in Greece, this competition offers an excellent chance to build bridges connecting research to companies. I believe that in this manner, it contributes to making use of significant innovations rather than leaving them on the laboratory shelves. In our case, we are hoping that our participation in the competition will assist us in finding companies that wish to either incorporate our technology in their production process or work with us in order to turn the laboratory prototype of the portable device into a marketable product.

Panagiotis Siozos

The portable system started being developed around 2000 by Dr Anglos and then the baton was passed on to Dr Siozos. "The initial goal was to analyze objects in museums and archaeological excavations. In fact, the initial funding came from the USA and the Institute

for Aegean Prehistory Study Center for East Crete (IN-STAP). The first version of the system we developed is being used in the Institute's Conservation Laboratory in Crete," noted the Associate Professor.

Over the following years, and with funding from European and national programmes, the researchers managed to upgrade the device. In the context of a European project in 2007, they used it in the Damascus Archaeological Museum in Syria, while last year they conducted chemical analyses at the archaeological site of Tiryns. "So far, tests have been limited to managing cultural heritage items. This is due to the fact that as an institution, we are in close contact with archaeological societies and bodies," stressed Dr Siozos.

He further added that the technology is mature enough to be tested and be made commercially available for any application. "The sole condition is to find business partners, so that the device can hit the market," he concluded.

"What we have managed to do is fit the technology of a bulky, permanent laboratory in a small case. The device is in fact smaller than similar devices developed abroad and we estimate that the cost will also be lower." **Ε**

«What we have managed to do is fit the technology of a bulky, permanent laboratory in a small case. The device is in fact smaller than similar devices developed abroad and we estimate that the cost will also be lower».

SAVING ENERGY IN SHIPPING

A computer platform that uses mathematical equations to simulate the operation of integrated ship energy systems and propose design and operational improvements, thus lowering costs, enhancing safety and reducing air pollutants.

By Kostas Farmakis

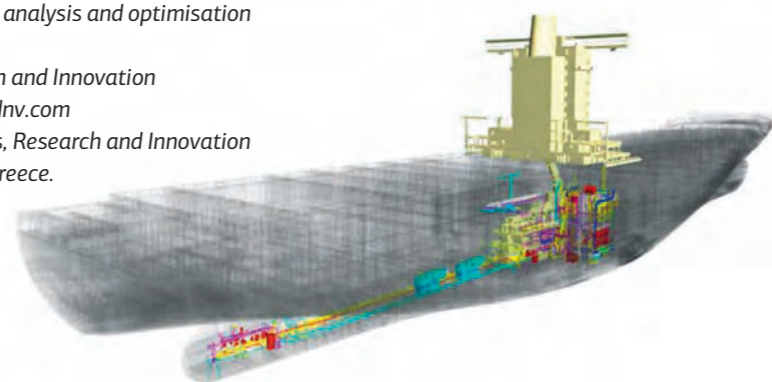
APPLIED RESEARCH: COSSMOS: Computer platform for analysis and optimisation of integrated ship energy systems

SCIENTIFIC BODY: Det Norske Veritas (DNV) SA Research and Innovation

CONTACT EMAIL: nikolaos.kakalis@dnv.com / pirmar@dnv.com

RESEARCH TEAM REPRESENTATIVE: Nikolaos Kakalis, Research and Innovation Director at the Norwegian Classification Society (DNV) in Greece.

ASSOCIATES: Georgios Dimopoulos,
Charikleia Georgopoulou, Iason Stefanatos,
Alexandros Zymaris



□ “THE SHIPPING INDUSTRY has always been interested in energy efficiency, i.e. how to lower fuel consumption and reduce air emissions,” stated Dr Nikolaos Kakalis, Research and Innovation Director at the Norwegian Classification Society (Det Norske Veritas - DNV) in Greece. “However, it used to focus on considering and improving each machinery component separately. One study concentrated on engines, another on boilers and so forth. But, as Aristotle pointed out in his Metaphysics, the whole is greater than the sum of its parts. In the context of our ongoing desire to improve, this led us to applying systems engineering in shipping. The main concept was that when a system is composed of interacting machinery, as is the case in ships, one needs to study the system as a whole, as well as its individual components. This perspective opens up new horizons in improving energy efficiency.”

By applying a way of thinking that was new to the shipping industry, Nikos Kakalis and his team devised and developed a new computer modelling and simulation framework: a computer platform they named COSSMOS (Complex Ship Systems MOdelling & Simulation). “The system’s description in English led to an acronym that resembles a Greek word.

Therefore, we opted for that name, as this tool was 100% developed in Greece.” COSSMOS is the first platform in the world that models, simulates and optimizes energy and marine machinery systems at the overall system level. “Take for example a tanker unloading. Several machinery components take part in this process. A boiler produces steam under pressure, the steam moves turbines, which in turn move the oil pumps. By inserting the conditions and parameters of the specific ship’s system in a COSSMOS model, we can simulate the unloading process. COSSMOS calculates the fuel consumption and compares it to the measured consumption. It then proposes changes in operational parameters to improve efficiency. Two Greek companies have thus far implemented this application on a pilot basis and the results have been very positive.”

Mr Kakalis also provided an explanation of mathematical modelling. “It is a way of describing physical reality through mathematics. Observing an actual system operation and understanding its basic physical mechanisms allow for translating it into equations, namely mathematical models. These describe a picture of the objective truth of the actual operation, which does not change. What changes is the



A FEW WORDS ABOUT THE RESEARCH

The main concept of systems engineering is that when a system is composed of interacting machinery, one needs to consider the system as a whole, in addition to its individual components. With the COSSMOS (Complex Ship Systems Modelling & Simulation) computer platform, ship machinery systems can be synthesized and tested on a computer, simulating real conditions. Simulation and optimization can be applied to anything from a simple pump to the entire engine room of a ship, for a variety of conditions in terms of load, temperature, speed, etc. This is achieved implementing mathematical equations developed by the team, which represent the physiochemical behaviour of machinery and their operations. The results can be then used either to assess and improve existing systems or to optimize the design of new ships and evaluate new technologies.

parameters relating to the design features of a machine and its operational variables. All these are inserted in computer code and verified with actual operational data. With the appropriate adjustments, the same COSSMOS mathematical model can describe a subsystem in ship A of one company or a similar subsystem in ship B (bigger or smaller) of another company. We have developed models for all the machinery found in a ship's engine room, thus forming the COSSMOS model library. In addition to optimizing tanker unloading efficiency and designing heat recovery systems in container ships, our team is also working on new technologies, such as hybrid propulsion and separating CO2 from flue gases onboard a ship."

Dr Kakalis has been working for DNV since 2008. COSSMOS was his idea. "Until 2008, when I joined DNV and we started setting up the Research and Innovation Department in Piraeus, I had little to do with shipping. Very soon, however, I identified this gap in the industry. We started by recruiting the appropriate people in the team and with our vision, desire and hard work, we managed to develop COSSMOS. At the same time, we collected feedback from Greek shipping companies – which are considered high-calibre – thus significantly accelerating our system development." Developing an innovative system such as COSSMOS requires an interdisciplinary team. "Our team includes two marine engineers, namely G. Dimopoulos, with a PhD from the National Technical University of Athens (NTUA) on ship energy system modelling and optimisation, and I. Stefanatos, with similar background. The team also comprises C. Georgopoulou and A. Zymaris, mechanical engineers with PhDs from NTUA on mechanical systems optimization. My contribution is combining these with systems engineering, the mathematical modelling of complex systems and their optimisation using advanced computational tools. I had acquired such experience abroad, in the context of my postgraduate studies in process systems engineering and my PhD in chemical engineering at Imperial College, as well as my postdoctoral research at Oxford University. My first degree was on metallurgical engineering at the NTUA."

So, how could COSSMOS change the world in the future? "If we could apply our approach in ship energy systems, existing ships



ABOUT THE COMPETITION

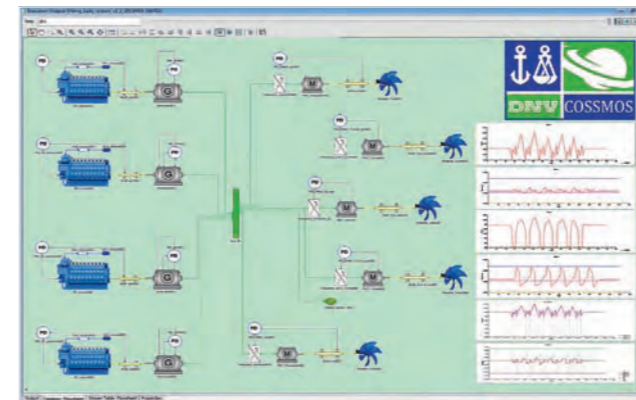
"Greece must rely on innovation"

We would like for organizations and people in Greece to see innovative products being developed. Especially in these hard times for the country, it is very important to showcase the efforts of Greek engineers and researchers. This is what makes the SEV and Eurobank initiative so special. Innovation, and how it can be used as a main growth pillar, should become a priority. Greece needs to rely on applied research and innovation. We need flexible and efficient mechanisms so that research and development results can be promoted in the market on time. In other words, we need to produce something useful that can create added value and, thus, profit.

Nikolaos Kakalis

"We have developed models for all the machinery found in a ship's engine room, thus forming the COSSMOS model library."

would operate more efficiently, new ships would be designed with holistically optimized engine rooms and the incorporation of new technologies would also run more smoothly. All these provide obvious benefits towards reducing fuel consumption and air emissions, which means better resource management and, thus, a small contribution to sustainability. We are the only R&D unit of ship classification societies in Greece. With this investment, DNV aimed at further supporting Greek



Above (from left to right): Alexandros Zymaris, Iason Stefanatos, Charikleia Georgopoulou, Nikolaos Kakalis, Georgios Dimopoulos.
Below, snapshot depicting a dynamic simulation of an electrical propulsion system on the COSSMOS interface.

shipping, offering even more innovative products and services. This is the purpose we have been serving consistently and thus far we have developed several pilot applications with shipping companies such as Arcadia Shipmanagement, Danaos Shipping, Louis Cruise Lines, Neptune Lines, Samos Steamship and Thenamaris Ships Management."

Since 2007, DNV has also entered into a strategic partnership with the NTUA School of Naval Architecture and Marine Engineering. The partnership has already reached its second stage, with DNV financing three PhD theses. "We believe that by strengthening our cooperation with internationally leading universities, such as the NTUA, we will reach even higher innovation levels overall. In this context, we have recently decided to further expand our cooperation with the NTUA by providing direct research funding to the NTUA School of Mechanical Engineering as well." E

IMPROVING THE LIFE OF PATIENTS

A pioneering electronic system enhances doctor-patient communication, helps carry out treatment with precision and monitors its course.

By Athos Dimoulas

APPLIED RESEARCH: Electronic Care and Treatment Compliance System

ORGANIZATION: PCC Hellas Patients Compliance Centers Ltd., www.pccint.eu

CONTACT EMAIL: georgem@pccint.eu

RESEARCH TEAM REPRESENTATIVE: George Mazarakis

ASSOCIATES: Zoe Tziakou, Dimitris Danatsas, Constantina Georgaki, Sophia Vassalou.



With large fonts and simple icons, the MDStation tablet has been designed to be easy to use by practically anyone.

□ PCC HELLAS has managed to build a bridge that reliably connects patients to their treating physicians. The role of the company is to ensure that treatment is completed in the best possible manner, while observing patient compliance, facilitating drug administration and smoothing out any rough edges in the cooperation between patients and their treating physicians. When treatment is properly followed, the problem is easier to overcome. Consequently, the quality of life of patients, as well as the people around them, is significantly improved. As PCC Hellas Managing Director George Mazarakis said, “The most important element is to succeed in changing patient mentality, in changing their behaviour. We behave one way when we are healthy and in a different way when we are facing a health problem.”

Mr Mazarakis founded PCC Hellas in 2006, being fully aware that he was breaking new ground in Greece and that a similar approach had already bore fruit abroad. “Some years ago, the US government had conducted a study which showed that patients who do not follow their treatment to the letter cost to the State billions of dollars. In the US, patient compliance is the law. This is not the case in Greece, where

patients have no place to lean on,” said Mr Mazarakis.

At first, they set up a call centre and a network of 60 healthcare professionals throughout Greece. PCC Hellas essentially stood between patients and doctors, facilitating information exchange and supporting the course of the treatment. In other words, PCC HELLAS received updated information regarding the treatment being followed and reminded patients – by placing a call or sending an SMS and when necessary, dispatching a healthcare professional – when they were supposed to take their medication, thus ensuring compliance to the physician’s instructions. The service then notified the physician on the course of the treatment. The services offered by PCC Hellas evolved over time, as it became clear that it was necessary to enhance communication between the two parties. “At some point, we realized that the physician, who is the most important player, was being informed by us over the phone. So we developed a web application, iPAX©, which transferred patient data to the physician’s computer automatically. There, apart from data on drug administration, the physician could also view comments made by the patients,



George Mazarakis in his office at PCC Hellas, the company he founded in 2006.

A FEW WORDS ABOUT THE RESEARCH

PCC Hellas has based its entire range of care-giving services on innovation and new methods. However, it is MDStation™ that has attracted growing attention, already making a positive impression wherever it has been presented in Europe: a modern and easy-to-use tablet PC that is addressed even to technology illiterates. The innovation that makes this system truly stand out is the patient's interaction with the tablet PC. For example, the following options are available: I took my medication, Remind me in one hour, I will not take my medication, etc. If patients respond that they have not taken their medication, new options open up: I do not have it, I think I am experiencing side-effects, I do not want to, etc. All of this information appears automatically on the physician's computer. There is also a section containing medication instructions, information on each patient's disease and a news feed. Finally, patients can call whomever they want to from a list, using video calls.

which could prove decisive, especially in cases of mental diseases." The fact that treating physicians could have an overview of the course of a patient at any given moment played an important role in how treatment would proceed, as it assisted them in better assessing the situation. "We do not interfere in any way. We simply help patients comply with the instructions of their treating physicians. Ideally, patients would not have any need for our services and would be able to contact their treating physician directly. But that is practically impossible," explained Mr Mazarakis.

Over the years, the system continued to evolve until the idea of a more integrated service arose. Thus MDStation™ was born; a system that perfected the PCC Hellas healthcare services. It is actually software that runs on smart phones or tablet PCs and has been specifically developed for patients. Through a friendly and easy-to-use interface, patients can stay up to date as to when they need to take their medication, resolve issues regarding their treatment, and submit problems and questions via questionnaires. In essence, it is an interactive patient-care system, as all data is automatically transferred to the company's central information management system and, most importantly, to the physician's computer.

MDStation™ has been available since last September and was tested in a pilot programme. "The response we received from patients was more than encouraging. A patient even told their physician that they felt as if someone was always

"The most important element is to succeed in changing patient mentality, in changing their behaviour. We behave one way when we are healthy and in a different way when we are facing a health problem."



Above: The PCC Hellas team: (from left to right) Constantina Georgaki, George Mazarakis, Sophia Vassalou, Dimitris Danatsas and Zoe Tziakou.

Below: Typical screenshots of MDStation™ in operation.

close by. Now we are waiting for buyers. We are looking for funding. This is why we have targeted the foreign market, where there are more options available," said Mr Mazarakis. He further noted, "In several conferences we have attended, we found that we had no competition simply because we combine everything in a single tablet PC".

So, at the moment, there are four different parameters at play: the patients handling the MDStation™ device, PCC Hellas via a central information management system, the healthcare professionals who are notified on time whenever they are needed, and the physicians via iPax©. Apart from the obvious advantages, the model proposed by the company can be used on a broader scale, e.g. in hospitals and care-giving facilities, and can eventually become a reliable health-monitoring tool all over the country. €

ABOUT THE COMPETITION

"We would like to get in touch with other research groups and the wider public"

When we heard about the first competition, we thought of submitting a proposal, but hesitated. We did keep an eye on it, however, and we were impressed. So, this year, we gave it a try and we realized that it is a very remarkable effort. In terms of self-confidence and morale, the experience has been very positive for us and the fact that we made it to the top ten gave us the strength and courage to continue. On a different note, we believe that the competition will provide us with the opportunity to come into contact with other research teams and broaden our contact with the public, which would be very hard to do so if we just waited for someone to click on our site.

George Mazarakis

NEW GENERATION NANOTECHNOLOGY MATERIALS

Using an internationally unique method, which happens to be an industrial secret, Glonatech produces nanostructured carbon that can be used as raw material in plastics, paints and construction materials, offering qualities such as increased durability, higher conductivity and greater fire resistance.

By Kostas Farmakis

APPLIED RESEARCH: Nanotechnology, environmental protection and human-life improvement

ORGANIZATION: Global Nanotechnologies (Glonatech SA), www.glonatech.com

CONTACT EMAIL: info@glonatech.com

RESEARCH TEAM REPRESENTATIVE: Dr Stefanos Nitodas, R&D Director at Glonatech Research Programmes

RESEARCH TEAM MEMBERS: Panagiotis Xenokostas, Nikolaos Bosinas, Dr Andreas Stefopoulos, Dr Georgios Tsiakatouras



Nanostructured carbon in the form of a composite material with a polymer.

□ NANOTUBES are a new material stemming from carbon processing. Industries use it as a raw material to deliver products with enhanced qualities (increased durability, water proofing, better thermal behaviour, conductivity, etc.) in multiple applications, such as all types of plastics, smart fabrics, ship paints, metal alloys, car bumpers, anti-frost aircraft coatings, solar panels, etc. Nanotubes have been named so after their production method. They come out of the laboratory in the form of small cylindrical tubes of nanostructured carbon, i.e. carbon developed at the nanometer scale, a scale that corresponds to sizes thousands of times smaller than a human hair. Glonatech, a subsidiary of ONEX Group, is a global leader in producing and processing carbon nanotubes.

“The initial goal for our investment was radical innovation; namely to work on something entirely new compared to global standards. Today we sell nanotubes to the industrial sector, either as primary material or as part of the intermediate products required to manufacture their end-products. We often undertake to conduct research and development for said industries, but only up to a point,” stated Panos Xenokostas,

CEO and Chairman at ONEX and Glonatech.

Dr Stefanos Nitodas, R&D Director at Glonatech, started working on nanotechnology not only due to its potential to create improved materials, but also because of the fact that “it is a science that leads to high added-value industrial products that can be sold abroad, as well as help the industrial sector in Greece acquire know-how and, by extension, gain a competitive advantage.”

Dr Nitodas offered only a few out of dozens of examples: “By adding nanostructured carbon in the plastics of the automotive industry, we have achieved up to 50% increase in durability, thus significantly extending the life of the product, while increasing its weight by a mere 5%. An important application developed by the Glonatech research team concerns ship paints, in some cases even doubling the life of the paint. At the same time, these paints have also proven environmentally friendly, as they simply push back marine micro-organisms with their mechanically-enhanced and water-repellent nanostructured surface rather than kill them, as is the case with existing products.”



“By adding nanostructured carbon in the plastics of the automotive industry, we have achieved up to 50% increase in durability, while increasing weight by a mere 5%.”
S. Nitodas



ABOUT THE COMPETITION

"It is an honour to participate"

We have entered a competition where the organizers' high standing is in itself the greatest reward for all of us at ONEX whose business strategy is focused on investing in new technologies.

Panos Xenokostas, CEO and President

One of the most interesting applications developed by Glonatech is monitoring the structural integrity of composite materials. Dr Nitodas further added, "Carbon nanotube electrodes within concrete or other polymers can record electrical resistance at any given moment. The nanotubes are dispersed and create a conductible grid, which can be measured. If the material cracks, the nanotube grid is affected and this can be detected by the change in electrical resistance. Knowing the electrical resistance allows you to deduce the mechanical strain the material at hand has suffered." This means that nanotube electrodes can, for example, be placed in marble monuments, aircraft wings or bridges to provide an instant alert in the event of substantial wear and tear. Dr Nitodas also suggested the use of nanotubes in Medicine, something that is both interesting and ambitious. "In the future, we will be able to use them as medication carriers. We will place the medication on their surface and insert them in the body in a controlled manner. This will assist in fighting neurological diseases or cancer, which cannot be efficiently treated at the moment. In general, nanotechnology can be applied to everything. We could even change the power storage capacity or speed of a computer; there are countless possibilities."

From a business perspective, it was a huge risk, as noted Mr Xenokostas. "It is one thing to have laboratory experiments showing that we would achieve the results we were after and an entirely different thing to apply your technology on an industrial scale. One can never be sure. We have now reached a point where it is perfectly safe to say that we have won this bet. Our next step is to let the international community know that we truly stand out; that all the other nanotubes out there are nothing but powder compared to our own."

Mr Xenokostas also spoke about how Greek high-tech companies are faced with distrust. "Some say, 'We only knew of Greece producing oil and wine; how did you come up with nanotechnology?' But they soon realize that we are of the highest level; that we have a vertical industry; that we have clients in France, UK, Turkey, Spain, Italy, the USA and elsewhere; and that there is only a handful of companies that can compete with us. We have been given the chance to take them by surprise by doing something innovative, and we have done just that." Of course, a company active in such a specialized field in Greece is faced with a series of other problems. "Firstly, we are located far from our major clients. Secondly, we are competing against companies that operate in more innovation-friendly entrepreneurial environments. Furthermore, the crisis has made accessing funds harder and more costly. In fact, subsidies, grants and EU support in general never reach the actual companies in Greece, for various reasons. We remain here because this is where we started; no one could have predicted what was about to happen." The other



Producing carbon nanotubes in Glonatech's pilot unit.

big problem in Greece is that the State does not provide opportunities to young scientists to become creative or find employment in their respective fields. University programmes are not enough and there are only a few companies that can absorb them. "I was reading the other day that there are about 22,000 Greek graduate theses online. But there are far less than 22,000 industries out there. This should make one ponder: so much knowledge is going to waste or is being channelled abroad, without any benefit to Greece."

These days, Glonatech is working with British Airways and various university institutions in Europe to produce new aircraft coatings, the main objective being to reduce the frost formed on the wings and other surfaces of the aircraft, thus improving safety and lowering costs. "Our next step is to develop many more industrial applications and dynamically enter the US market. Only the truly worthy companies can make it there. It makes no difference where you come from; if you can prove you are the best, then they will work with you," stressed Mr Xenokostas.

To sum up, Dr Fotini Gianakopoulou, newly-added associate (R&D Director – Product Development), described the company's vision in a few words: "Glonatech provides specialized solutions, adapted to the needs of the client, using nanomaterials. Our goal is to produce advanced products at a lower cost and with improved qualities. Contrary to common practice, our objective is to turn knowledge into a marketable product, thus connecting science to society." **E**



Above: Water-repellent paint, based on carbon nanotubes with mechanically enhanced durability. Middle: Measuring electrical resistance on carbon nanotube sensors. Below: Nanostructured carbon chemical processing.

A FEW WORDS ABOUT THE RESEARCH

The production method used for nanostructured carbon and its intermediate products is Glonatech's industrial secret. "In short, carbon in the gaseous state is deposited on certain metals and is converted into a solid state, acquiring qualities that depend on the type of catalyst used. To develop intermediate products with plastics, nanotubes – processed or not – are mixed with some type of polymer or resin, using proprietary methods," described Dr Nitodas.

The nanostructured carbon contained in the final composite product (plastics, paints, construction materials, etc.) provides qualities such as increased durability, water proofing, fire resistance, etc. Furthermore, it can be used as a sensor and information-transfer material to monitor the structural integrity of buildings, aircraft parts, etc.

A DIGITAL MAGAZINE THAT KNOWS YOU

NOOWIT filters the content from your favorite sources (sites, blogs, etc.) according to your interests and edits a magazine just for you.

By Giannis Papadimitriou

APPLIED RESEARCH: Web-based digital magazine publishing platform which can adapt to the interests of each individual reader

ORGANIZATION: Noowit, www.noowit.com

CONTACT EMAIL: n.nanas@noowit.com

RESEARCH TEAM REPRESENTATIVE: Dr Nikolaos Nanas

ASSOCIATE: Christos Spiliopoulos



The cover of Discover magazine, in its basic Noowit personalised version. Nikolaos Nanas (on the right) and Christos Spiliopoulos in their office in Larissa.

□ ONE OF THEM had been researching Adaptive Information Filtering in the context of his PhD in the UK. The other had been developing complex algorithms for computer software. When the theoretical knowledge of the former met with the practical mindset of the latter, Noowit was born: a web-based publishing platform that gives everyone the opportunity to publish a digital magazine which can adapt to the evolving interests of each individual reader. In fact, both Dr Nikolaos Nanas, researcher at the Institute for Research and Technology, Thessaly, and Christos Spiliopoulos, University of Thessaly graduate, aspire to radically improve the way information is published, distributed and presented to individual users and communities on the web.

Nowadays, a large share of the readers shift from traditional media to the web, spending much of their time and energy in front of a screen until they finally locate

what they are interested in, often reading articles they would have rather skipped in the process. Noowit essentially puts this mess of electronic content into order. Which explains precisely the motto of its creators: Cut the noise. "Undoubtedly, web technology has led to vast changes in the way we keep ourselves informed. It is obvious that the mass information model has collapsed and we are now rapidly heading towards personalized information. Noowit fights off the excessive intake of information from the modern web and allows us to focus on the more important articles, filtering the noise that goes along with them," explained Dr Nanas, 38, inventor of the revolutionary platform.

The name Noowit is a combination of the words nous (the Greek word for "mind") and "wit". It has been inspired by Biology and it is based on the function of the immune system. Specifically, it is an extension of



A FEW WORDS ABOUT THE RESEARCH

Noowit creates and keeps a profile of interests for each reader. The profile is capable of constantly adapting to any changes in these interests. Therefore, the Noowit targeted publishing platform can offer each reader a personalized magazine (entitled Discover), which composes articles from various sources (newspapers, magazines, blogs) in real time, according to the topics readers have selected. Users can also create their own intelligent magazine, either with content selected from third parties or with primary content. When a registered reader opens one of the Noowit magazines, their profile assesses articles according to their interests and composes the pages of the magazine accordingly. The most interesting articles take up more space and are thus easier for the reader to spot.

Nootropia, namely the result of Dr Nanas' PhD. As he described, "The immune system creates a network of antibodies which constantly self-organize in order to maintain the identity of the body and separate it from the exogenous pathological environment. In a similar manner, Nootropia uses a network of features to create a profile. Said features are extracted from the content of an article, as well as other metadata (author, reader, etc.), to compose an identity of interests for one or more individuals."

In other words, whoever visits the Noowit site will be able to choose from which sources they wish to receive information. The articles they are interested in, sorted by date, will be displayed in the form of a digital magazine on their computer screen. Without the reader even noticing, the system will record their last selections and adapt the content of the magazine accordingly. "The more one reads about a specific issue, the more the relating content will expand in their magazine pages," explained Noowit co-founder Christos Spiliopoulos, 28. "Consequently, it will be easier to trace what one wants and skip anything irrelevant. This adaptation to individual interests can become highly tailored. For example, let's say someone has been looking for yellow round dining table chairs for the last two weeks. Noowit will not just display articles generally relating to interior design, but also articles specifically tailored to their specific current interests."

Since readers will be able to exclusively read what they are interested in, there are more chances a journalist's article will reach its target audience and not be lost in the endless sea of texts on the web. "Targeted distribution multiplies the possibility of the reader interacting with the article, i.e. sharing it, commenting on it, etc. We ensure that producers can publish their content in a targeted manner and that consumers can easily find what they are looking for. So a new information



"We ensure that producers can publish their content in a targeted manner and that consumers can easily find what they are looking for."

ABOUT THE COMPETITION

"Noowit could not have been absent from this competition"

Undoubtedly, there is a huge gap between the business world and academia. It is preposterous to be waiting two years to receive funding for your innovation. So I entered this competition because the organizers are making a serious effort to showcase and promote research and innovation in Greece. Noowit could not have been absent from this competition.

Nikolaos Nanas

economy will gradually be created," noted Dr Nanas.

In addition to targeted reading, another important capability offered by Noowit is that anyone will be able to publish their own digital magazine, either by producing original content or by curating material from different sources. This way the creators of Noowit are paving the way for independent journalism. "From each deal we close with the media, a small sum will be withheld to create a common bank for journalists. Through the platform, independent journalists will be able to earn money by cashing in their likes (the number of users who liked the article)," explained C. Spiliopoulos.

Noowit was launched on Thursday 28 March 2013,



Constantly tuned in to Noowit to cover the needs of their new venture.

Sample of a Noowit page, adapted to the interests of a hypothetical reader.

in a private beta version, which means that access was permitted only after a personal invitation. Since early July, its creators have allowed open access to the platform, which in addition to English and Greek, supports other languages as well (such as French, Spanish, German and more); yet another innovation of Noowit, which has been receiving encouraging messages. "Already there is strong interest both in Greece and abroad, and we remain optimistic that the response will be positive. Of course, making our vision of Noowit a reality, namely a global personalised publishing platform, requires investment funds for various purposes, including staffing the company." E

SMART NANOSTRUCTURED WATER, OIL AND DIRT-REPELLENT SURFACES

Plasma Nanotexturing is a method used to induce nanotopography on polymeric and other surfaces, making them antireflective, and when combined with chemical modification, water- or oil-repellent, and essentially self-cleaning. These surfaces can also be used in bioanalytic labs-on-a-chip, achieving faster and more reliable biological and chemical analysis.

By Kostas Farmakis

APPLIED RESEARCH: Smart nanostructured surfaces and bioanalytic labs-on-a-chip: Nanotexturing soft matter

ORGANIZATION: National Center for Scientific Research (NCSR) Demokritos

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RESEARCH TEAM REPRESENTATIVE: Evangelos Gogolides, Director of Research at the Institute of Microelectronics, NCSR Demokritos, www.imel.demokritos.gr

RESEARCH TEAM MEMBERS: Angeliki Tserepi, Sotirios Kakampakos, Panagiota Petrou, Nikolaos Vourdas, Katerina Tsougeni, Maria-Elena Vlachopoulou, Antonia Malainou, Kosmas Ellinas



Water droplets bouncing on a water-repellent surface.

“MICRO and nanotechnology have been inspired by nature. Many surfaces of plants and animals have amazing properties, e.g. they are water-repellent, self-cleaning, and even oil- or frost-repellent. Just think of water-lily leaves or duck wings. By looking at these surfaces through an electron microscope, one can observe that they consist of hierarchical micro and nano structures,” explained Dr Evangelos Gogolides, Director of Research at the NCSR Demokritos Department of Microelectronics. But in order to mimic nature, one needs to apply cutting-edge technology, often creating new, innovative processes. “In this context, we used electrical plasma discharges and developed a method for creating nanostructured and chemically modified surfaces using gaseous plasma nanotechnology, which we coined “nanotexturing”. In essence, we created a new texture on the surface of the material in the micro and nano scale. These surfaces can repel water, ice, oil and

microorganisms, while at the same time, their transparency is controllable; hence they are smart. The applications literally have no limit: window panes and plastics that do not accumulate dirt, can repel water or oil, do not reflect light, are antibacterial, the list just keeps going on.”

Nanotechnology is an ongoing revolution unlike any we have seen since the time polymers and integrated circuits were invented and started being widely used. In a way, we are getting reacquainted with materials. Everything can be modified so as to attain improved properties, while new uses can be found for each material. In the case of the NCSR Demokritos researchers, their innovation arose almost by chance. “The main mission of our Department was mainly to fabricate prototypes of integrated circuits and microsensors for microelectronics and related applications. In essence, we were taking matter and creating nanostructures. In this microfabrication process chain, the



The research team (from left to right): Nikolaos Vourdas, Katerina Tsougeni, Angeliki Tserepi, Marilena Vlachopoulou, Evangelos Gogolides, Kosmas Ellinas, Antonia Malainou, Panagiota Petrou, Sotirios Kakampakos.



Young researchers processing materials in the plasma reactors.



Located in the clean room of the Microelectronics Department, the unique electron beam lithography infrastructure in Greece shapes matter in dimensions below 10 nanometres.

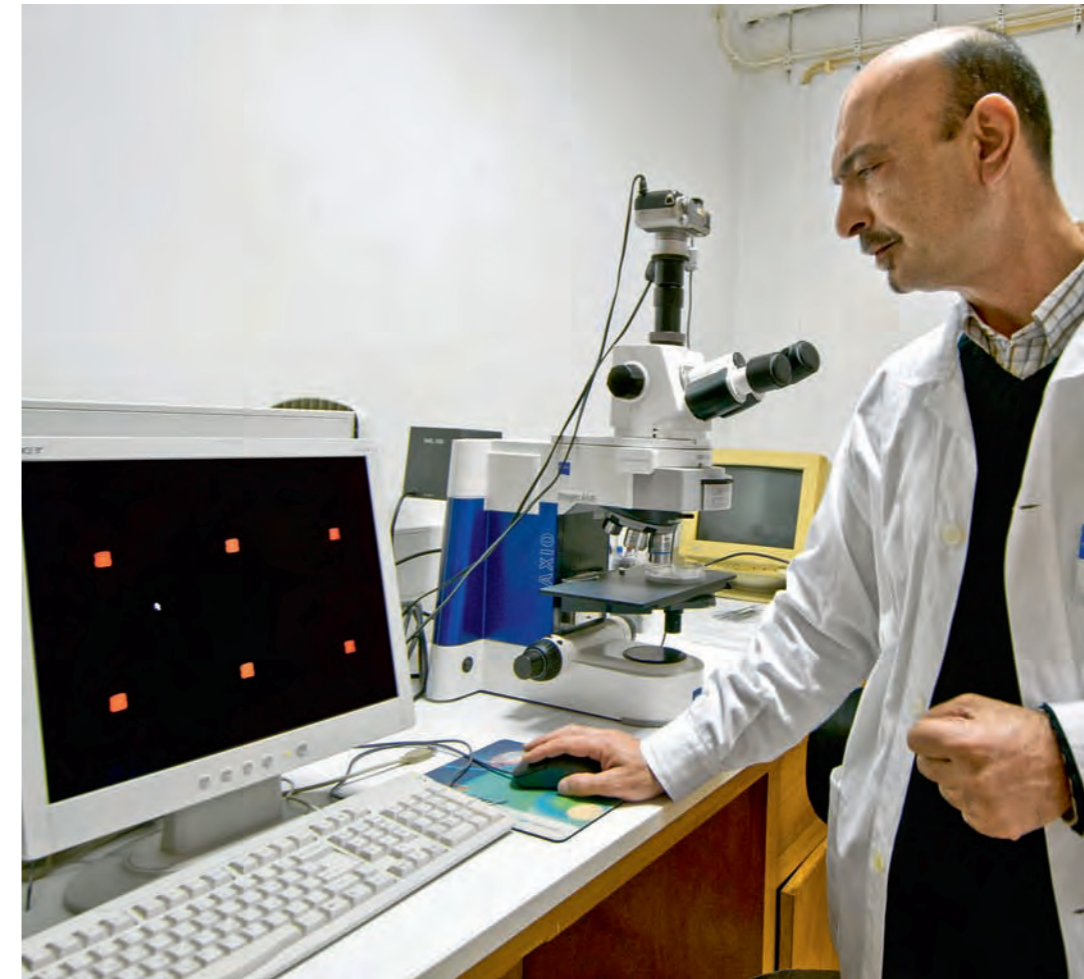
A FEW WORDS ABOUT THE RESEARCH

As Dr Gogolides explained, "We used electrical plasma discharges as a nanotechnology tool, in an effort to mimic nature. We developed a method for creating surfaces which are chemically modified and textured at the micro and nanoscale using gaseous plasma nanotechnology, which we coined "nanotexturing". Nanostructures created by the plasma are in the form of cones, columns or fibres. Depending on the plasma chemistry they can be either super-hydrophilic attracting water, or super-hydrophobic repelling water. In the latter case, they are self-cleaning, repelling not only water, but also ice, oil and microorganisms. At the same time, they are antireflective with controllable transparency, and, therefore, considered smart surfaces. Applications include self-cleaning window panels when it rains, antireflective polymers that do not hold water or oil and surfaces that never attract bacteria, to name a few. On the other hand, super-hydrophilic surfaces may also be useful for medical purposes as they favour biomolecule and cell attachment. Furthermore, we incorporated nanostructured surfaces inside bioanalytic labs-on-a-chip and as antifouling microchannel walls repelling protein, DNA or cells, or as spots used for their effective attachment and capture. We try to trap rare cells in such arrays, such as bacteria found in contaminated food, or to enrich a liquid with the desired chemical substances. These smart arrays can be used by chemists, biochemists, biologists and engineers to improve and simplify several bioanalytic applications, combining low cost and fast processing."

"When a droplet falls on a nanostructured water-repellent surface, it ends up standing on a forest of branched micro and nano columns. Because the contact surface of the droplet is so small, it somewhat stands in midair, retaining its round shape, and eventually rolls off."

surfaces we were fabricating had to be perfectly smooth; the micro-nanostructures had to be geometrically perfect and arranged in perfectly periodic positions. However, while etching a silicon surface we noted that significant roughness started to form, an undesirable feature in classical microelectronics. By depositing a hydrophobic coating on the roughened material, we found that water droplets we would let fall on the material would bounce away, as they would do on the surface of lotus leaves. In essence, we had randomly created a so-called biomimetic structure inside our lab. We then tried doing the same with Plexiglas and other polymers and discovered that it is a general phenomenon: We realized that when properly processed in plasma, all polymer surfaces can become self-cleaning as well as water- or oil-repellent. We have also realized that, under different plasma chemistry, all polymer surfaces could also become water attracting (hydrophilic)," described Dr Gogolides.

These super-hydrophobic qualities can be acquired by an object either when processing directly the object in the plasma (this is the case of plastics) or when applying a coating on it and then plasma processing the coating (as



Nanostructured protein microarray as seen through the fluorescence microscope.

ABOUT THE COMPETITION

"We hope that our innovation will become known to many companies and manufacturers"

We consider that plasma nanotexturing is a mature technology; it is covered by international patent applications, and has become known through many scientific publications. Furthermore, it has a vast range of applications. It is, therefore, high time for the technology to become known to the broader public, and to be applied to industries, where it can provide a competitive advantage. We hope it will become known to many companies and manufacturers, so that it may be used in close collaboration with them. We hope that the existing knowledge and high-level human resources will be channelled to society in a broader way, and not by simply feeding the new knowledge and research production chain.

Evangelos Gogolides and associates

is the case of ceramics). In the case of photovoltaic solar panels or simple window panes, the aim is to let all solar radiation pass through, while at the same time making them anti-reflective, as well as water- or ice-repellent.

But how does water repelling work in the nanoscale? "When a droplet falls on a nanostructured water-repellent surface, it ends up standing on a forest of branched micro and nano columns. It cannot fall between them, much like a bed of nails. Because the contact surface of the droplet on this hierarchical and water repellent surface is so small, it somewhat stands in midair, retaining its round shape, and eventually rolls off. Think of ice skating, where we increase the sliding capability by reducing the contact surface."

The second important area where plasma nanotexturing technology can be applied is bioanalytic labs-on-a-chip. These are laboratories sized approximately a few cm² which perform chemical, biological, environmental and other analysis using the tiniest sample volume. They can be used to detect DNA mutations in patients or to test pathogens in food products. "These take advantage of microfluidics and their related properties. Our breakthrough was to incorporate in such labs-on-chip both super-hydrophilic

and super-hydrophobic surfaces. Using our technology we could incorporate pumps and micro valves into these labs-on-a-chip. Just as transistors have shrunk in size and calculations can now be carried out so much faster, chemical analysis can now be conducted within minutes instead of days, precisely because the dimensions have been reduced. The innovative element of our technology is higher intensity and lower detection limit. This is because nanostructured surfaces emit a stronger signal, and thus offer the potential to detect substances, disease markers, antibodies, and rare cells in a safer and easier way."

Dr Gogolides is generally worried about the progress of research in Greece and the fact that it is not used properly. "In Greece, we have an amazing educational level, but there are no industries to absorb all these scientists, graduates and PhD holders, who end up giving private lessons to educate the next generation, who will do the same. The majority of them should be channelled to production industries. Universities need to form start-ups. On the other hand, companies must understand the need for research if they wish to survive. It is the only way to move forward." E

NANOPARTICLES: A NEW WEAPON IN THE FIGHT AGAINST THE INVISIBLE ENEMY

The innovative tool developed by the CERTH team helps biologists/toxicologists to study the health impact of soot and engineered nanoparticles that poison the atmosphere.

By Giannis Papadimitriou

APPLIED RESEARCH: System for preliminary in-vitro health impact assessment of size-selected nanoparticles

ORGANIZATION: Aerosol and Particle Technology Laboratory, Chemical Process & Energy Resources Institute, Centre for Research and Technology Hellas (CERTH), www.certh.gr

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RESEARCH TEAM REPRESENTATIVE: Eleni Papaioannou

RESEARCH TEAM MEMBERS: Akrivi Asimakopoulou, Penelope Baltzopoulou, Nickos Vlachos, Leonidas Chasapidis, Filis Akritidis, Michalis Vatos



Multiculture Exposure Chamber (MEC)(on the left) and Selective Particle Size (SPS) sampler (on the right).

□ OVER THE LAST YEARS, an increasing number of scientists are supporting that nanoparticle size plays an important role in human health. The smaller a particle is, the more penetrating it becomes and, by extension, the deeper it goes into the body, causing asthma, allergies and even DNA mutations. Such nanoparticles are the soot particulates, which are a million times smaller than a millimetre and are responsible for chronic and severe biological ef-

fects on the lungs.

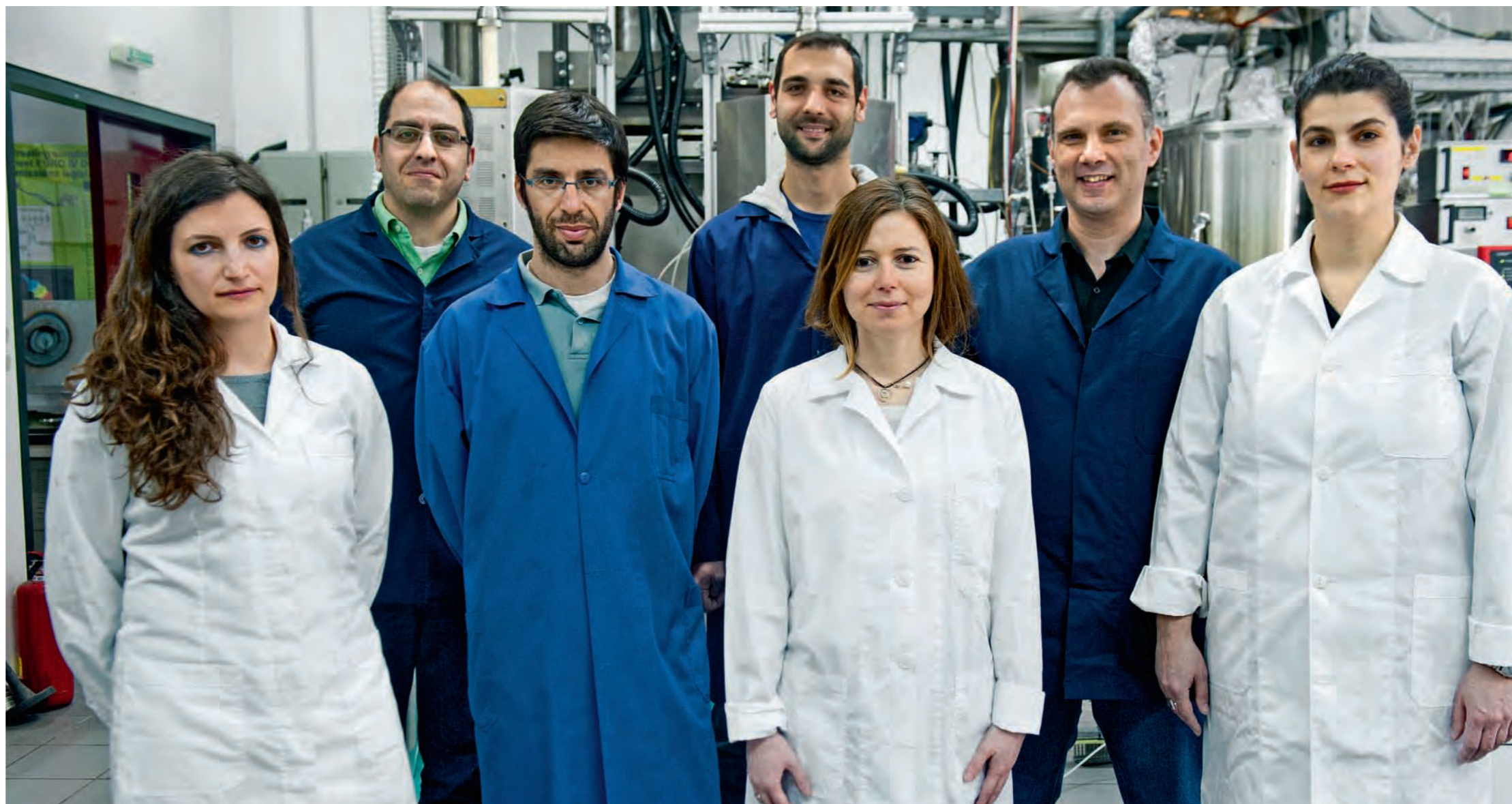
A CERTH research team in Thessaloniki has developed a system that selectively separates nanoparticles emitted by diesel engines and exposes them to biological samples (cellular lines, tissue) in order to study their size-related health impact.

“We offer an innovative tool to biologists/toxicologists to facilitate the study of the health impact of both soot and engineered nanoparticles widely produced by various industries. The use of such a system may contribute to policy-making regarding nanoparticle exposure both in the environment and the workplace, thus improving

everyday life,” explained Ms Eleni Papaioannou, chemical engineer and Deputy Director at the Aerosol and Particle Technology Laboratory. Basically, this system, which is an innovation, consists of two devices, connected in series: the Selective Particle Size (SPS) sampler and the Multiculture Exposure Chamber (MEC) of the uniform organotypic multiple biological samples. A typical separation and exposure experiment lasts about three hours.

A 1,600 cc diesel engine - operated by a dynamometer and installed on a test bench - has been designed for evaluating emission control technologies, e.g. die-

The Aerosol and Particle Technology Laboratory research team with Ms Papaioannou in the centre.





Mr Chasapidis and Mr Akritudis in the diesel engine emission cell.

sel particulate filters (DPFs). The aerosol coming out of the engine exhaust pipe is led to the Selective Particle Size sampler, after dilution, in order to simulate actual exhaust-fume inhaling conditions. Specifically, when people are exposed to exhaust fumes, they are

A FEW WORDS ABOUT THE RESEARCH

The original SPS-MEC system consists of a Selective Particle Size (SPS) sampler that operates in a series with a Multiculture Exposure Chamber (MEC). By using the SPS sampler, one can collect a sample of an aerosol with an average size distribution of below or above 100 nm. The design of the sampler combines principles of aerosol transport phenomena and separation technologies. Particles smaller than a given size are removed from the exhaust by diffusional deposition, while removal of particles above a given size is achieved by low pressure inertial impaction. After separating the nanoparticles according to their size, the selected aerosol is directed towards the original organotypic in-vitro exposure chamber, where it is uniformly exposed to cellular lines or tissue. The sampling and exposure system has the innovative feature of uniformly exposing biological samples to selective fractions of aerosols, thus promoting research on the health impact assessment of nanoparticles.

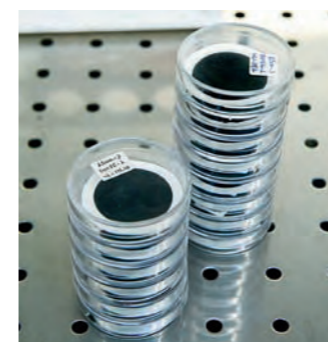
not standing right in front of the bus exhaust pipe, but at some distance from it. So, the pollutants they inhale are somewhat diluted.

“The next phase of the separation process is achieved by two specially designed devices where the aerosol stream is separated into two streams: one stream with small (<100 nm) and another one with large (>100 nm) nanoparticles” explained Ms Penelope Baltzopoulou, chemical engineer at CERTH and core member of the research group that developed the device in question. At the age of 34, she has already been systematically studying and researching atmospheric pollution for 11 years, with a dedication mostly attributed to her place of origin. Born and raised in the environmentally strained city of Ptolemaida, she feels morally obligated to contribute towards improving environmental conditions in Greece, to the best of her abilities.

“Innovation is the proper tool that can help us escape the financial crisis. No matter how hard the State will keep placing obstacles in our way, by merging research organisations and centres and cutting research funds, we will keep doing our best,” she added, clearly disappointed by the role of the State.



Ms Papaioannou placing samples in the Multiculture Exposure Chamber (MEC).



On the left, different size soot nanoparticles from a diesel engine exhaust pipe.



Mr Akritudis putting together the Impactor of the Selective Particle Size (SPS) sampler.

After the size-selective separation, nanoparticles are led to the exposure chamber, which consists of 36 different cell-culture positions. The chamber, which may be rectangular or round, is made of acrylic, a material that is cell-friendly. “The aim is to lead the aerosol from the size separator, without affecting it in any way whatsoever, and bring it into direct contact with the cells. In other words, we are trying to bring into contact a gaseous phase with the liquid phase in order to simulate aerosol deposition in the lungs. This latter is the innovation. Usually, scientists collected the amount

“The system may contribute to adopting policies for reducing nanoparticles in the environment and the workplace, thus improving everyday life,” stressed Ms Eleni Papaioannou.

ABOUT THE COMPETITION

“The award encourages us to continue”

We entered the SEV and Eurobank competition in order to make the research carried out by the team I represent more widely known to the public, as well as to demonstrate the importance of nanoparticles for health and the environment. Having our work recognized via the competition is very important, particularly during the current crisis and in the absence of support/funding from domestic bodies. The Greece Innovates initiative contributes to extroversion and helps showcase research achievements. Having our efforts recognized encourages us to continue.

Eleni Papaioannou

of soot sampled in a filter placed after the exhaust pipe and dissolved it in liquid solvents. As a result, ex situ testing does not represent actual conditions,” said Dr Akrivi Asimakopoulou, chemical engineer and core member of the research team.

The size-selected aerosol stream enters the chamber and is distributed uniformly over all the cell cultures. Then it is concentrated to the sides of the device and the lower compartment, which is also its exit point. The second innovation of the chamber lies in this precise operation. “The parallel flow of aerosol towards the cell surface does not dry out the cultures, which was the case with commercially available devices, where the air entered the chamber vertically towards the cultures. This greatly facilitates the experiment. Another advantage of the chamber, compared to similar commercially available devices, is the possibility of exposing a large number of biological samples at the same time. This significantly lowers the cost of each experiment,” clarified Dr Asimakopoulou. Besides, herein lies the reciprocity of an innovation. First you fund laboratories and then you reap multiple benefits. No country has ever come out short due to research. ■

IMPROVING THE QUALITY OF LIFE OF PEOPLE WITH MOVEMENT DISORDERS

A photonic sensor paves the way for developing smart pads that will allow physicians to systematically monitor pressure ulcers in people with artificial limbs and people in wheelchairs

By Kostas Deligiannis

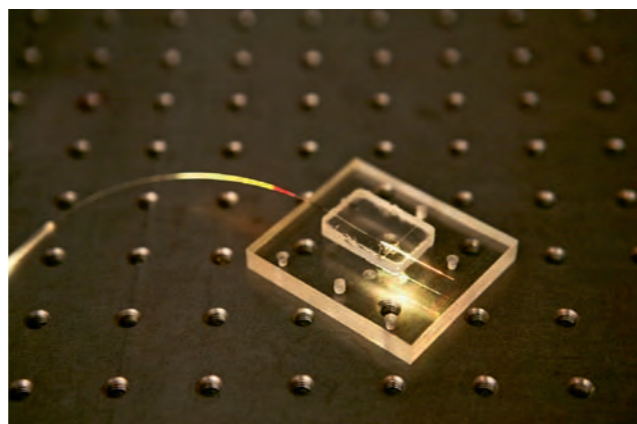
APPLIED RESEARCH: A photonic sensor for monitoring shear stress between human skin and artificial surfaces of limbs and wheelchairs

ORGANIZATION: Institute of Electronic Structure and Laser, Foundation for Research and Technology – Hellas (FORTH)

CONTACT EMAIL: pissas@iesl.forth.gr

RESEARCH TEAM REPRESENTATIVE: Dr Stavros Pissadakis, Associate Researcher

ASSOCIATE RESEARCHERS: Dr Alessandro Candiani, Dr Maria Konstantaki



*The sensor has the form of an optical fibre
On the right, Mr Stavros Pissadakis with his associate, Maria Konstantaki.*

□ THE PHOTONIC SENSOR developed by Mr Stavros Pissadakis, Associate Researcher at FORTH, along with his associates, Alessandro Candiani and Maria Konstantaki, promises relief to millions of people in wheelchairs or with artificial limbs, throughout the world. In the form of an optical fibre, the sensor lays the foundation for dealing with pressure ulcers, namely the wounds formed when the skin rubs on the harsh surfaces of the wheelchair or the artificial limb. Combined with other existing photonic pressure detectors, it could greatly prevent the formation of such wounds.

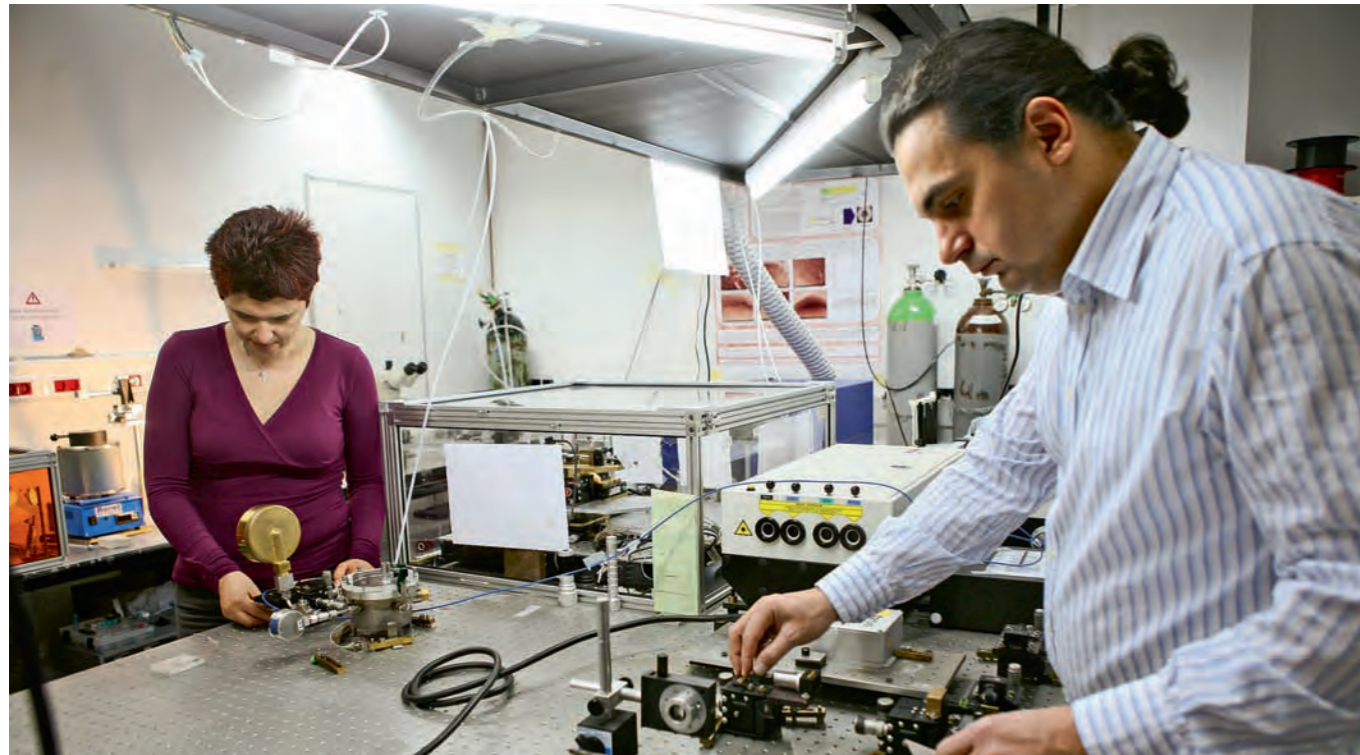
“Pressure ulcers are a source of great discomfort for people with movement disorders, as they take a long time to heal. At the same time, the bandages used to cover the wound as well as the medication required to fight off infections place a significant burden on health

systems,” noted Mr Pissadakis. Recent scientific research has shown that a key factor on whether a wound will be formed or not is transverse shear stress, namely how much the skin is displaced at a point where it comes into contact with the artificial limb or other surface as the person moves.

The innovation of the FORTH sensor is that it can accurately measure this precise displacement and, what is more, in real time. “Skin strain and local skin temperature also play an important role. Both causes have been known to physicians for years and sensors for measuring them are already available, again in the form of an optical fibre,” added the researcher. So, a device incorporating all three photonic detectors will record all critical parameters that determine ulcer formation.

This device will be in the form of a special elastic pad





Laboratory testing.

On the left: Together with photonic sensors measuring stress and temperature, the sensor could be incorporated into a single device in the form of a plastic pad, which will be placed on the points of contact between the wheelchair or artificial limb and the human body.



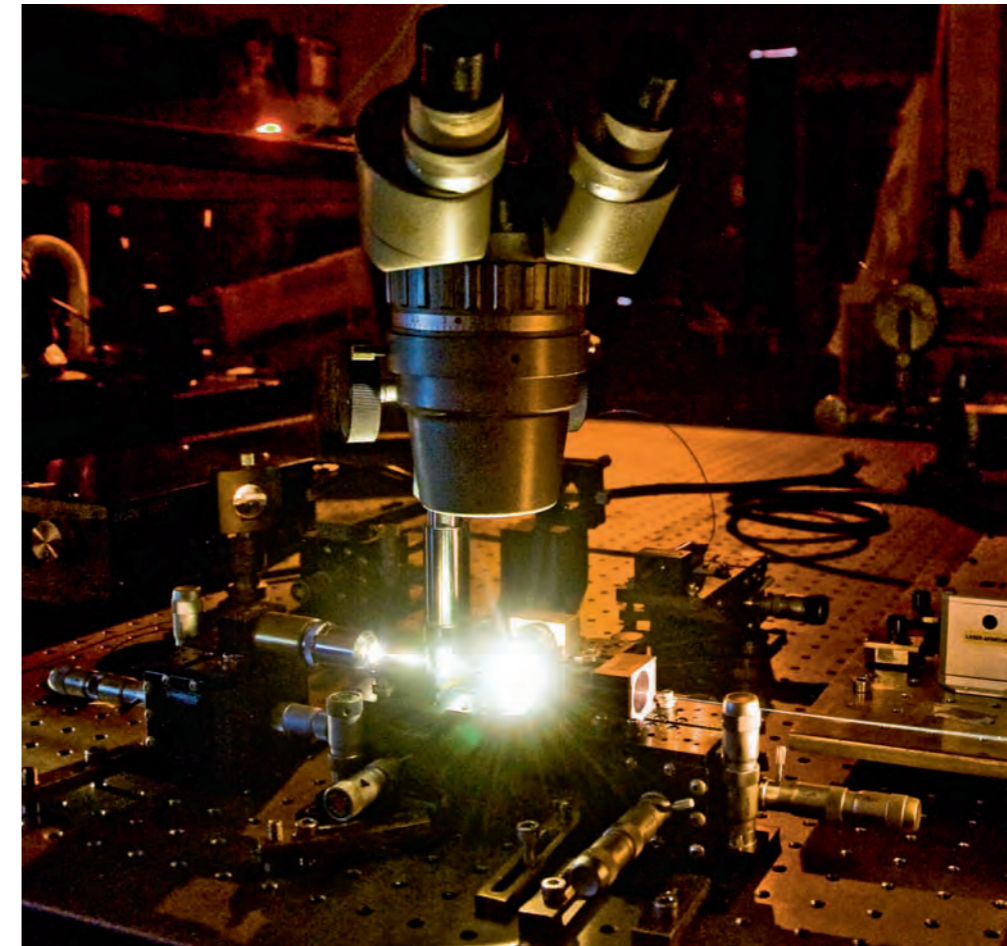
A FEW WORDS ABOUT THE RESEARCH

Bed-confined patients, diabetics, people with artificial limbs and people in wheelchairs are prone to pressure ulcers. Pressure ulcers significantly affect patient recovery and quality of life, they take a long time to heal and pose a considerable financial burden.

Our research team combined photonic gap optical fibre technology with magnetic fluid technology to develop advanced photonic sensors aimed at recording critical parameters of human skin strain. These photonic sensors, which are in the form of elastic pads the size of a coin, can accurately monitor and record the displacement of human skin when it comes into prolonged contact with artificial surfaces, such as artificial limbs and wheelchairs. Recording the values and coordinates of excessive epidermal loadings makes it possible to better predict and thus avoid pressure ulcers.

that will be placed on the contact points. “Therefore, during each patient consultation, the physician will assess the measurements using special software, obtain a clearer picture of where the skin has been strained and make the necessary adjustments on the wheelchair or the artificial limb to prevent ulcer formation,” noted the researcher. The measurements will also be useful to companies manufacturing such equipment, as they will allow them to improve their product designs.

Apart from wheelchairs and artificial limbs, the pads could also be used on ICU beds, where patients face the same problem – besides, it is estimated that 20% of ICU patients develop pressure ulcers. “In this case, air mattresses will automatically receive the measurements and adjust specific points of the bed to alter pressure and thus prevent wound formation,” added Mr Pissadakis. According to the research team, the device could also be fitted to shoes for diabetics to prevent ul-



Experimental optical fibre characterization. To make the sensor, laser is used to incorporate microscopic structures into the optical fibre, where materials with special magnetic properties (magnetic fluids) are placed.

ABOUT THE COMPETITION

“Scientists are not cut off from society”

By entering the Greece Innovates competition, we hope to attract funding so that the photonic sensor we have developed can be marketed in the future. At the same time, this competition contributes to promoting the culture of innovation in Greece – and with great success we might add, judging from the first competition. So, even if we do not find investors, we believe that this competition will offer us the opportunity to show the public that scientists are not cut off from society. On the contrary, when properly guided, research can always satisfy an actual need.

Stavros Pissadakis

cers and, consequently, infections.

To make all these applications possible, the sensor had to operate accurately and respond to actual use conditions. As skin elasticity varies between different points of the human body and among ages, the sensor had to be able to record a large range of displacements. “Our lab experiments have proven that, apart from reliable, our sensor is the first in the world that can measure transverse shear stress from 200 millionths of a metre to 1 centimetre and, what is more, two-dimensionally,” stressed the researcher.

These pioneering features stem from microstructured optical fibres and magnetic fluids, two technologies the scientific team combined in an innovative way. However, for the pad to reach the market, the team needs funding and “at least five years of hard work,” according to Mr Pissadakis.

In any case, a photonic sensor that accurately meas-

ures transverse shear stress can go beyond medical applications. “It could very well be incorporated into tanker reservoirs, for example, particularly on sheet-iron joints, to detect micro cracks and significant strain in real time,” noted the researcher. ■

“Our lab experiments have proven that, apart from reliable, our sensor is the first in the world that can measure transverse shear stress from 200 millionths of a metre to 1 centimetre and, what is more, two-dimensionally.”

HYPER-VISION FOR PHYSICIANS

This biophotonic imaging method has already been used to develop new generation microscopes and endoscopes that will allow physicians to view details invisible to the naked eye. Should clinical trials prove that this method reliably detects pathological lesions, then biopsies will be substantially rendered obsolete, as endoscopes will allow for direct diagnosis.

By Kostas Deligiannis

APPLIED RESEARCH: Spectral hyper-vision for early and non-invasive diagnosis

SCIENTIFIC BODY: Electronics Laboratory, School of Electronic and Computer Engineering, Technical University of Crete, Chania, Greece www.electronics.tuc.gr

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RESEARCH TEAM REPRESENTATIVE: Prof. Costas Balas, Associate Professor at the Technical University of Crete and Director of the Electronics Laboratory

ASSOCIATES: Giorgos Epitropou, Vasilis Kavvadias, Minas Paschopoulos (Associate Professor of Gynaecology at the University of Ioannina) Fani Gkrozou (University of Ioannina Gynaecology PhD).



In addition to the magnified coloured image of the area scanned by the endoscope (on the left), a spectral map will be displayed on the device monitor (on the right), where cancer cells will appear in red to stand out.

□ IN A FEW YEARS, physicians will have access to new endoscopes and microscopes, which will reveal to them much more than what the human eye can see. This is what Prof. Costas Balas and his associates promise with the technology they have developed. The major disadvantage of today's endoscopes and microscopes is that they simply project a magnified image of the tissue or organ under examination. Thanks to this new technology, physicians will acquire hyper-vision, in the sense that they will be able to observe in very narrow spectral bands within both visible and the invisible regions of the spectrum. Features of diagnostic importance, invisible otherwise, will now be highlighted and detected at an early, curable stage.

As far as the endoscope is concerned, one of its most important applications relates to the mapping of precancerous lesions. "With today's endoscopes, physicians can detect potential malignancies only when the dis-

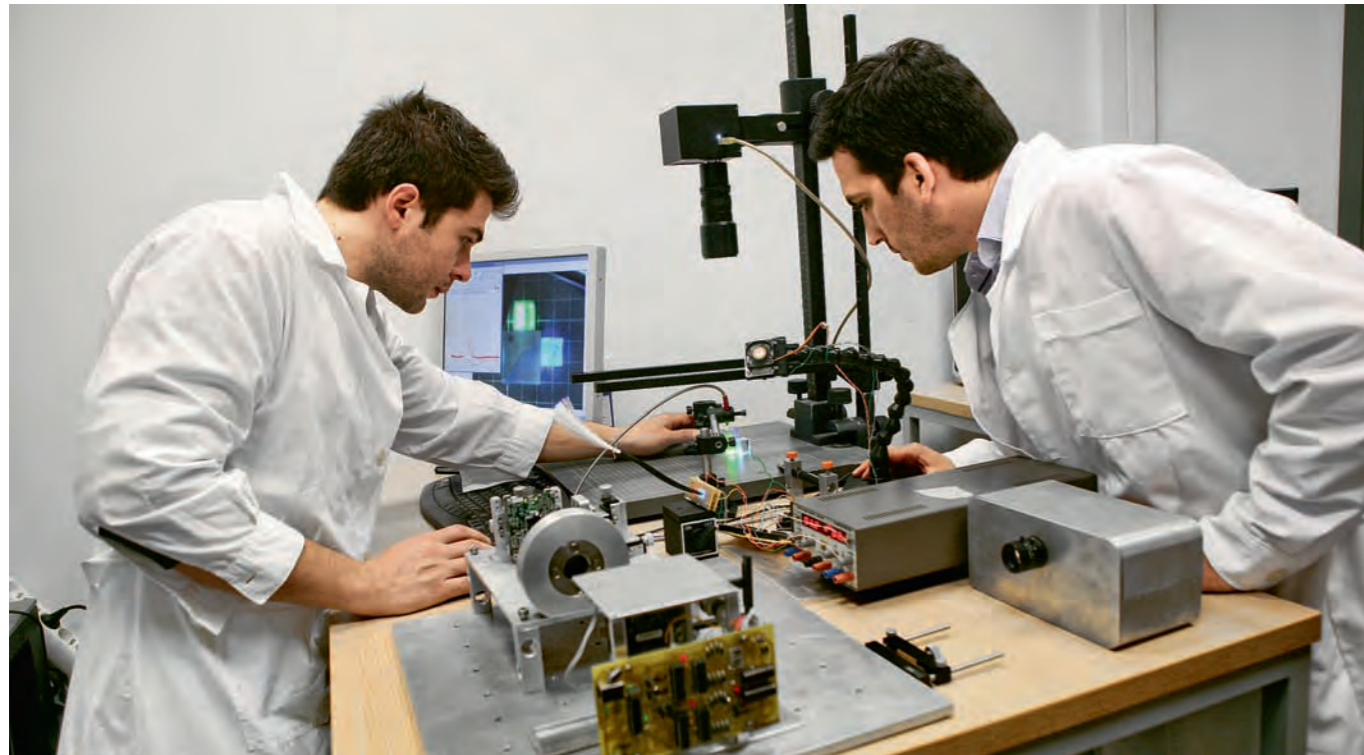
ease has progressed enough to have become visible," said Prof. Balas. However, in case of precancerous lesions that are invisible to the naked eye, the only option for physicians is to roughly estimate from which points to collect samples, based on experience. Which means that there is room for error.

The new technology will offer physicians the possibility to see the precancerous tissue at the early stages of the disease. This is due to the fact that, in addition to the magnified colour image of the area scanned by the endoscope, a spectral map will also be displayed on the device monitor, where neoplastic areas will appear in red to stand out. Thus, physicians will know exactly where the problem is located.

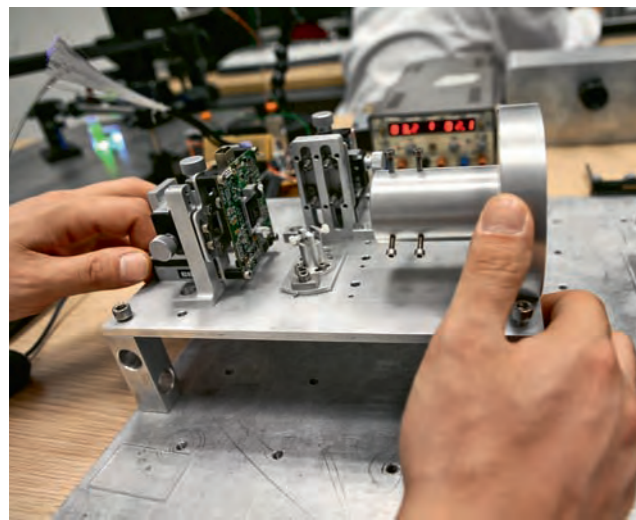
But how will this technology allow the instrument to recognize cancer cells? "The answer lies in the fact that cells interact with light in a specific way, namely they



Prof. Costas Balas at the Technical University of Crete (centre) with the research team members.



One of the main applications of the microscope concerns biopsy analyses; the aim is to quantify the degree of absorption of the dyes, for the first time.



A FEW WORDS ABOUT THE RESEARCH

Spectral hyper-vision technology displays tissues not based on the three colours on which the human eyesight is based, but on dozens of colours or optical frequencies, both within and outside the visual spectrum. These colours simply compose the spectrum and it has been proven that a series of lesions have their own spectral signatures. Our method puts these signatures to good use by introducing a new type of multifunctional vision. Through that, even subclinical lesions become directly visible and are instantly mapped. The ulterior objective is for our technology to make the idea of a visual biopsy a reality: namely non-invasive on-site diagnosis that will replace conventional biopsies, which present several disadvantages.

have different spectral signatures depending on whether they are healthy or not. In fact, when they are not healthy, their signature also reveals both the disease and how far it has progressed,” explained Prof. Balas.

Thus, by lighting up the area and dividing it into 5 million pixels, the endoscope will record the optical properties of every pixel to determine its spectral signature. “From that, it will be able to deduce whether the tissue corresponding to the specific pixel has lesions or not – in this case, neoplasia or cancer – as well as the grade of the disease,” he added.

This is a one-of-a-kind technology globally, as it takes only fractions of a second to determine and analyze signatures. Therefore, physicians will obtain a spectral map of the area being scanned in real time. “Otherwise, it would have been useless, as it is impossible for the patient to remain completely still throughout the examination,” noted Prof. Balas.

The microscope will be based on a similar operating principle, with the map being used to quantify anatom-



Quality control laboratory testing of the spectral hyper-vision endoscope.

ABOUT THE COMPETITION

“Research is a noble competition field”

I believe that competitions like the one organized by SEV and Eurobank are one of the most effective ways of delivering to the Greek public the message that research is a field of creativity, incessant learning and noble competition. At the same time, such a competition provides the opportunity for our work to be assessed from both a scientific and a business perspective, something that I believe all scientists who develop innovations should seek. The reason why our team decided not to enter the first competition had to do with the fact that our technology was not mature at the time and was several years away from commercial application. This year, we consider it a great distinction to have been shortlisted among the finalists, given the high level of proposals.

Costas Balas

ic pathology examinations, which are very subjective in the way they are conducted today. “We place special emphasis on biopsy analyses, which are conducted using special dyes. Spectral imaging will allow quantifying the extent to which these dyes have been absorbed by samples, thus making the examination objective,” noted the Professor.

The endoscope is expected to be launched in the market in the next two years according to Prof. Balas. Furthermore, it is estimated that the instrument will cost less than existing endoscopes.

In fact, it will most probably prove even more revolutionary, as it leaves room for rendering biopsies altogether obsolete. “If it can detect malignancies in an equally reliable manner as biopsies – which we believe is the case – then the endoscope will provide diagnosis without requiring samples. So, concurrently with the examination, physicians will be able to conclude whether the area is completely healthy or not,” said the scientist.

This is a one-of-a-kind technology globally; it is based on the fact that cells interact with light in a specific way, namely they have different spectral signatures depending on whether they are healthy or not.

The first clinical trials to assess the system’s reliability have already started at the Medical Faculty of the University of Ioannina, carried out by Associate Professor Minas Paschopoulos, and their results are quite hopeful. The endoscope is also being tested in Ioannina to determine endometrial “quality”, which is one of the main causes of female infertility. **E**

SMART AND ADJUSTABLE MOBILE TELEPHONY ANTENNAS

A system installed on existing infrastructure offers networks the possibility to automatically modify their capacity according to demand, without requiring the installation of new and expensive antennas

By Athos Dimoulas

APPLIED RESEARCH: Robotic Antenna Systems for Radio Transmission Automatic Monitoring and Control
ORGANIZATION: FASMETRICS SA
CONTACT EMAIL: dk@fasmetrics.gr
RESEARCH TEAM REPRESENTATIVE: Dimitris Kolokotronis, CEO of FASMETRICS SA
ASSOCIATES: Dr Ioannis Korinthios (Professional Services, Executive Director), Dimitris Kapellos (Products Division, Executive Director)



Part of the mechanism installed on mobile telephony antennas. On the right, Mr Kolokotronis.

□ “MOBILE TELEPHONY is a field where blue-chip companies all over the world spend billions every year for research and development. The only way for a small Greek company to stand out in this global industry is to create a truly innovative product with actual value for its clients,” said Mr Dimitris Kolokotronis, CEO of FASMETRICS SA. This is not a new project; the company already owns important copyrights and internationally approved patents. Furthermore, it was voted the fastest growing technology company in Greece two years in a row, while it was ranked 33rd (2011) and 18th (2012) in the Deloitte Technology Fast 500 international competition.

For over 20 years now, mobile telephony has been

developing rapidly in Greece, but not in the best possible way, as noted Mr Kolokotronis. “Antennas were installed without planning, mainly in areas where there was space available and not where they would best serve the network and its users. Furthermore, they have a given capacity, which does not increase without resorting to expensive infrastructure adjustments and upgrades. We offer a smart and economical solution.” FASMETRICS has developed a robotic antenna system that optimizes the services provided by mobile network operators, keeping up with the needs created from using 3G and 4G networks. “We focused on the antenna because we observed that it is the only element in this





The FASMETRICS system adapts antenna operational parameters depending on network needs. On the right, Mr Kolokotronis with his associates Dimitris Kapellos (centre) and Dr Ioannis Korinthios.

“You cannot have a fixed network when you are serving mobile users. So we thought that the network needs to be dynamic and the antennas need to become adjustable, to become aware of the world around them.”

field that does not evolve as much as others. You cannot have a fixed network when you are serving mobile users. The network needs to be dynamic and the antennas need to become adjustable.” So, the network is no longer fixed since the antennas (installed on new and existing infrastructure) are smart. They perceive user activity needs and adjust to them. The proposal is more economical than installing new current technology antennas and more environmentally friendly.

With long experience in the field of mobile telephony and having worked on base station radio technology and radio network design, Mr Kolokotronis founded the company in 2005 in order to implement his ideas and

A FEW WORDS ABOUT THE RESEARCH

Through the FASMETRICS system, antennas collect user traffic data (e.g. number of voice and data calls, etc.) from any given location and automatically modify their operational parameters. Thus, a mobile network operator can dynamically increase or reduce its network capacity – making it capable of managing even more simultaneous calls during peak hours – whenever it likes, without having to install permanent infrastructure that costs way more and is not environmentally friendly.

turn them into marketable products. Initially, FASMETRICS provided services in Greece and abroad, measuring network performance. This procedure is mandatory for licensing purposes, but also necessary for measuring the exact levels of radiation, coverage and performance, as well as configuring operational parameters accordingly. “Network radio diffusion is not controllable, as is the case with wired electrical signal diffusion. It is a random and sensitive environment and should be measured with attention and precision.” Gradually, and after gaining increasing knowledge in the field of networks, Mr Kolokotronis and his associates conceived the idea of robotic antenna systems and decided to develop it. “It was a fairly uncharted territory that lacked technical know-how. But our experience placed us a few steps ahead of all the others.”

Nowadays, FASMETRICS has successfully completed all pilot trials. The results are very positive and initial contacts have already been made with clients. “We are optimistic about our commercial success, both locally and internationally. We are unique at what we do and we are solving a serious existing problem. There is no reason whatsoever why we would fail,” concluded Mr Kolokotronis. €



ABOUT THE COMPETITION

“The value of our research has been acknowledged”

We are a small Greek company; we are living amid the Greek crisis and we are treading among giants while offering a product that promises a lot. It is not a simple bet, but in the end we are judged based on our work, in much the same way as we are currently being judged by the competition committee. By entering the competition, we are a step closer to our goal: when later someone hears that we make robotic antennas, they will know we mean it. It is a way of making our efforts known, while confirming the value of our research.

Dim. Kolokotronis

INNOVATION

THE FIRST NATURAL DETERGENT IN EUROPE

Unique not only because it consists of substances that do not harm human health and the environment, but also because its cleaning action does not fall short of conventional products. Could a Greek innovation truly make a difference in the market?

By Athos Dimoulas

APPLIED RESEARCH: Development of highly efficient natural detergents, human and environmentally friendly
ORGANIZATION: Provipax SA, pro-Actina SA
CONTACT EMAIL: kgouliaris@provipax.com
RESEARCH TEAM REPRESENTATIVE: Konstantinos Gouliaris, MSc in Chemical Engineering, CEO of PROVIPAX SA
RESEARCH TEAM MEMBERS: Dimitra Gouliari (MSc in Chemistry, PROVIPAX SA Production Chemist), Alexandros Strogilos (PhD in Chemistry, Head of Research and Development at pro-Actina SA), Alexandros Magkos (PhD in Chemistry, Researcher-Responsible for the Product Development at pro-Actina SA), Ilias Kouladouros (Chemist, Professor at the Agricultural University of Athens, Co-founder and Scientific Consultant at pro-Actina SA)



From natural saponin to the new Fleriana detergent

PROVIPAX develops innovative consumer products for home and personal use. Pro-ACTINA works on researching and developing high-tech chemical products. The result of their joint venture was Fleriana, the first natural detergent in Europe. It is a product made with raw materials from renewable resources and will not harm humans and the environment. "There are certain product categories that remain stagnant. Developments have been taking place in the area of detergents, in terms of external appearance or marketing for instance, but companies have essentially been using the same synthetic chemicals for years now," stated Mr Konstantinos Gouliaris, CEO of PROVIPAX, who came up with the concept of developing Fleriana.

The necessary condition for producing this innovative detergent was that it had to consist solely of natural raw

materials, so that it could be scientifically proven that it will be friendly towards humans and the environment. Apart from that, though, another condition was for the end product to be effective and better than existing ones. In other words, the aim was for the detergent not to lack anything in aroma or cleaning power, yet be produced at low cost so that it could be sold to consumers at competitive prices compared to conventional detergents for the same use. "We took all the products available in the market and compared them first to each other and then to our own, so as to ensure that it does not fall short in any category," said Mr Gouliaris. The fact that the objectives were achieved makes the two companies optimistic about both the course of the project and the dynamics of the technology they developed: namely that it will set a new market standard, thus paving the way for other



Konstantinos Gouliaris, CEO of PROVIPAX SA



Above: Standard types of dirt to test the detergent's cleaning power. On the right: The Fleriana detergent and its convenient measuring cup.

Below: Dr Alexandros Magos, Head of Product Development at pro-ACTINA SA, at the laboratory where the detergent was developed

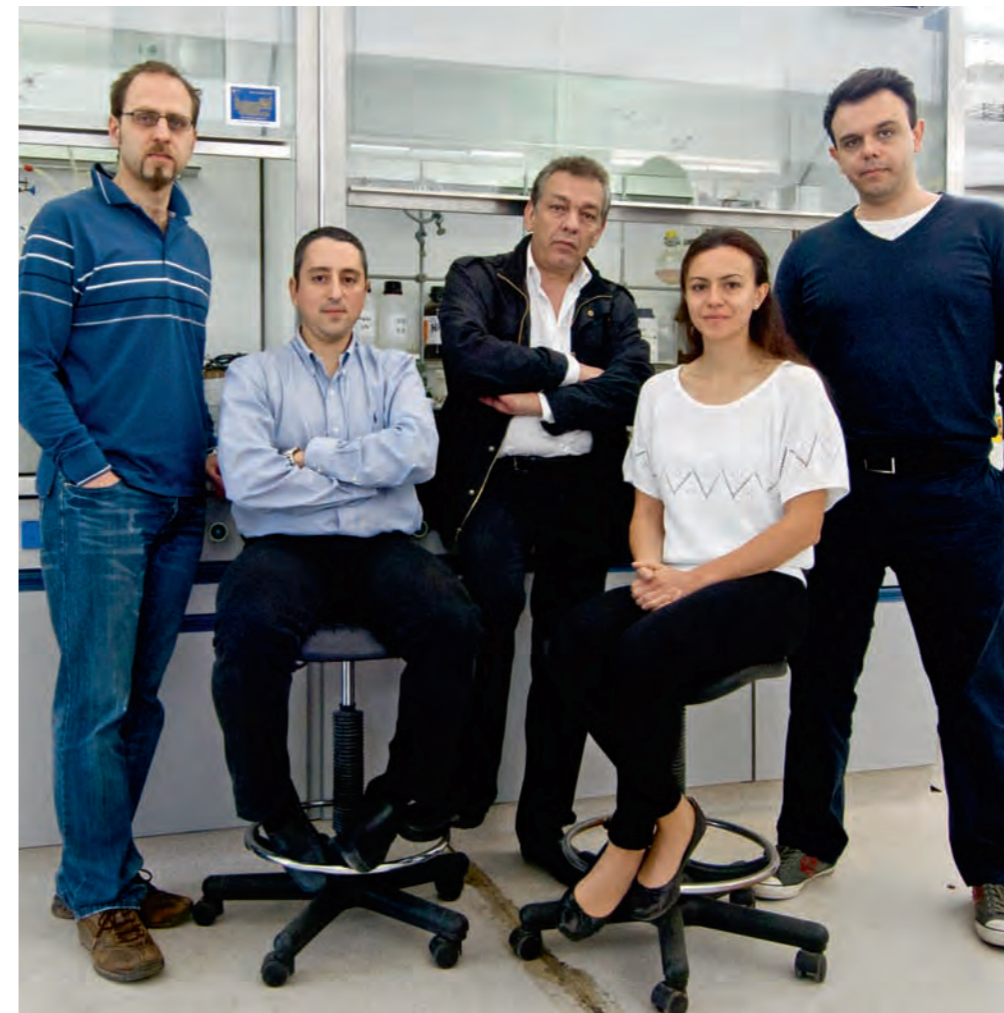


A FEW WORDS ABOUT THE RESEARCH

Provipax SA and Pro Actina SA undertook a joint research project aimed at developing the first natural detergent in the market. Fleriana is an international innovation, as it was created using raw materials from renewable resources. This would not be deemed very important if the end-product had not turned out to be so effective. After many years of research, it was proven that it is possible for a detergent not to lack anything in aroma or cleaning power compared to conventional detergents, yet at the same time, be friendly towards humans and the environment. The fact that the two companies managed to keep production costs at low levels made the whole effort a complete success, as Fleriana's market price will not be any higher than that of common synthetic detergents.

products based on the same mentality.

"What is impressive is that we have used imported raw materials, but created the technological product in Greece, contrary to common practice," said Mr Ilias Kouladouros, chemist, scientific consultant at pro-ACTINA and Professor at the AUA. It was he who suggested that they use saponin as the natural base of the product, which comes from tea trees and acts as a natural detergent. "It is a raw material with properties similar to those of soap, despite the fact that they do not share the same chemical composition. Each individual natural substance may not be as strong on its own, and this is why they are not found in similar products. The combination we came up with, however, led to the desired result," explained Mr



Two companies (PROVIPAX and pro-ACTINA) worked together to achieve this result. From left to right: Alexandros Magos, Alexandros Stroylos, Ilias Kouladouros, Dimitra Gouliari and Konstantinos Gouliaris

"The most powerful innovations are simple; they are those that enter every home. Our product is not something highly specialized, but its widespread use will have a positive long-term impact on the environment and humans."

Gouliaris. On his part, Mr Alexandros Magos, chemical researcher at pro-ACTINA, added, "More importantly, the materials we used and the way we used them assisted us in creating a product that is not labelled irritant."

In the meantime, all the team members agreed that production had to be simple, without sophisticated processes, so that the product could be easily manufactured in large quantities and the know-how could be transferred anywhere. Besides, the detergent has already been unveiled abroad. "Every small company like ours must follow the path of extroversion towards foreign markets, while staying in Greece and investing on their research here," said Mr Alexandros Stroylos, Director of Research and Development at pro-ACTINA.

As we speak, Fleriana is being launched in the market and is expected to take its rightful position on the supermarket shelves. The people behind it are hoping for a positive response from the public. They are hoping that consumers will place their trust on a small pioneering Greek company. "This is the first product based on this technology. If it goes well, we will move on to fabric softeners, dishwashing detergents, general use cleaning products. And all of them based on the same mentality. The most powerful innovations are simple; they are those that enter every home. Our product is not something highly specialized, but its widespread use will have a positive long-term impact on the environment and humans," noted Mr Gouliaris.

ABOUT THE COMPETITION

"We thought that entering this competition would be a nice way of showing that things do happen in Greece."

We have all been faced with a reality where we keep on hearing, either directly or indirectly, how sour things have gone and how lazy the Greeks are. The crisis implies that the level of the Greek people is low. On the other hand, being market people, we see around us Greek companies with exceptional ideas, which they develop and work truly hard on. We thought that entering this competition would be a nice way of showing that things do happen in Greece and that innovation can be found here. Furthermore, for a small company like ours, it is a great opportunity to showcase our work.

Konstantinos Gouliaris

PORTABLE SYSTEM FOR DNA ANALYSIS USING SOUND WAVES

Thanks to the cutting-edge technology of acoustic detection, scientists have laid the foundations for making a pocket-size kit that will conduct on-site DNA tests at low cost.

By Kostas Deligiannis

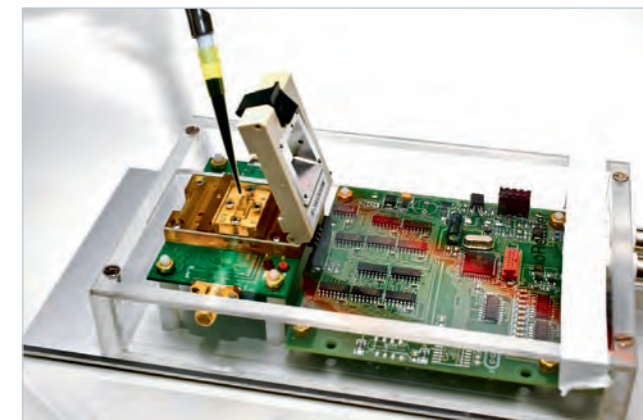
APPLIED RESEARCH: Easy-to-use system for genetic analysis based on mobile phone technology, also aimed at developing countries

ORGANIZATION: Institute of Molecular Biology and Biotechnology (IMBB) – Foundation for Research and Technology-Hellas (FORTH)

CONTACT EMAIL: gizeli@imbb.forth.gr

RESEARCH TEAM REPRESENTATIVE: Dr. Electra Gizeli, Associate Researcher at IMBB and Associate Professor at the Department of Biology at the University of Crete

CO-INVENTORS: Dr. George Papadakis, Dr. Achilleas Tsortos



Through detecting genetic material, the device will also be able to detect infectious diseases in the human blood, food contamination and environmental pollution



From left to right, Dr. George Papadakis and Dr. Achilleas Tsortos, associate researchers who developed this technique, together with Dr. Electra Gizeli, Associate Researcher at FORTH and an Associate Professor at the Department of Biology at the University of Crete. The remaining scientific team members, from right to left, are Dr. Maria Gianneli, Dr. Dimitra Milioni, Ms. Georgia Charalampous, Dr. Rena Lympouridou, Ms. Chara Spanou and Dr. Pablo Mateos.

□ “WHEN IT COMES to basic research, solving a scientific puzzle may lead to innovative technological achievements, even though this may not be obvious right from the start” said Dr. Electra Gizeli, Associate Professor at the University of Crete Department of Biology and Associate Researcher at FORTH.

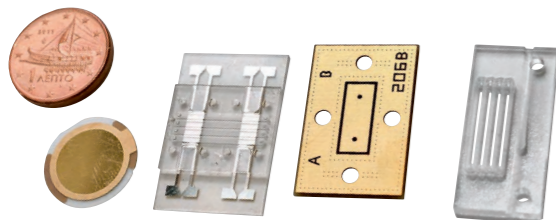
In this case, the puzzle related to the behaviour of genetic material as it interacts with ultrasound. As discovered a few years ago by Drs Electra Gizeli, Giorgos Papadakis and Achilleas Tsortos, with suitable preparation, when subjected to ultrasound waves, every DNA molecule gives out a distinct signal, which constitutes its acoustic signature.

While studying this behaviour and trying to explain it, the researchers discovered they could use it as a DNA molecule acoustic detection method based on acoustic signatures. The technique they have developed is a world-first and paves the way for a portable genetic-testing system.

“The system will not be any larger than a pocket book, so that it can be easily transported and conduct on-site analysis” noted Dr. Gizeli. Furthermore, given the low cost of analysis, the researchers believe it could also be used in the developing world. The aim is, through genetic material, to also test human blood for infectious diseases (e.g. AIDS, diarrhoea syndrome),



At the heart of this piece of equipment lies a device not larger than a credit card. Below, microscopic channels where sample pre-processing automatically occurs



A FEW WORDS ABOUT THE RESEARCH

The Biosensors Lab has developed a new competitive method for genetic analysis based on the modern principles of micro/nanotechnology and biophysics. The idea was to create a diagnostic system combining the classic polymerase chain reaction (PCR) method with a totally innovative method for measuring PCR products, without labelling of the molecules, relying on acoustic biosensors.

Acoustic ultrasonic microdevices are produced in huge quantities all over the world to be used in mobile phones and other electronic devices. Thus, they are readily available at an extremely low cost, allowing the development of an economical and easy-to-use diagnostic system. Furthermore, it is possible to produce an integrated portable device that allows performing multiple genetic analyses in non-laboratory conditions and by non-specialised staff, thereby creating prospects of using it in developing countries.

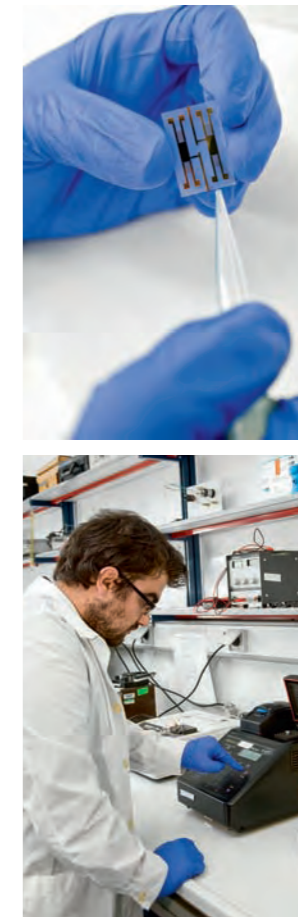
detect pathogenic microorganisms in the environment and test foods for possible spoilage (e.g. salmonella). "Moreover, the system will be able to determine, for instance, whether a mosquito population is genetically resistant to a specific insecticide, which might render spraying obsolete," added Dr. Papadakis.

First, users will dissolve the sample in a special mix of chemical substances (reactors) that will be different each time. Then they will pour a few drops on the main component of the system – a plastic device (lab-on-a-chip) that will not be any larger than a credit card and which will have microscopic channels where pre-processing will automatically occur. Within the device, the sample will then interact with ultrasound waves so that it can be determined whether it contains a specific genetic material or not, depending on whether it will produce the respective acoustic signature or not. Overall, the whole process will not last more than 3 hours.

The system will have several advantages compared to similar devices developed by other research teams which are based on different detection methods.



Scientists are already planning on using the operating principle of the portable device to create many more applications, as well as for basic research



ABOUT THE COMPETITION

"Mapping innovation in Greece is underway"

As every researcher is focused on their respective field, quite often not even scientists themselves are aware of all the noteworthy efforts being expended by Greek scientists in other fields. Thus, even though we were sure that top-quality research is being carried out in Greece, the first competition gave us the opportunity to find out about exceptional ideas coming from institutions and companies in Greece. The fact that this competition is a way of mapping innovation in Greece prompted us to participate this year, in order to present our work outside laboratory walls, to the broader scientific community and, most importantly, the public. Besides, when research is being conducted with state funds, it is important for people to be aware of any direct applications.

Electra Gizeli

"One of the main advantages is that it will be using cheap consumables, since detecting acoustic signals is conducted with mass production chips used in mobile phones to filter frequencies" explained Dr. Gizeli. Furthermore, it will require simple reactors to dissolve samples. "Another advantage is that it will not require more than one to two hours of training for someone to learn how to use it," added Dr. Papadakis.

The idea is ready to be launched in the market, provided that investors are found. Such a portable

device would also be useful in the developed world, so that certain medical tests could be performed directly in the doctor's office rather than in microbiology laboratories, as is the case today. "It could replace several tests that currently entail cell cultures and take days to produce results," said Dr. Gizeli. Furthermore, it could also be used to detect genetically modified ingredients in foods.

However, apart from the portable system for genetic analysis, the acoustic detection method lays the foundations for many other applications – including studying the properties of biomolecules and more. Even more importantly for scientists, this technique is a powerful and reliable tool for basic research. This is why the first papers the team published caused quite a stir in the research community. In fact, their work was posted on the website of the international Human Frontier Science Program organization.

The research team has already been granted a patent in the US, while the respective European patent is expected to be granted soon. In both cases, patents will cover all possible acoustic detection uses.

The device is based on acoustic detection, a patented world-first technology developed at FORTH



SHIELDING THE SEAS AGAINST INVASIVE SPECIES

After years of research, Greek company ERMA FIRST developed a system that prevents microorganisms and species that destroy marine ecosystems from being transferred through ballast water.

By Natassa Blatsiou

INNOVATION: Ballast water treatment system

ORGANIZATION: ERMA FIRST ESK ENGINEERING SOLUTIONS SA

CONTACT EMAIL: marketing@ermafirst.com

REPRESENTATIVE: Konstantinos Stampedakis

RESEARCH TEAM: Konstantinos Stampedakis (Chemical Engineer, MSc), Eleni Polychronopoulou (Chemist), Giannis Moulinos (Marine Engineer), Efi Tsolaki (Environmental Engineer, MSc, PhD), Nikos Kyritsis (Production and Management Engineer, MSc)



ERMA FIRST ballast water management system

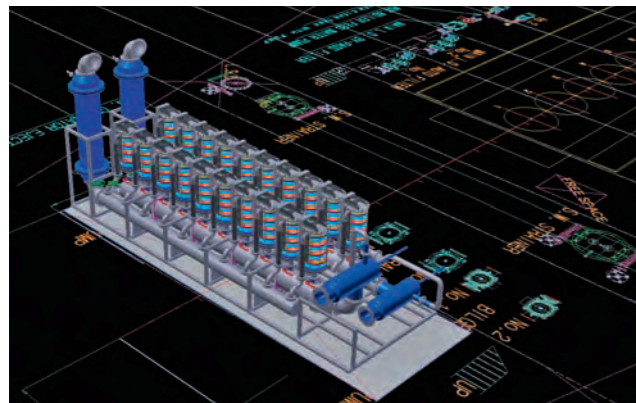
Opposite: Konstantinos Stampedakis (first from the right) with research team members Eleni Polychronopoulou, Efi Tsolaki and Nikos Kyritsis.

□ THE INVASION of foreign marine species into ecosystems is one of the most significant threats to the natural equilibrium, with unpredictable consequences for the environment and native populations. In the early 80s, the Amurensis starfish from South Australia threatened fish farming in Japan. Marine organisms native to Bangladesh carried the cholera germ to South America, infecting one million people. The green crab of the European Atlantic shores displaces native species wherever it invades – all the way to Japan. Even in Greece, the Gulf of Elefsina is now host to 1,200 species hitherto unknown in Greece. After many years of research, scientists discovered that the main migration medium for such species is ballast water – i.e. the water loaded to a ship when it is travelling without cargo so as to ensure stability and maintain safe navigation conditions.

As soon as the cargo has been unloaded, the ship requires ballast water to sail safely. However, the water

that enters the tanks contains marine microorganisms, such as bacteria, germs, plankton, spores, eggs and fish larvae, which end up back in the sea before the next ship loading. It is estimated that ships transfer 10 billion tons of ballast water every year, which contain 50,000 animal planktons per cubic meter of water! As a result, 3,000 kinds of organisms are perpetually transferred all over the world, forming the fourth biggest threat to the sea, after overfishing, pollution, and shoreline and natural habitat destruction.

Given these figures, the International Maritime Organization (IMO) formulated the Ballast Water Management Convention in 2004, establishing standards and procedures for the management and control of ships' ballast water and sediments. With this Convention in mind, a group of Greek engineers and scientists – namely Chemical Engineer Konstantinos Stampedakis, Chemist Eleni Polychronopoulou, Marine Engineer Giannis



Drawing of the procedure. The water that enters the ship during ballasting goes through the hydrocyclone, which prevents 80% of particles larger than 10 micrometers from passing through. On the right, snapshot from the assembly stage.



Final assembly of an ERMA FIRST BWTS 400. The system is destined for a Greek-owned ship under construction in a South Korean shipyard.

ABOUT THE COMPETITION

"It is important to be judged by notable people"

As a team, we believe that we have managed to create an innovative product. But believing so yourself is not enough. It is very important to be judged by a notable committee, like the one judging this competition, and for its members to applaud your efforts."

Konstantinos Stampedakis

A FEW WORDS ABOUT THE RESEARCH

The seawater enters the hydrocyclone, which consists of 512 small cyclones. The water entry speed sets off the centrifuge procedure. The heavier fraction is drained and the clean fraction overflows into the electrolytic cells for decontamination. The chlorine produced for cleaning the ballast water goes through special electrodes. The innovation lies in the design of the hydrocyclone, which combines the hydrocyclone with electrolysis (whole flow), as well as the formula for the metal oxide used to coat the electrodes that produce chlorine.

Moulinos, Environmental Engineer Dr Efi Tsolaki and Production and Management Engineer Nikos Kyritsis – started designing a ballast water management system according to the new standards. In fact, in 2012 they managed to get their product certified by the Greek state and Lloyds Register. "After a time-consuming and costly process, ERMA FIRST, which is the name of the company producing the system, developed a commercial product that can be installed on any type or size of ship. Unfortunately, the optimization and certification procedure, which

lasted three whole years, could not have been conducted in Greece due to lack of properly equipped laboratories. Therefore, land-based system testing as well as marine environment simulation procedures were carried out at the Royal Netherlands Institute for Sea Research, on Texel island," said Konstantinos Stampedakis. Fortunately, final testing was kept Greek, as it was carried out on a container ship owned by Greek company CostaMare.

The system operates during ballasting and involves two stages. First, the water that enters the ship goes through a uniquely designed hydrocyclone, which prevents 80% of particles larger than 10 micrometers from passing through. Then the entire water volume is decontaminated using electrolysis. In fact, the electrodes used to produce the chlorine are coated with a mixture of metal oxides that greatly reduce energy consumption. During the reverse procedure of throwing water back in the sea, two chlorine gauges are installed, controlling the residual action and toxicity of the water. When the latter exceeds the limits, microorganisms are automatically destroyed using chemical substances.

The fierce competition is a challenge for ERMA FIRST. To date, it has received twelve orders, which are

"As a Greek company operating on its own funds and with no state support, we are competing against much cheaper systems, produced mainly in the Far East, as well as against technological efforts 100% subsidized by hosting states."

expected to double within the year. "We have a cutting-edge product, but as a Greek company operating on its own funds and with no state support, we are competing against much cheaper systems, produced mainly in the Far East, as well as against technological efforts 100% subsidized by hosting states." Furthermore, an important commercial element is that the ballast water management system is the second most expensive piece of equipment after the engine. "The engine in itself is a true investment. It means less maintenance, fuel and other costs. By contrast, treating ballast water is nothing but an expense. There is no gain for the ship owner, other than improving their environmental profile, which is not something everyone is willing to invest on." The fact is that the IMO convention needs a further 6% of the required votes to come into force,

while as of December 2013, the US Coast Guard shall require such equipment on every commercial ship visiting and dropping ballast water in US territorial waters. This piece of legislation actually affects 80% of commercial ships.

What matters most to the team, however, is to keep improving within a dynamic market where things are happening fast. "We are in a constant optimization process, as each time we build a new system, we try to improve our technology. At the same time, new technical, scientific and commercial data from all over the world have led to a second generation system, which will be suitable for special types of ships, maximize efficiency and reduce the final cost, so that we can be even more competitive in the market," concluded Mr Stampedakis.

THE PACK THAT TURNS OLIVES INTO A SNACK FOR ANY HOUR OF THE DAY OR NIGHT

A globally unique snack pack transforms olives into a healthy snack, in line with the contemporary and modern lifestyle. An easy to carry, ready to eat, entirely preservative-free snack, with a one-year shelf life.

By Athos Dimoulas

INNOVATION: Healthy olive snack pack in innovative packaging
ORGANIZATION: GAEA S.A., www.gaea.gr
CONTACT EMAIL: info@gaea.gr
RESEARCH TEAM REPRESENTATIVE: Dr Aris Kefalogiannis, Gaea CEO
RESEARCH TEAM MEMBERS: Dimitris Skondras (Chemical Engineer, Plant Manager), Athanasios Kerasiotis (NTUA Chemical Engineer and Production Manager), Christos Diamantakos (Department of Marketing), Konstantina Tzia (Professor at the Food Chemistry and Technology Laboratory of the NTUA)



The olive snack pack as found in the market

□ In 1995, during a conversation held in London, Mr Aris Kefalogiannis heard someone asking why Greek products were nowhere to be found in supermarkets abroad. This sparked the creation of GAEA, a brand name soon to become synonymous with quality Greek food on an international level. “Our aim is to promote the Greek and Mediterranean diet, our very own culinary culture,” explained Mr Kefalogiannis, CEO and founder of GAEA, which has become a recognized European company that exports 82% of its products. “Extroversion has been our objective and vision from the very beginning. However, given that the Greeks rediscovered the natural Greek diet in the late 90s, we also chose to market our products in Greece. Our international venture, though, has proven a golden strategy during the crisis, even though the latter

was something we had not expected.”
 One of GAEA’s latest creations is the olive snack pack, an international innovation that has already received awards abroad. This product proposes a new culinary habit. The olive is no longer treated as just a complement to a meal; it is taken off the table and outside the house, eaten at any time of the day or night. Of course, for that to happen, it took three years of research by the company’s Quality and Research Department, in cooperation with the Chemistry and Food Technology Laboratory of the National Technical University of Athens. Another requirement was to establish a new Product Development Department, as noted GAEA Laboratory Director Dimitris Skondras. “Ever since 1995, when we started out, we have never stopped researching and developing ideas on



Aris Kefalogiannis established Gaea in 1995 to promote greek and mediterranean food over the world.

“Everything we produce is natural, preservative-free, additive-free, and without artificial aromas and flavours. We want to promote the well-being of consumers.”



The five members of the research team. Aris Kefalogiannis and Konstantina Tzia (seated). Standing, from left to right, Dimitris Skondras, Athanasios Kerasiotis and Christos Diamantakos.

new projects. The snack pack is one of many.”

“This company has values. Everything we produce must be natural, preservative-free, additive-free, and without the artificial aromas and flavours that usually

A FEW WORDS ABOUT THE RESEARCH

A delicate product like olives requires special treatment, especially if one wants to keep it fresh for at least 12 months. Initially, research focused on the packaging material, which shields the olive against all external agents, and then on the preservation environment. After taking almost all the air out, nitrogen and carbon dioxide are added, which protect the olive and eliminate microbial deteriorations. An all-natural, preservative-free snack with just 3% salt content, in a convenient and easy-to-carry snack pack.

make production easier. We want to promote the well-being of consumers, since it is common knowledge that healthy eating is tantamount to preventive medicine.” In fact, the product is not only tasty, but it is also 100% natural, it has no preservatives and, what is more, it is has a very low salt content (3%), when the respective salt levels found in other olives available in the market is more than double (6%-12%).

“When we started out this idea, olive specialists in Greece said that we were setting out to accomplish the impossible,” recalled Mr Kefalogiannis. GAEA’s success is largely due to its team and its cooperation with Ms Konstantina Tzia, Professor at the NTUA Chemistry and Food Technology Laboratory. “The idea sounded very interesting when I first heard it. There was nothing like it



ABOUT THE COMPETITION

“Research needs to be applied in order to bring funds back to universities”

Greece has excellent research potential that has not yet been tapped into. It has been left idle for years because some kind of dogma kept entrepreneurs away from universities and universities away from entrepreneurs. Research needs to be applied in order to bring funds back to universities, so that they can continue their work. A competition like this one motivates people to develop products that will add value to the country. Besides, it is time to reward research and innovation. I also followed last year’s competition, attended the award ceremony and heard some amazing ideas.

Aris Kefalogiannis



GAEA’s latest technology chemical laboratory where raw material research and analysis is conducted. On the small photo above, olives right before packaging.

in the market and no similar research was being carried out at the time. Eventually, we managed to create a top-quality product through an innovative procedure,” stated Ms Tzia. An important part of the research focused on the packaging, which had to keep the product fresh. “We even took out its natural preservative, namely salt, and modified the atmosphere inside the bag by taking out the air and adding mostly CO₂, thus creating a protective environment that would ensure the quality of the olive and shield it against microbial deteriorations,” explained Ms Tzia. They even managed to increase the shelf life of the product to twelve months.

As Athanasios Kerasiotis, Chemical Engineer and GAEA Production Manager, explained, after they got the experimental results right and found the right packaging,

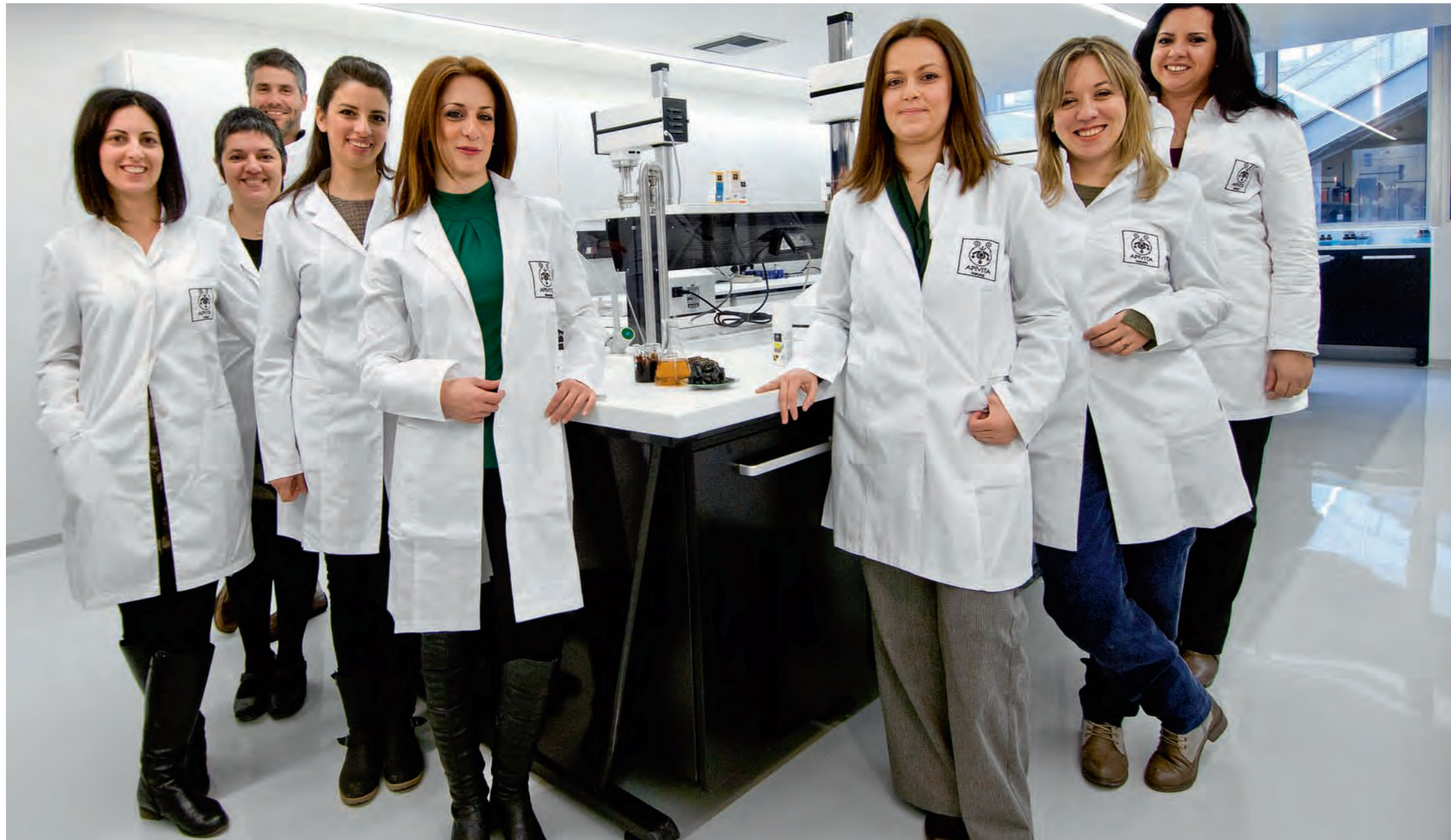
they needed to figure out how to make the product. “The machine we needed did not exist. So we built it in cooperation with a German company. It was a serious investment that exceeded €300,000.” However, as Ms Tzia pointed out, “This product would never have come out if the quality of the olives themselves was not up to standard.”

Market response has been more than satisfactory. Apart from supermarkets, the snack pack can be found in European markets and in the mini-bars of luxury hotels, while it is also sold on all Easyjet flights. “The product has been successful because it satisfies an actual need. People wanted a healthy snack based on a singular raw material, like the Greek olive. And that is exactly what we gave them.” κ

SUN-SHIELDING PROPOLIS

A globally-unique natural method for extracting propolis, in an environmentally friendly way, which adds antioxidant and photoprotective properties to the final product.

By Kostas Farmakis



APPLIED RESEARCH: Greek Propolis with highly antioxidant and photoprotective properties

ORGANIZATION: APIVITA SA Cosmetics – Dietary Products – Medications, www.apivita.com

CONTACT EMAIL: info@apivita.com

RESEARCH TEAM REPRESENTATIVE: Panagiota Dragani, Chemist, head of the R&D Department

RESEARCH TEAM MEMBERS: Danai Georgiou (R&D Manager), Maria Gika (R&D Manager), Natalia-Pavlina Vardoulaki (R&D Technician), Eirini Kyramariou (R&D Technician), Sofia Papaspyrou (Regulatory Affairs Manager), Anna Patera (Quality Assurance Manager), Konstantinos Gardikis (Research & Innovation Manager)



The patented propolis extract has been added to the APIVITA sun-protection product range

Panagiota Dragani (third from the right) with the research team members at the company's R&D laboratory

□ PROPOLIS and its properties have been known for thousands of years, as referenced in ancient texts. It has been mentioned by ancient Greek philosophers and doctors, including Aristotle, Hippocrates and Dioscourides. The Egyptians used it as an antiseptic, while its properties were also known to the Incas in Peru.

“It is the natural antiseptic of bees,” noted Ms Panagiota Dragani, Chemist and Director of Apivita’s Research & Development Department. “On average, a hive hosts 40,000 bees, at a temperature not exceeding 38o C and relative humidity above 70%. These conditions are ideal for microbes, viruses and fungi. Irrespective of this, bees live, grow and multiply without getting ill, all thanks to propolis. It is their natural defence.”

Apivita has been producing propolis extracts for 34 years and its latest achievement is a new extract that uses all of the substance’s antioxidant and photoprotective properties. As Ms Dragani explained, “Excessive exposure to the sun affects natural skin function, and can cause premature aging, immunosuppression and even cancer. This is why it is necessary to use sunscreens that provide effective protection against harmful UVA and UVB radiation, in accordance with EU directives and recommendations. Our innovation does not stop there. The extraction procedure we have developed and patented makes a propolis product that combats free radicals, which are very high-energy substances developed within the human body, mainly due to exposure to the sun and air pollutants. Free radicals can cause premature aging and other degenerative diseases. Propolis



Propolis in the solid state, and its extract



The propolis extract is incorporated into the new formulas tested at Apivita laboratories

becomes our second line of defence, preventing skin damage.” Thus, even when directly exposed to the sun, skin cells manage to maintain their vitality and metabolism, and continue to produce structural proteins, thereby preventing premature aging.

The antioxidant substances contained in propolis combat the main cause of premature aging, which is the free radicals. “Free radicals are active high-energy molecules – created even by the oxygen we breathe through natural and pathological processes – which activate numerous chemical reactions within the body. In the skin, they affect the main structural components of the cell membrane, destroying its

cohesion; within the cell, they affect proteins and cause DNA degeneration, destabilizing all metabolic activity in general.”

Apivita, which was founded by Niki and Nikos Koutsianas in 1979, was the first natural cosmetics company in Greece. The recent innovation is the capstone of a long effort and has placed Apivita among world leaders in processing and using propolis. The company specializes in natural products, starting from producing the primary material, and ending with applying modern and innovative natural methods in processing their end products. “It goes without saying that we use the latest technology – a natural product is not necessarily produced manually. We could have applied some other procedure, cheaper but harmful to the product or with environmentally harmful solvents, synthetic glycol or chemical ether. However, we use water and glycerine, both natural and edible ingredients. We could have opted for high-temperature or energy-consuming microwave extraction, but we do it at room temperature instead. Sustainability is a key rule in designing and performing all our activities,” stressed Ms Dragani.

Propolis consists mostly of resins (50%) and waxes (30%). The remaining ingredients include about 10% essential oils and volatile elements, about 5% pollen and 5% trace elements, minerals and other substances, such as sugars and vitamins. The relatively hard but, at higher temperatures malleable sticky material, results from the enzyme processing performed by the bees on the ingredients they transfer to the hive

A FEW WORDS ABOUT THE RESEARCH

Propolis extraction has been known for many years. As Ms Dragani explained, “The entirely new element is that extraction has been combined with capturing the active ingredients of propolis (encapsulation). In other words, when the beneficial ingredients of propolis are released into the extraction medium – in this case water and glycerine – they are trapped into the cavity of a natural oligosaccharide, thus increasing their solubility, enhancing the extract’s composition and preserving the potency of the propolis’ ingredients. Furthermore, the extract maintains its huge antioxidant action, provided that the encapsulated ingredients are kept stable and protected from oxidation and degradation reactions, even when exposed to sunlight, heat or a prolonged lifespan.” Even the residue of this extraction method, namely the residual propolis, which is still rich in active substances, can be used in other products, such as propolis soap.



Above: The research team controls every stage of the procedure

Below: Laboratory research on applying the propolis extract to new products

from the resinous secretions of tree barks. “While the properties of propolis have been known for long, it was until recently considered a byproduct of honey. Today, however, we try to make full use of it, as we study, discover and implement new processing methods and applications. Furthermore, together with our subsidiary Agipaia, we provide beekeepers with optimized protocols for proper collection.”

Particular attention has been given to the cooperation between various scientific fields.

“The extract combats free radicals, which can cause premature aging and other degenerative diseases. Propolis becomes our second line of defence, preventing skin damage.”

Nowadays, no innovation can stand without sharing knowledge with other fields. “Our team includes chemists, chemical engineers and cosmetologists. We also work with biologists, pharmacists and environmentalists.” But what will the scientific team do next? “First, we want to fully explore, even down to the molecular level, the mechanism of collagen and elastin production induced by the specific extract. Collagen and elastin are substances that provide elasticity, toning and firmness, while preventing the formation of wrinkles. In addition, we are researching and designing other propolis extraction methods, with the aim of further enhancing and giving prominence to its numerous other properties.”

The result of their efforts makes them all proud. “This is a product that truly defines us, it reflects our philosophy. It is a product that is so true to everything Apivita has been promoting for so many years, namely the bee and its society, Greek nature, as well as the scientific documentation of the Hippocratic practice,” concluded Ms Dragani.

ABOUT THE COMPETITION

“We wanted to serve as an example”

We felt compelled to participate in an effort made by two important bodies to support research in Greece. We wanted to serve as an example of how private initiative can lead to great results, even in Greece. Furthermore, we help create a feeling that, should you choose to do something, there are other people like you around who can work with you in a common effort to produce results. Publicity and promotion always help in finding partners and fellow visionaries. Moreover, it would give us great satisfaction if we were to receive confirmation that our product is truly special, through such an assessment procedure.

Panagiota Dragani

TURNING OIL MILL WASTE INTO A VALUABLE RAW MATERIAL

Dr Charis Galanakis has invented a cheap and simple technology that can convert the environmentally harmful oil mill wastewater into a valuable raw material to produce cosmetics and foods with increased nutritional value

By Kostas Deligiannis

INNOVATION: Functional food ingredients from olive oil mill wastewater

ORGANIZATION: Phenoliv AB, Galanakis Laboratories

CONTACT EMAIL: cgalanakis@chemlab.gr

RESEARCH TEAM REPRESENTATIVE: Dr Charis Galanakis

RESEARCH TEAM MEMBERS: Eva Tornberg, Professor at the University of Lund in Sweden



A chocolate which owes its antioxidant properties to an additive produced by oil mill wastewater is already available in the Swedish market

□ CONTINUING a tradition that has been holding for three generations, Mr Charis Galanakis studied Chemistry and together with his brother, who is a chemical engineer, they have taken over the laboratory business their grandfather had founded in Chania, Crete, back in 1925. At the same time, however, the 32-year old scientist has invented a technology for managing oil mill wastewater, the polluting liquid waste of olive oil production. Using this method, waste will no longer be an issue for oil mills nor a source of environmental pollution, as its ingredients can be used to produce many commercial products.

Besides, it is estimated that one million tons of wastewater are produced in Greece every year. "Oil mills commonly transfer wastewater to a remote area and leave it there to drain in pits. The solid residue is then taken to a landfill site," said Mr Galanakis. However, apart from the very strong smell, this drain-

ing releases polyphenols to the environment. These chemical substances have such a high concentration of oil mill wastewater that it makes them toxic to plants, thus eliminating all plant life in the surrounding area. "Despite the fact that several ideas have so far been proposed on processing oil mill wastewater and reducing its environmental load, they are so costly that applying them would shut down all the oil mills," added the scientist.

By contrast, Mr Galanakis' technique turns managing oil mill wastewater into a profit-generating process, by separating wastewater ingredients so that they can be used to produce valuable products. One of the main ingredients is polyphenols which, in low concentrations, has been proven to have antioxidant action. "Thus, they can be used as additives in producing functional foods – such as drinks, sodas, meat and bakery products, yoghurt, margarine and



The researcher at the chemical analysis family business founded by his grandfather in the city of Chania back in 1925



The innovation promises to help oil mills get rid of environmentally harmful wastewater, which in Greece amounts to one million tons per year

A FEW WORDS ABOUT THE RESEARCH

This patented method is green, sustainable and cheap, as it uses only natural techniques and recycled alcohol. The value-added ingredients retrieved are pectin and polyphenol extract (Lundoliv). Pectin can replace fat in meat or other food products. Lundoliv has strong antioxidant action and contains hydroxytyrosol, a substance approved by the European Food Safety Authority for keeping LDL-cholesterol at low levels and protecting lipids against oxidation. Lundoliv is already being used as an additive by a Swedish chocolate manufacturer, while Greek bakery and cosmetics companies are also exploring the possibility of using it. Other suggested applications include carbonated beverages, fruit drinks, chips, yoghurt and natural meat preservation. To get an idea, applying this method to yoghurt manufacturing can yield profit 20 times greater than the initial investment cost within 5 years.

sparkling water,” noted the researcher.

In fact, a functional chocolate is already available in the Swedish market. This chocolate owes its antioxidant properties to an additive produced from oil mill wastewater using this particular method. “Given that polyphenols also have anti-aging and sun-protection properties, a Greek cosmetics company is already working on a new cream and sunscreen,” he added. The valuable ingredients of oil mill wastewater do not end here, as the same technique is used to separate pectin, a residue rich in edible fibres. “Pectin can be used as a substitute for fat in meat products, which will absorb much less oil during deep fat frying” stressed Mr Galanakis.

Commercial uses have been found for 98% of the ingredients isolated from oil mill wastewater with this technique, while the remaining 2% is rich in water insoluble fibres, which could be used to produce biofuels and soil improvers. This means that the method does not produce polluting by-products, while it involves environmentally friendly physico-chemical processes. “Compared to other technologies that reuse oil mill wastewater and have been applied abroad for more than a decade, this particu-



Thanks to the processing procedure, recycling oil mill wastewater becomes profitable, as the ingredients can be used to produce many foods with high nutritional value

Commercial uses have been found for 98% of the ingredients retrieved from oil mill wastewater with this technique, while the remaining 2% is rich in undissolved fibres, which could be used to produce biofuels and soil improvers.

lar method has the advantage of being simpler and, thus, less costly,” he noted.

Mr Galanakis started working on the idea in 2005, under the framework of his doctoral thesis at the Technical University of Crete. Part of his research was carried out at the University of Lund in Sweden, where he patented this technology together with Professor Eva Tornberg. In 2009, together with the Lund University Innovation System, they founded the company Phenoliv AB, which has taken over the patent. Today, only half the process is carried out in Greece, partly due to legal and other issues. The processed oil mill wastewater is then transferred to Sweden for the extraction of polyphenols per batch-

es and the production of the final product, according to demand.

Together with his associates from Sweden, the scientist is currently working on specific polyphenol applications in the food industry. In other words, he is studying the appropriate quantity that needs to be added to specific foods so that they may acquire antioxidant properties and health claims, without greatly affecting their flavour. “Despite the fact that this innovation is not widely known, we have already been contacted by a municipality in Greece which is looking for a solution for the 30,000 tons of oil mill wastewater they produce every year,” he concluded.

ABOUT THE COMPETITION

“Moral reward and stimulus for new investments in Greece”

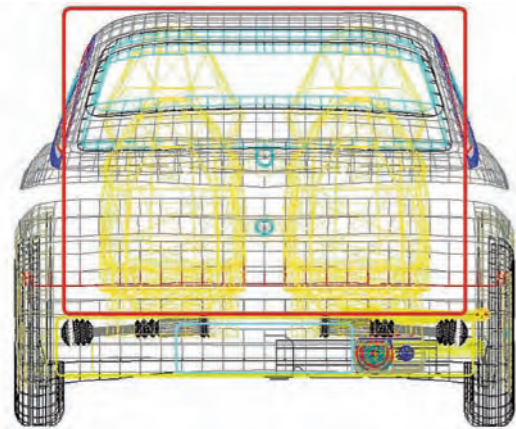
The fact that we were among the 20 proposals shortlisted in the competition was first and foremost a moral reward for us, given that in the field of research, the times one feels disappointed by far outnumber the times one feels vindicated for their work. At the same time, I hope that the promotion through the Greece Innovates! competition will make our technology known to Greek food companies that we could work with or to strategic investors who will undertake to fund the oil mill wastewater industrial processing unit. Therefore, I am optimistic that this unit will be established in Greece and not in Sweden, where the company was founded. Anyhow, being shortlisted in the competition was enough to rekindle the interest of my Swedish associates in this prospect.

Charis Galanakis

ONE CHASSIS FOR EVERY TYPE OF VEHICLE

During the last 15 years, a Greek engineer, who has worked for major automotive firms such as FIAT and Mercedes, has been perfecting an idea that can change the entire automotive industry.

By Natassa Blatsiou



The Greek parametric chassis is based on a simple suspension module and frame

INNOVATION: Using the parametric chassis and suspension module technology

ORGANIZATION: Ellenic Vehicle Research Ltd, www.parametric-chassis.com

CONTACT EMAIL: dhatzikakidis@gmail.com

REPRESENTATIVE: Dimitrios Hatzikakidis

□ TODAY, traditional automobile design houses, from Giorgetto Giugiaro's Italdesign to the Bertone family business and the famous Pininfarina house, are struggling to survive. The huge design and production cost has been strangling an entire industry, which is going through one of the toughest periods in its history. So how can cost be reduced? Is it enough to transfer part of the production process of large European manufacturers to third countries with cheap labour? Mechanical engineer Dr Dimitrios Hatzikakidis believes that only innovation can satisfy the urgent need to reduce costs. Ellenic Vehicle Research Ltd., under the guidance of Dr Hatzikakidis and with associates all over the world, is here to propose a pioneering innovation that can reduce the automobile

manufacturing cost by up to 80% for the most expensive models.

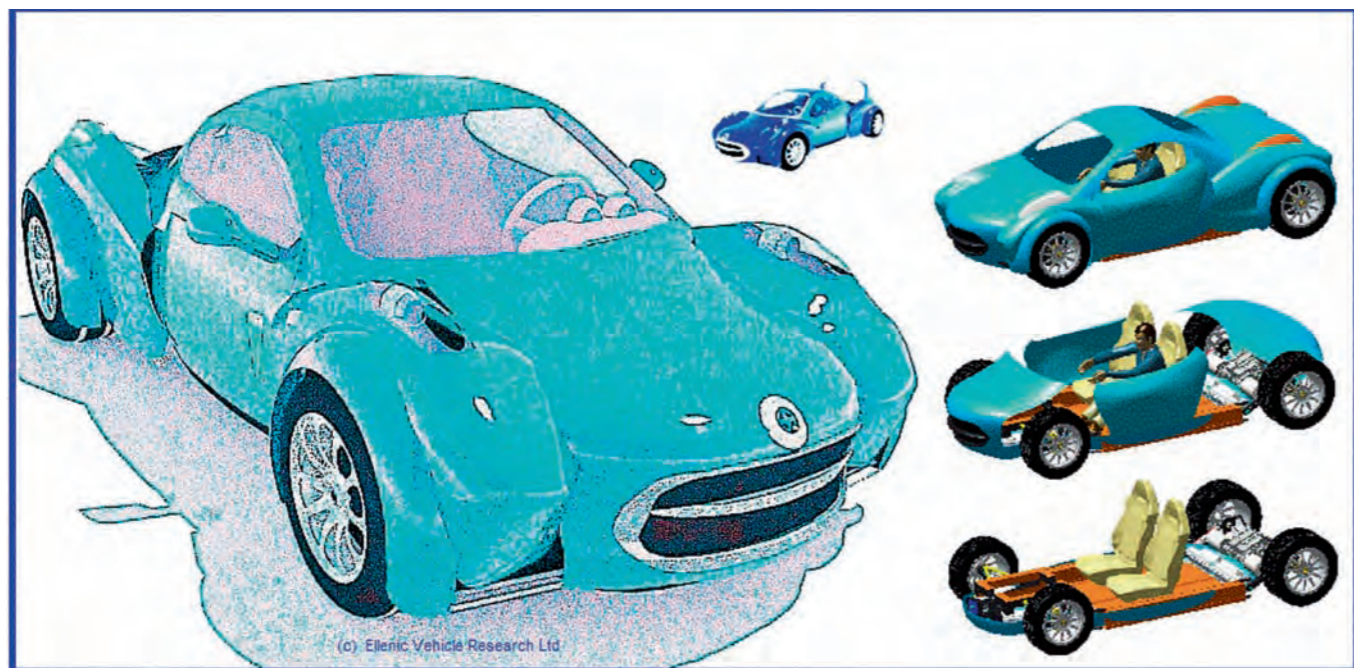
The idea is simple but forward-looking and is called standardization. "Dr Hatzikakidis thought of something that no one else had thought of in the automotive industry for centuries: the concept of standardization. Automobile designers work in exactly the same way as tailors: they make custom-made suits. Not even patterns for different sizes are available," explained Professor Konstantinos Spentzas, founder of the NTUA Vehicle Laboratory, who has been following the progress of Dimitris Hatzikakidis'

technology since 1998.

"With this innovation, we have managed to separate the design process and the industrial part of the assembly process into pieces, in order to develop a successive platform that leaves much leeway for manufacturers and designers. Specifically, we propose a ready-made chassis based on which one can design and then manufacture conventional, commercial and electric vehicles, even military tanks," said Dr Hatzikakidis. In fact, the same 'fully tuneable' suspension module is used four times, which greatly reduces the cost of manufacturing, due to



"A ready-made chassis based on which one can design and then manufacture conventional, commercial and electric vehicles, even military tanks."



Proposal to design a two-seat sports car based on the parametric chassis. The assembling method changes the way automobiles have so far been manufactured, by introducing the concept of standardization

the economies of scale. At the same time, the resulting frame is 100% parametric and can meet the needs of different related vehicles.

Together with the research and development, which started in 1998, which has created one technological and three pre-industrial prototypes, Dr Hatzikakidis undertook the extremely difficult and time-consuming task of creating a patent strategy at a global level. To date, eight patents have been issued by the European Patent Office. The parametric chassis patent has been granted in the USA, while patent issuing is pending in another ten offices all over the world.

The interest of multinational automobile design and manufacturing companies is great and market developments are very favourable. In Hong-Kong, the respective website (www.parametric-chassis.com) counts five million visits, while investment entities and groups have expressed great interest. "Our aim is to preserve the industrial copyright in every area this technology is used all over the world, as well as to

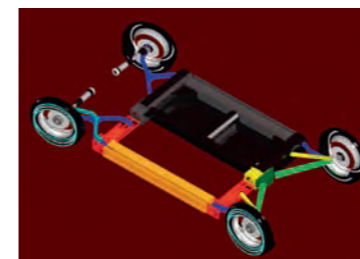
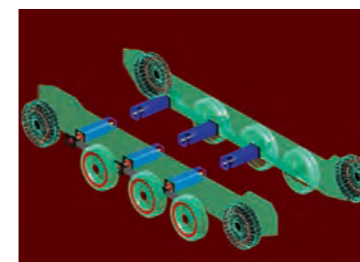
A FEW WORDS ABOUT THE RESEARCH

The Greek parametric chassis is based on a simple chassis and suspension module. The same suspension element is used in all four corners of the chassis, while the batteries and the other heavy and bulky elements, such as fuel cells, are placed in the centre. The parametric chassis may be used to manufacture electric/hybrid and sports cars, conventional automobiles, military vehicles, as well as light commercial vehicles.

work with individual manufacturers. We want many applications, many technologies, many manufacturing plants, satellite companies in many places that will serve the new market. We do not want to simply sell the patent to an investment entity, but to change the way automobiles are manufactured."

Dr Hatzikakidis did not opt for the recognition and substantial financial gain offered by the large manufacturers he has worked for, but chose instead to retain his capacity as a mechanical engineer in order to fully concentrate on the parametric chassis research. He has worked as an engineer at the headquarters of Mercedes in Germany and FIAT in Italy. He developed the side mirror turn signals for Mercedes in 1987 and designed the four-door vehicle with two visible and two hidden door handles in 1992, which was applied to Alfa Romeo 156. These innovations were adopted by the entire automotive industry. "An idea is a flash of lightning. However, contrary to the side mirror turn signals or the door handles – ideas that can be expressed even over the phone – the parametric chassis innovation is the result of thousands of hours of research and development from thousands of bits and pieces of information. What brought us here was the extensive experience in design and vehicle dynamics, as well as the valuable knowledge on the advantages and disadvantages of traditional layouts."

But how easy is it to radically change the way automobiles are conceived, designed and then assembled? The answer is: "With many obstacles and difficulties. We have the delusion that technology has reached its



Above: The parametric chassis allows separating the design and the assembly process into pieces, thus leaving much leeway for manufacturers and designers



ABOUT THE COMPETITION

"SEV and Eurobank guarantee credibility"

The two bodies that jointly organize the competition are a guarantee that actual innovations will be showcased, without any hidden agendas. As far as our innovation is concerned, we believe that in this way, it will become more widely known, not only to the automotive industry, but also to interested funding entities.

Dimitris Hatzikakidis

peak, but technology is dying. We are manufacturing everything, even airplanes, in such a traditional way which gives the impression that the modern research world suffers from lack of ideas. But the truth is that new design ideas are always treated with suspicion, because the established interests are fixed and conflicting," said Dr Hatzikakidis. One of his favourite examples is the story of the American Earle MacPherson, an engineer who was ignored for twenty years by the automobile industry before adopting his wonderful patent, namely the MacPherson strut. As chief engineer at General

Motors in the mid-30s, he designed and patented the now popular MacPherson struts, in order to incorporate them in the front suspension of General Motors' Chevrolet Cadet. However, this project was cancelled and the first appearance of the suspension that marked the automotive history was delayed until 1949, when it was first used on Ford Vedette. Today, it is considered a great suspension because it is not expensive to manufacture and fits even in small vehicles. Will Dr Hatzikakidis become the next MacPherson or will we have to wait for a long time before we see that happening?

NEW HOPE IN THE FIGHT AGAINST INFERTILITY

A new diagnostic method used in semen analysis detects infectious agents directly related to male infertility and paves the way for having children after suitable treatment.

By Natassa Blatsiou

INNOVATION: Method for detecting intracellular microorganisms in sperm cells

ORGANIZATION: Locus Medicus SA, Cellular Biology and Immunology Laboratory, www.locus-medicus.gr

CONTACT EMAIL: adgritzapis@ciic.gr

REPRESENTATIVE: Angelos Gritzapis

RESEARCH TEAM MEMBERS: Angelos Gritzapis and Vasilis Tsilivakos (scientific heads), Michalis Leventopoulos, Konstantinos Makarounis, Efi Nosi, Dimitrios Nikolopoulos



Using a globally-unique diagnostic method, microorganisms within sperm cells are tested as the main cause of male infertility and miscarriages

□ A WORLD-FIRST DIAGNOSTIC method offers hope to infertile couples who wish to have children. “So far, no one had ever looked for microorganisms within sperm cells as the main cause of male infertility and infectious embryos, which could lead to miscarriage or congenital diseases,” said histopathologist-perinatal immunologist Dr Vasilis Tsilivakos and biologist-immunologist Dr Angelos Gritzapis. However, the two scientists did not content themselves to just conceiving the idea on the causes of male infertility, but managed to penetrate sperm cells, trace the

most common viruses within them and offer suitable treatment. This is particularly important, since only the internal content of the head of the spermatozoon penetrates the ovum during insemination, becoming part of the composition of the first embryonic cell. Of course, the microorganisms attached to the outer part of the membrane do not penetrate the ovum during insemination. “Our innovation lies on the fact that we have managed to penetrate this particularly dense cell and detect infectious agents using immunofluorescence techniques.”

The main indications that led to the scientific discovery arose when in endometrial curettage materi-

als from miscarriages, they found that inflammatory reactions would develop in the implantation position, especially around embryonic cells. “At that moment, we wondered why female defences would react towards embryonic cells, assuming that these may contain microorganisms that come from sperm cells,” explained Dr Tsilivakos. In 2010, the two researchers tried to find a way to ascertain the existence of infectious agents within the core of sperm cells and their efforts bore fruit a few months later. The innovative method is already being applied for a year and a half. It is cheap, accurate and repeatable. Apart from the lower cost, its advantage compared to mo-

The members of the Locus Medicus Cellular Biology and Immunology Laboratory research team. In the middle (from left to right), scientific heads Angelos Gritzapis and Vasilis Tsilivakos.





The method is based on sperm immunophenotypic analysis and intracellular microorganism detection. This assists in detecting viruses, Chlamydia and other infectious agents within sperm cells.

A FEW WORDS ABOUT THE RESEARCH

The method is based on sperm immunophenotypic analysis for intracellular microorganism detection. Monoclonal antibodies are used, which recognize special proteins of the microorganisms under examination, following solubilization of the sperm cell membrane and relaxation of their intracellular space. Results are assessed using flow cytometry, which allows analyzing a large number of cells. This assists in detecting viruses, Chlamydia and other infectious agents within sperm cells.

lecular tests is that it detects microorganisms within sperm cells that relate to the infertility of the couple. At least 700 infertile couples have been tested so far and the percentage of those who tested positive for infectious agents was almost 60%. With suitable treatment, sperm chart indexes improved and many couples managed to have children. The exact success rates will be announced some time in 2014. At the same time, patent applications have been submitted both at the Hellenic Industrial Property Organisation and the World Intellectual Property Organization.

"This method plays a fundamental role in the overall assessment of male infertility," stressed Dr Tsilivakos. At the same time, however, it opens up a new research field. "An important research sequel is analyzing the mechanisms whereby sperm cells acquire infectious agents, which is expected to shed light on many dark issues regarding sperm physiology, as well as provide answers to a series of questions such as: Where do infectious agents come from? What do viruses cause to the embryo? How have viruses evolved in relation to humans and what are the implications?" Equally important is the social aspect of the research, given that infertility had so far been treated more as a female rather than a male problem. "Our method documents the participation of the male in the issue of infertility. Both males and females are equally responsible, while a considerable burden of responsibility



Results are assessed using flow cytometry, which allows analyzing a large number of cells

is attributed to common yet combined issues of the couple," concluded Dr Tsilivakos.

The new method forms an essential part of the causative and individualized approach to infertility, which, according to the two scientists, must precede in vitro fertilization. "We provide the greatest possible benefit with the least possible physical and mental burden and at a minimal cost. The primary aim of infertile couples should be to determine the agents responsible for their inability to conceive. Under no circumstances should one commence treatment before reaching a safe conclusion as to the participation of all causative factors of the couple's infertility. Tests must be individualized, few in number and focused, and they must precede any in vitro fertilization efforts," stressed the two researchers.

Two international patents have also been developed by the Locus Medicus Clinical Diagnostics Laboratory. In fact, one of these patents relates to infertility and focuses on testing menstruation material to diagnose endometritis via detecting Chlamydia or other infectious agents (2001). The company's scientific activity includes more than twenty international scientific publications, as well as five conference awards. The research team aims to further develop their work not only on infertility issues, but also on other scientific fields, such as infections, cancer and biotechnology.

However, apart from the research work, another

innovation is the way the centre operates. Locus Medicus, which was founded in 1996, is a small self-financed private company oriented towards extraversion (tests are sent from abroad on a daily basis), which operates both a research and a routine unit. These two units interact, exchanging new scientific knowledge and resources respectively. Furthermore, the company employees can, under certain conditions, become company shareholders. "We believe that we have a growth model worth disseminating. Private companies that conduct research should base their research activities more on their own profitability rather than just on subsidies."

At least 700 infertile couples have been tested so far and the percentage of those who tested positive for infectious agents was almost 60%. With suitable treatment, sperm chart indexes improved and many couples managed to have children.

ABOUT THE COMPETITION

"It is important that we find imitators"

Greek innovation and the respective patents should be respected and not undermined, given how the country has a low regard for the concept of innovation. Unfortunately, citizens are not adequately informed about the research activities of the Greek scientific community, as is the case in other European countries. Therefore, it is important to support Eurobank and SEV's initiative and to get SMEs to copy our example and turn to research.

Angelos Gritzapis

ACCESS TO THE SEA FOR PEOPLE WITH PHYSICAL DISABILITIES

Seatrac, a globally unique device, aims at radically facilitating access to the sea for people with lower-limb disabilities, while at the same time constituting a core tourist commodity with a potential value of €166 billion.

By Natassa Blatsiou

INNOVATION: Non-permanent structure offering autonomous access to the sea for people with lower-limb disabilities

ORGANIZATION: TOBEA Mechanical Applications Ltd, www.tobea.gr

CONTACT EMAIL: fotiou@mech.patras.gr

REPRESENTATIVE: Ignatios Fotiou

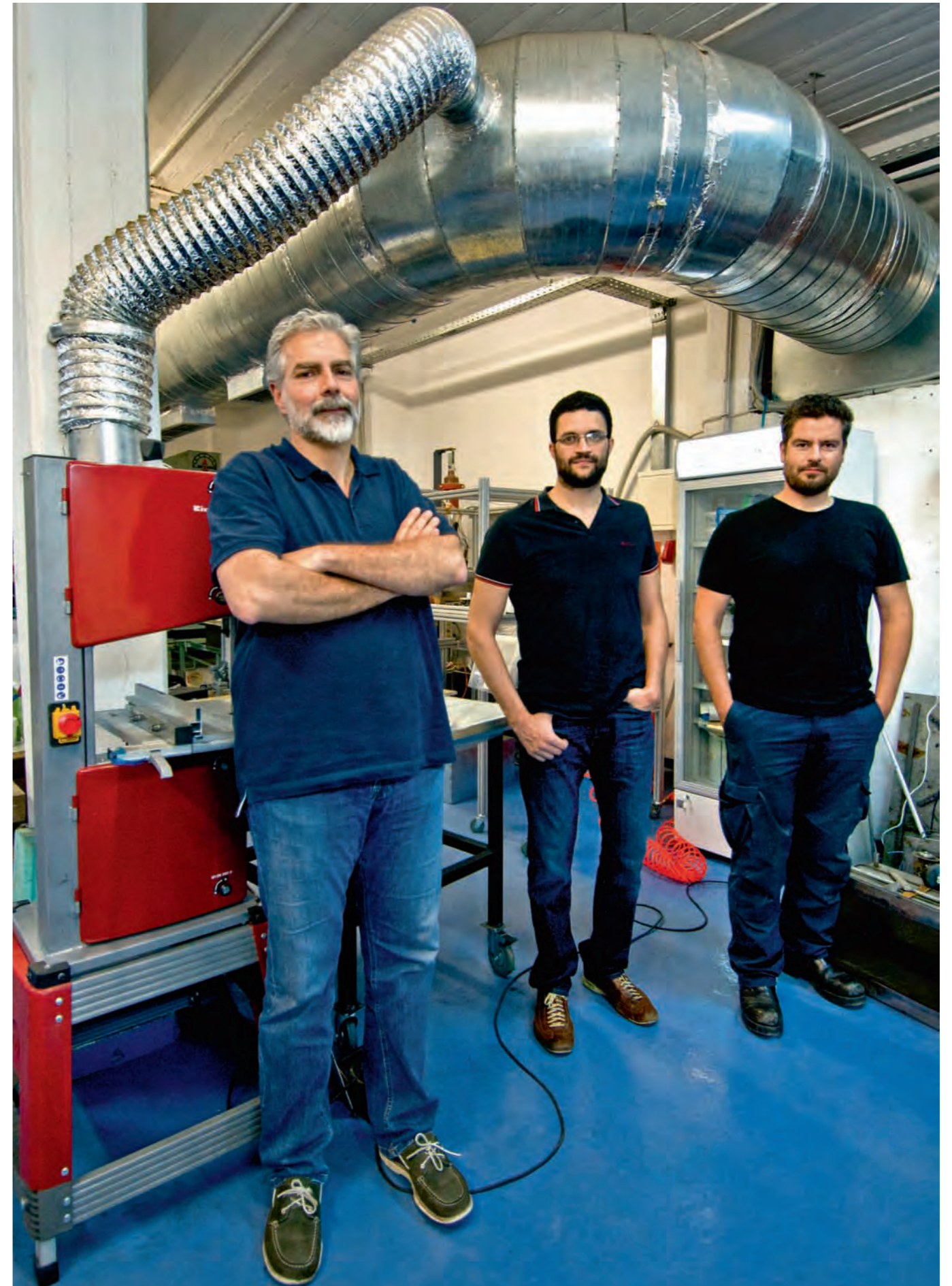
RESEARCH TEAM: Dr Vasileios Kostopoulos, Professor at the University of Patras Department of Mechanical Engineering and Aeronautics, Dr George Sotiriadis.

□ THE CITIZENS of developed countries will statistically spend seven to eight years of their lives facing limited mobility. This means that they will have to count on help to perform daily activities which are otherwise considered simple. Just imagine how greatly dependent on others wheelchair-confined people are when they want to enjoy something as seemingly simple as a dip into the sea. Until recently, no one in the world had thought of constructing a fixed-track system that would allow people with limited mobility to cross the beach and enter the sea unassisted.

Fortunately, the courage of a disabled Greek, the talent of a research team and tremendous perseverance against red tape contributed towards the development of the innovative Seatrac device. Back in 2008, Gerasimos Fessian, Vice Prefect of Health Prefecture of Achaia and a person with limited mobility himself, contacted the Technical Mechanics Laboratory of the University of Patras Department of Mechanical Engineering and Aeronautics asking that they construct a device that would allow him autonomous, i.e. unassisted, access to the sea. "Our laboratory is involved in cutting-edge technology and new materials, but we are also a place that functions as a research hub, which can house and develop ideas such as this one," noted Ignatios Fotiou, candidate PhD student at the Department of Mechanical Engineering and a member of Professor Vasilis Kostopoulos' laboratory research team. "I remember that we got back to the office thinking that



Above, the device with Mr Gerasimos Fessian (left) and team representative Mr Ignatios Fotiou. Below, the device ready for use at the sea. Right, Dr Vasileios Kostopoulos (left), Dr George Sotiriadis (middle) and Mr Fotiou (right) at the University of Patras laboratory.



we would just do a Google search, find a similar device and adjust it to our needs. As the hours went by searching, we could not believe the gap in this kind of technology globally. There were wheelchairs designed for the sea and small cranes that required operators, but there was nothing autonomous as Mr Fessian had requested.”

Apart from being directly interested, Mr Fessian was also the best construction consultant, given that as a wheelchair user, he was well aware of the technical requirements, while as Vice Prefect, he was familiar with the legislative framework. “Permanent structures are not permitted on Greek beaches. Therefore, the device had to be portable and power-autonomous.” The research team preconceived the design of a solar-powered fixed-track system. This way, they would be able to define the course of the wheelchair by developing a temporary and economical structure, without altering the natural landscape of the beach. They then focused on selecting the suitable motor mechanism, since both the sand and the sea posed significant technical challenges. Despite the reservations of the engineering workshops they worked with (constantly hearing that something cannot be done), they eventually settled on a stainless steel system with less powerful mechanisms and movement transmission via a wire rope. In spite of their hard work, the first device was literally drifted by the waves! “We worked on it, spent many sleepless nights and finally found a solution inspired by the stilt houses at the distant seas of Thailand,” recalled Mr Fotiou. Significant improvements have been made from the first device until today, assisted by the users themselves, as well as the Hellenic Union of Paraplegic. It has been improved appearance-wise and comfort-wise, while it has been adjusted to the strict requirements of the EU safety standards. The patent has already been issued in Europe and the USA, but it remains open for users who might want to construct something similar for personal use.

Red tape was by far the greatest challenge faced by the research team. “Unfortunately, we have been forced to act as managers, lawyers, accountants and public servants, and we have been having a hard time being what we actually are: engineers,” said Mr Fotiou. The construction of the eight Seatrac devices was co-funded by the relevant prefecture, but they remain decommissioned for a second year running, locked up in warehouses. Of course, there are some bright exceptions in public administration, such as the personal contribution of Ms Lilika Vasilakou, Vice Regional Governor of Finance for Attica, in installing



The Seatrac user will leave the wheelchair further away from the water and cover the distance to the sea using the device. Small photo on the left: view of the device assembly. The structure is not permanent and it is environmentally friendly, as it runs on solar power

A FEW WORDS ABOUT THE RESEARCH

The device includes a solar-powered seat that moves on a fixed track. The operation is performed using a simple waterproof remote control, which has only two buttons: one for the sea and one for the land. The track covers a distance of about 15 metres inside and outside the water and the satisfactory water-entry depth is 80 centimetres.

ABOUT THE COMPETITION

“For us, the reward is to be promoted to the public”

Knowledge must not be confined to a small scientific circle, it must reach the world. For us, reward is not being up for a monetary prize, but being promoted to the wider public and receiving knowledge from people within the market.

Ignatios Fotiou

contacted us, while active interest has been shown by private individuals and business,” noted Mr Fotiou. “But it is equally important for Greece that counts on the sun and the sea. Why shouldn’t we welcome a part of the 89.3 million tourists who demand access to the sea, and receive a share of this €166 billion industry?” he further wondered.

Seatrac’s innovation breeds social responsibility. “Agi-os Vasileios, the first beach in Achaia where the device was installed, served as a social experiment. In the beginning, people were sneaking peaks or parking in the disabled spot, but in three weeks no one was looking, the disabled parking spot was empty and the people with limited mobility became a part of the beach after four years. People become used to things and disabled individuals can determine what they can do in life,” stated Mr Fessian. What will happen, though, seeing that there are no roads or special signs for the disabled? “Let’s not lose spirit. The roads should have been there, but the Seatrac beaches will bring in money to build roads. The tourists who come to Greece will surely be disappointed. However, if they see something they had never seen before at the beach, they will remember that, and not the condition of the road,” said Mr Fotiou.

In future, the aim is to make Seatrac a first-rate tourist amenity system: WiFi station with live streaming, weather station, shower, toilet and umbrella. “Just think what a German would do if he saw his friend entering the sea the moment he was planning his holidays online. We have something unique at hand. France has over 70 tourist areas certified by France national label (« Tourisme & Handicap », but it is missing one thing: Seatrac. In Greece, we do have the device, but we do not know what the term “comprehensive beach” means. It is a great opportunity and we can all profit from it. As a country, we can become pioneers in creating a comprehensive beach and drafting the relevant EU legislation.»

But even on the level of connecting innovation with entrepreneurship, the news is excellent. Seatrac has been generating revenue for the University of Patras, as well as creating jobs at the TOBEA spin-off, the company that owns the innovation. “We may be involved in cutting-edge technology as a laboratory, yet we have something on our CV that makes us truly proud: Seatrac,” noted Mr Fotiou.

“At the first beach the device was installed, the visitors do not park at the disabled spots anymore and people with limited mobility have become part of the beach. People become used to things and disabled individuals can determine what they can do in life.”

10 devices in total, as well as 7 more this year. According to Mr Fotiou, the cost of each device does not exceed €30,000, including transport, installation, maintenance and dismantling.

Despite the challenges, the future of Seatrac is bright, with strong potentials for exports and domestic tourism. “The Cyprus Tourism Organization has purchased some devices, other countries, such as Croatia and Israel, have

MEASURING THE QUALITY OF VISION

Light scattering, i.e. the random deflection of light when it passes through a transparent medium with imperfections, has been the subject of a study that pertains to objectively measuring its impact on vision. The device is under development, yet it creates conditions for new treatment methods in ophthalmology.

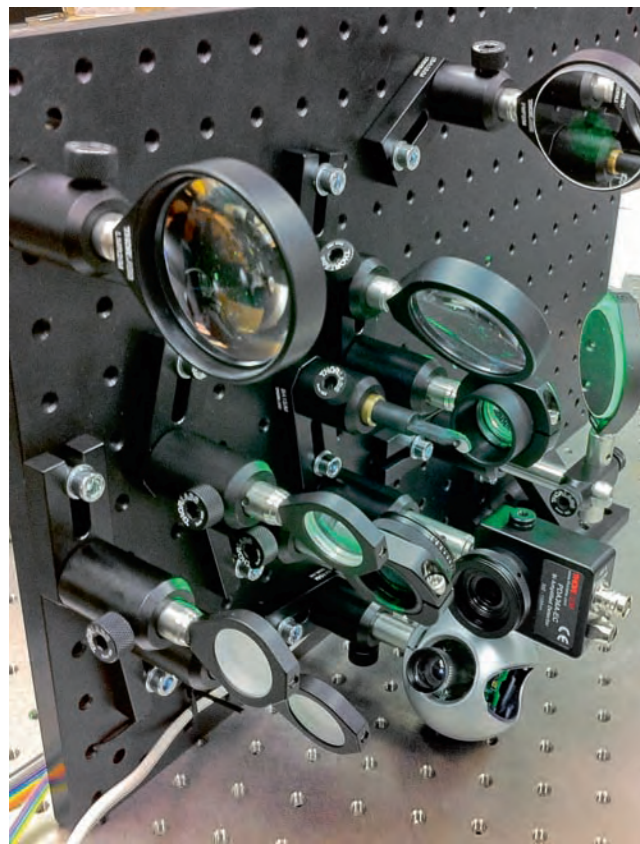
By Kostas Farmakis

INNOVATION: Quantifying vision quality through measuring light scattering

ORGANIZATION: SinusMedii Ltd

CONTACT EMAIL: info@sinusmedii.eu, ginis@ivo.gr

REPRESENTATIVE: Dr Harilaos Ginis



Model of the device during lab testing

□ "IT MAY COME as a surprise, but even today, there are no objective methods available for measuring main parameters during an eye test," noted Dr Harilaos Ginis. "For example, patients try to make out letters on a chart and the physician selects suitable glasses by trial and error. During another very frequent diagnostic test, a physician observes the crystalline lens opacities of a patient and, based on experience, decides whether cataract surgery is required or not. While there is equipment available that can measure the optical properties of the eye, there is no method available to fully understand the image quality perceived by a patient. The object of my study is to develop objective methods for measuring and subsequently understanding the role of optical eye parameters in vision."

Having a PhD in Physics, one would think that ophthalmology and the function of eyes would not fall within his sphere of expertise. "Apart from everything else, the eye is an optical instrument. In this respect, it should be studied in terms of optics. Measuring and studying the way light is scattered in the eye requires a combined approach using optics, maths, computer simulation and image analysis."

Dr Ginis focused his research on light scattering. It is the phenomenon whereby light propagates randomly when passing through transparent objects with imperfections. As he stated, "An example of light scattering is the halo formed around the Moon, a lamp or the lights of an oncoming vehicle at night. This halo affects and aggravates vision, even in normal eyes. To better comprehend the role of scattering, consider that there is increased scattering when your glasses are very dirty. In this instance, vision quality is impaired differently compared to using wrong prescription glasses."





The mathematical representation of the formations that cause scattering in the eye bring to mind a multitude of other natural dynamic systems

Because the magnitude of scattered light is very small, it is difficult to be measured. The eye would have to be probed with a powerful light source so as to produce observable scattering, but this would not be safe for the eye. Dr Ginis explained how he reached a solution: "Using light distributed over a large area of the eye – but not focused – and changing its geometric features, it was possible to record (and analyze through a suitable

A FEW WORDS ABOUT THE RESEARCH

It is a new diagnostic tool that for the first time offers quantitative information on the transparency of optical parts of the eye (cornea, lens), by measuring light scattering, i.e. the random deflection of light when it passes through a transparent body with imperfections. With this test, physicians will be able to objectively decide on the need to perform cataract surgery, as well as assess the effectiveness of different treatment methods. Incorporating light scattering measurements in clinical practice will assist in better understanding the phenomenon and its impact on vision quality. This is significant in cases when increased scattering may have a negative impact, such as impaired vision during night driving, which greatly increases the risk of an accident.

mathematical model) how light is scattered, using light sources within the safety limits. Thus, for the first time ever, it is possible to quantify scattered light in an objective manner. So, patients will no longer be required to describe their symptoms subjectively."

The method has multiple applications. "Most importantly, it can quantify cataract. So, when a patient visited an ophthalmologist and complained about problems during night driving, the ophthalmologist would check the lens for clouding, but until today, it was impossible to obtain a quantifier (i.e. a number) that would assess the severity of the problem. This method, though, could accurately measure the problem. Furthermore, in conditions that deteriorate corneal transparency (inflammations, edema), a quantifier for scattering could contribute towards better assessing treatment and assisting the physician in making the right decision."

Dr Ginis believes that the device could pave the way for developing new treatment methods. "Imagine if we wanted to make fever medication, but did not have access to a thermometer; all relevant medical procedures would have to be empirical. We have managed to assess



Final adjustments before commencement of pre-clinical trials on actual eyes.

"Physicians could observe clouding in a patient's lens, but until today, there were no quantifiers that would assess its severity. My method measures the problem accurately."

everything objectively, creating the conditions for the medical community to propose the most suitable treatment for each individual case."

Dr Ginis commenced his research at the University of Crete – where the model device is located and is currently being used by a student for his PhD – and completed it at the University of Murcia, Spain, where he was given access to facilities, equipment and associates. He also established SinusMedii, the company that aims to seal a deal with a major manufacturer. The construction of a fully operational device will depend on whether a partnership will be struck with investors. "I want this to happen in Herakleio, Crete,

due to my ties with the local university. I feel I owe a lot to Crete, on a personal and scientific level, and I want to keep the effort Greek. If all goes well, next year, I would want the device to be produced here in Herakleio by me and a team of another two-three people, and be available through a company, preferably European. Both of these could be achieved."

Dr Ginis' research is unique globally, while it is considered a point of reference with regard to assessing the transparency of ocular tissue. "An immediate benefit would be cutting down on cataract surgeries, which are expensive, yet may not be necessary in certain cases."

So, what's next for the scientist? "We have fully comprehended the optics and there is extensive knowledge on vision, but we have not fully understood how eye optics relate to vision. Meaning that, if there was increased scattering, how would this affect night driving or if the lens had an anomaly, how would this affect the ability to read small print? There are plenty of observations, but there is no solid mathematical framework linking the two. It is something I plan on researching in the future."

ABOUT THE COMPETITION

"Innovation should be instilled in young scientists"

I participated in the Greece Innovates! competition as I considered it a positive move in the effort to showcase innovation and creativity. Every distinction constitutes a moral satisfaction, but it also communicates a very important message: innovation – and by extension entrepreneurship – is not just a way of gaining high added value or seeking resources within a modern environment. It is a mentality that has to be instilled in young scientists and which should become the start of a positive cycle, i.e. a new status quo in higher education, which will focus on knowledge and scientific adequacy.

Harilaos Ginis

A CONTRIBUTORY UNIVERSITY

From vehicle emission control technology to computer games for preventing senile dementia, the laboratories of the Aristotle University of Thessaloniki produce work, generate revenues and assist the foundation in remaining extroverted and competitive on an international level.

By Giannis Papadimitriou



THE ARISTOTLE University of Thessaloniki (AUTH) was founded in 1925 and was the second university to be established in Greece. Today, it is the largest in the country, covering an area of 430,000 m². Only if one took a walk between its tall buildings and through its shady parks would they appreciate its size. Certain facilities, such as laboratories or administration buildings, are even located outside the main campus. Overall,

it comprises 42 departments and faculties, 61 clinics, 295 laboratories, 23 study rooms, 45 departmental and one central library, which is one of the largest in the Balkans. Just as impressive as the numbers regarding its facilities are the numbers regarding its people, the ones who produce actual scientific knowledge.

Today, the AUTH numbers 62,000 registered undergraduate students and another 10,000 postgraduate



Medical School Professor Panagiotis Bamidis at the Medical Informatics Laboratory explaining how computer games help prevent senile dementia.

and doctoral students. Its teaching and research staff number more than 2,500 individuals! Two significant facts that illustrate AUTH's extroversion are that it attracts foreign students (3,937 in 2013-2014) and that it actively participates in international conferences (e.g. the European University Association). A further testament is the 592 active bilateral agreements for student and faculty exchange. During 2012, over 1,000 of its Greek and foreign students moved, a number that gave the AUTH the first place in student mobility in the country.

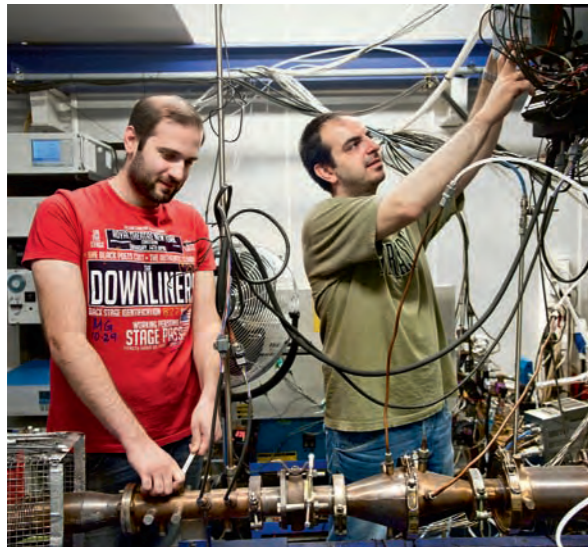
For all these facilities and academic courses to function orderly every day, a huge budget is required. It was, therefore, reasonable to wonder and ask the AUTH's Rector, Ioannis A. Mylopoulos, how hard it is to retain a high level in research and education during a period of recession, when Greek universities are underfunded and gradually disdained. "From the moment I was elected, in 2010, in the middle of the financial crisis, my colleagues and I made three strategic decisions: not to hurt education, not to throttle research and not to restrict the intellectual output of the university in any way. To achieve this, we implemented a program to reduce expenses and to produce own revenues, so that



IOANNIS MYLOPOULOS
AUTH Rector

"A desert oasis"

It is unfortunate that despite its advantages and positive traits, Greece has the tendency to undermine what is good and showcase what is negative. Therefore, we definitely need to encourage good practices. The Eurobank awards are indeed a desert oasis, as they offer an incentive to research teams to improve their performance. I hope that this action will be imitated, so that we can stop lamenting about our losses and eventually focus on fresh creations.



Cables, measurements and constructions are part of the daily routine in the Mechanical Engineering laboratories.



Eyes locked on the computer that measures air pollution.

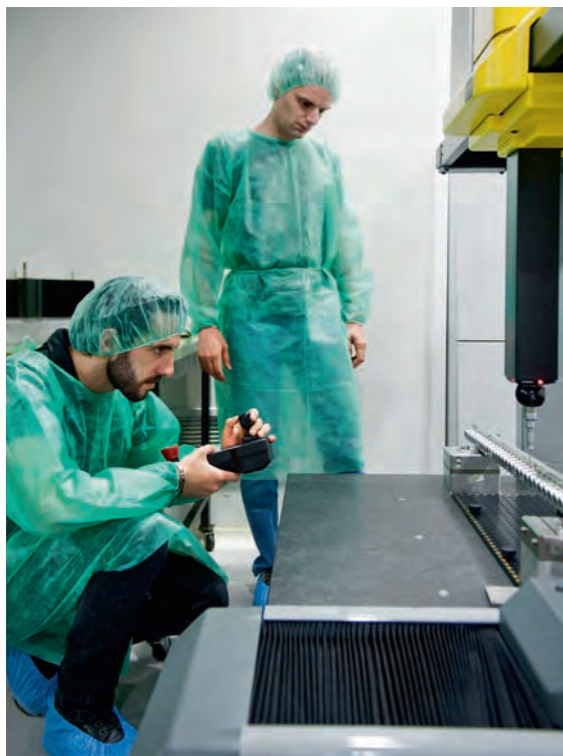


Experimentation and construction in the lab.



Studying human brain activity with Neurofeedback systems.

any setbacks from budget saving would be overcome by finding new funds. For example, we reduced cleaning and security costs, founded our own publishing house and undertook the management of over half of the canteens,” he answered and proudly showed us the



Co-operation, observation and initiative: three key factors for the success of an experiment.

relevant Research Committee documents.

According to statistics provided by Mr Mylopoulos, for every euro received in state funding, the AUTH generates €3 via its research activities, recording an annual turnover of €60 million. Moreover it creates 3,000 new jobs, thus effectively reducing the number of talented researchers who opt to leave the country. “At a time when Greece is trying to plan its future from scratch, there is no doubt that research should be the main drive for economic growth. By continually participating in competitive European programs, we have greatly increased our revenues. We reinvest the money we earn in research, so as to either support programmes which are underway or fund new research teams,” added the Rector.

Substituting state subsidies with funds coming from research might not have been easy, but it was definitely worth it. Today, by participating in 48 networks and implementing over 1400 research projects every year, the AUTH is among the top 200 universities in the world. In other words, it is included in the top 1% of the respective world ranking, with some of its departments working with global industry giants. A typical example is the Applied Thermodynamics Laboratory in the School of Mechanical Engineering, which has many well-known automobile companies in its clientele. The objectives of this specific laboratory – which has an annual turnover of over €1 million, excluding the minimal state funds it receives – are to develop technology that will help reduce car pollution, to evaluate the compatibility of new forms of fuel with existing engines and to deal with the effects of air pollution.

Given that it is necessary to connect research to

the market, the Laboratory has founded two spin-off companies, Exothermia and Emisia SA, with the aim of turning laboratory discoveries into marketable products. “It is quite common for many innovations never to reach the market, with the laboratories missing out on income from commercially valuable products. For a research institution to be sustainable, it is crucial for it to be connected to the market,” explained Mr Zisis Samaras, Professor at the Department of Mechanical Engineering and Laboratory Director. When asked if laboratories working with the market run the risk of shedding their academic nature and focusing solely on the pursuit of money, Mr Samaras responded, “Industries expect new ideas and innovations from a university, which, however, they would never fund. So, if a laboratory or research institute aspires to stay ahead of market needs, it should mainly focus on basic research, because without it, it will slowly dwindle away and have nothing to offer.”

Apart from heavy industry-related research, the AUTH

also runs other research programs that deal with improving our daily lives. For example, the Medical Informatics Laboratory in the School of Medicine has been systematically active in the fields of technology and computer science for over 20 years. A system named Fit for All, which is based on principles found in computer games and has been shown to have helped elderly in preventing senile dementia, is planned to be launched in the market this year. “Anyone can buy the equipment and receive technical support from our Department by paying €150–200 per year,” said Mr Panagiotis Bamidis, Assistant Professor in the Medical Informatics Laboratory, adding that two municipalities in Thessaloniki have already expressed interest in acquiring the system. What could be better than to provide innovative products to society and at the same time secure viability after having got rid of patchwork state funding? With its research work in recent years, the AUTH has disproved the myth that Greek Universities are in decline and non-contributory.

According to statistics provided by Mr Mylopoulos, for every euro received by state funding, the AUTH generates €3 via its research activities, recording an annual turnover of €60 million.

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RESEARCH, KNOWLEDGE AND INNOVATION HUB

Having received international awards and distinctions, it constantly adds courses in new fields, expanding its horizons and fostering an entrepreneurial spirit. With almost all specializations housed within a single campus, it offers unique opportunities for partnerships between scientists who truly conduct interdisciplinary research.

By Natassa Blatsiou



“AS A RULE, research nowadays has to be interdisciplinary for it to be considered truly important,” stressed Giorgos Panagiotakis, Rector of the University of Patras and Professor at the Faculty of Medicine. “In ancient times, a single person would have knowledge of several sciences, whereas today, different people, each with their own specialization, join forces towards a common goal. The University of Patras has a comparative advantage in fostering interdisciplinary partnerships: it has departments covering almost the entire

scientific range, while it is located in the same area as the General University Hospital of Patras and in the same city as the Technological Institute of Patras and the Open University.”

The University of Patras has been operating for 50 years and is the third largest one in Greece. It comprises 5 faculties and 24 departments, numbering 25,000 undergraduate and 3,500 postgraduate students. It started out as a Technological Institution, with an Engineering School and



Dr Ioannis Matsoukas (in the middle) together with members of his research team who have reached the clinical trial approval stage for a multiple sclerosis vaccine.

Natural Sciences departments. Later on, it added a Medicine and a Pharmacy department, as well as Educational and Social Sciences departments. In the course of its operation, it has received both national and international awards and distinctions.

After discussing with professors who have been distinguished for their research activity, one concludes that, despite the economic crisis, the scientific community does not lack innovation. There are numerous examples: the Machine Design Laboratory (Department of Mechanical Engineering and Aeronautics) has been developing a number of innovations, including a method for assessing bone quality in the context of monitoring osteoporosis and other metabolic diseases, a device with exceptionally precise measurements to replace the rectal prostate examination, a method for assessing jawbone quality before placing dental implants, and so on. Associate Professor Sofia Panteliou is a member of the Laboratory.

Dr Ioannis Matsoukas, Chemist, and his research team, have reached the clinical trial approval stage for a multiple sclerosis vaccine, while an anti-hypertension product that is applied percutaneously has now reached the pre-clinical trial stage. Pharmacology Professor and Vice-President of the Medicine Department Christodoulos



GEORGIOS PANAGIOTAKIS

Rector

“Contributing to the entrepreneurship spirit”

The competition is important for all the participants. As a bank, Eurobank sets a good example for all banking institutions to support innovation. Participating universities foster the spirit of entrepreneurship, a forbidden word until recently. Young scientists not only feel they will receive a moral reward for their work, but also that they will become known throughout Greece, thus multiplying their chances of making their dream come true, namely finding an entrepreneur, an investor or even a company where they can continue their research.



Members of the Applied Photophysics & Photochemistry Laboratory, headed by Professor Panagiotis Lianos (on the right).



Associate Professor Sofia Panteliou at the Machine Design Laboratory.



Chemical measurement instruments.



The Chemistry Department absorbs a great percentage of its graduates in its research laboratories.

Floridellis has created a pharmacoepidemiological and drug monitoring centre with the aim of promoting drug safety and efficiency. The Applied Photophysics & Photochemistry Laboratory, headed by Professor Panagiotis Lianos, has established a spin-off company named Brite, which produces innovative panels that turn every window pane into an energy-producing unit. Finally, the Laboratory of Applied Mechanics and Vibrations of the Department of Mechanical Engineering and Aeronautics, headed by



The Laboratory of Applied Mechanics and Vibrations develops materials with multifunctional properties.

Professor Vassilis Kostopoulos, develops new and improved composite materials with multifunctional properties and steadily supports Greek industries by providing high-quality services. In fact, it has been granted international operation and quality certifications.

“Our only option for the development required today in Greece is innovation, with products that are useful for society,” stressed Dr Matsoukas of the Chemistry Department. His laboratory has managed to retain 250 graduates in its midst since 1997, while he has awarded a particularly high number of titles (25 postgraduate degrees and 25 PhDs). “Chemistry, Pharmaceutical Medicine and Biology are working harmoniously together, while there is significant extroversion with the annual organization of international conferences,” he noted. Along the same lines, Dr Kostopoulos’ Laboratory of Applied Mechanics and Vibrations receives 95% of its funding from European programmes and employs 35 people. “It goes without saying that the current funding rate (0.3%) should be raised to the European average (4%), but as researchers, we must also answer to society and be assessed on the basis of what we produce,” he noted.

“What is certain is that Greece has very highly trained human resources. Given that the University can no longer absorb them, the only solution for Greece is to export high technology all over the world, following the example of Israel,” added Physics Professor P. Lianos.

According to the Rector, a good start for this Greek University to become internationally competitive and attract the best new candidate scientists would be to introduce three forbidden words in its vocabulary: assessment, excellence and entrepreneurship. “Until recently, assessment had been connected to punishment.

Now professors seek both internal and external assessment. Excellence had been combined with the elite, with money thrown out the window and fruitless efforts. However, a university should showcase excellence and in order to do that, it should fund all its good research teams and let the best among them excel. Finally, entrepreneurship should stop being considered incompatible to the public nature of higher education. Entrepreneurship means that we encourage and support research teams, help create spin-off companies and attract funds from industries.”

Nowadays, the best scientists will inevitably leave the country, as the opportunities for an academic career have been drastically reduced and postdoctoral researchers who are not entrepreneurs will require a two-year scholarship to keep on working at the University. “If they are not granted the scholarship, they will definitely turn to universities abroad. On our part, as a university and in the context of consolidating our finances, we have cut expenses, but have not yet managed to raise our revenues. The university needs to attract more research programmes, activate its asset development company, reopen its publishing house and make use of its brand name.”

According to the Rector, a good start for the Greek University to become internationally competitive would be to introduce three forbidden words in its vocabulary: assessment, excellence and entrepreneurship

The Rector deems that it is important for the Greek mentality regarding education to change. “If we do not want unemployment to increase in the long run, the number of students should be reduced. It might be that those in charge want to pamper the Greek family, but the final result is a fleeting and fictitious reduction in unemployment, to the detriment of the sustainability of future university education and unemployment,” he noted.

Professor Christodoulos Floridellis took the debate about innovation one step further: “What we need today is not just innovation. We need a new kind of innovation. What does this mean? It means that the breakthroughs that have occurred in Biology, for instance, but also the scientific and epistemological breakthroughs of recent years, illustrate that new knowledge requires an interdisciplinary approach. Innovation should be based on this new knowledge. For example, we cannot make improved versions of existing drugs. This requirement also poses a great challenge in terms of training new scientists. Education is no longer an issue of simply passing on knowledge, but a new interdisciplinary approach to knowledge. We need to see how we are going to ask new questions and not how to answer old ones, as we were used to teach new scientists.”

According to the Rector, a good start for the Greek University to become internationally competitive would be to introduce three forbidden words in its vocabulary: assessment, excellence and entrepreneurship.

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FLEXIBILITY AND EXTROVERSION

The international experience of the teaching and research staff, coupled with its adequate size and its dedication to high academic and research standards make the Technical University of Crete one of the most dynamic educational institutions in Greece.

By Kostas Deligiannis



■ THE TECHNICAL UNIVERSITY OF CRETE (TUC) is located in the city of Chania and is the second exclusively technical university in Greece. It comprises five departments (Production Engineering and Management, Mineral Resources Engineering, Electronic and Computer Engineering, Environmental Engineering, and Architectural Engineering), with just over 3,100 students (including postgraduates). By comparison, it is a rather small institution. However, in the current juncture, this could be

considered an advantage.

According to Rector Vassilis Digalakis, Professor at the Electronic and Computer Engineering Department, this is because, thanks to its size, the TUC has the flexibility required to implement the changes that will help it cope with any additional duties it needs to undertake relatively easily and rapidly. What are these duties? "I believe that in these times, the TUC, as is the case with the rest of the academic institutions in Greece, apart from providing high-



Over the last four years, the Microprocessors and Hardware Laboratory has received €3 million in EU funding.

quality scientific knowledge to its graduates, must also assist them to take advantage of every possible opportunity arising in the professional arena."

The same view is shared by Dionysis (Dennis) Tschritzis, President of the Technical University of Crete Council and internationally acclaimed Professor of Informatics (at the universities of Toronto, Vienna, Geneva and Crete), as well as Senior Vice-President of the Fraunhofer research centre in Germany until 2011. "Given the rapid changes in Greece over the last few years, it has become evident that tertiary education needs restructuring, so that research can have an impact on both the industrial sector and the economy. It is also quite imperative to offer students professional knowledge, so that they can fully cope in the labour market – even going as far as teaching them how to conduct themselves in an interview," he noted.

The Rector further added that, apart from this new role undertaken by the institution, the scientific training offered will naturally continue to be of primary value. "A positive feature of the TUC is that it was founded relatively recently – registrations started in 1985. As a result, contrary to other academic institutions, the academic staff was recruited after the syllabus was created." Thus, the syllabus covers the main disciplines of a technical university, while reflecting the developments in the respective scientific fields.

VASSILIS DIGALAKIS Rector

"Our aim is to be ranked among the leading institutions in the world"

Tertiary education has the potential to help the Greek economy grow, by contributing to its competitiveness and extroversion. In this context, a regional institution such as the TUC could play an important role, since in many technological fields, it is currently much easier for an idea that is born in Chania to penetrate the global market. Given that such examples are also encountered abroad, namely in similarly sized institutions, our aim is to help the TUC evolve, using these institutions as a model. To achieve this goal, a series of conditions have to be met first. Initially, the TUC must be ranked among the leading tertiary educational institutions in the world. Furthermore, we will try to further promote the work that is carried out here, so as to attract more students. At the same time, we would like to strengthen our cooperation with the University of Crete and the Foundation for Research and Technology – Hellas (FORTH), so that Crete can become a pole of innovation.





In partnership with the Psychiatry Department of the University of Sussex, the Distributed Multimedia Information Systems and Applications (MUSIC) Laboratory develops 3D virtual environments for mental illness research.



Laboratory research never ends.



Training programme for installation of photovoltaic systems.



The Micro-Cutting and Construction Simulation Laboratory works with construction companies, assisting them in resolving issues that arise in practice.



Apart from providing high-quality scientific knowledge to its graduates, the institution must also assist them to take advantage of every possible opportunity arising in the professional arena.



“Our goal is to develop a specific strategy for every department, which will then be adjusted even further to meet both current and future needs. For example, based on the prospect of finding natural gas or oil in Greece, the Mineral Resources Engineering Department should turn to hydrocarbon solutions, while the Environmental Engineering Department should deal with water and energy management issues,” noted Mr Tsichritzis.

At the same time, the TUC will continue to combine theoretical with applied knowledge, as is the case today, where all the classes are accompanied by laboratories. Besides, several of these laboratories conduct internationally competitive research, such as the Physical Chemistry and Chemical Processes Laboratory, which has developed state-of-the-art catalysts for cars, or the Microprocessors and Hardware Laboratory which has received €3 million in EU funding over the last four years. Furthermore, the Laboratories act as bridges of cooperation with foreign institutions. A typical example is the Distributed Multimedia Information Systems and Applications (MUSIC) Laboratory which, together with the Psychiatry Department of the University of Sussex, develops 3D virtual environments for mental illness research.

Dialogos, a spin-off company of the Technical University of Crete, was the first to apply voice portals in Greece, while Forth Photonics was founded in 2002 with the aim of making biophotonic technology for diagnosing cervical pre-cancer and cancer commercially available.

Dialogos, a spin-off company of the Technical University of Crete, was the first to apply voice portals in Greece, while Forth Photonics was founded in 2002 with the aim of making biophotonic technology for diagnosing cervical pre-cancer and cancer commercially available.

“The staff of the TUC is of a very high standing. Given that it is a new institution, most of its scientists have completed their postgraduate studies or have worked in universities in the USA and Europe. This means that they have brought with them the mentality of the respective foreign institutions,” noted the Rector. This mentality translates into high-quality knowledge offered, but also into scientific distinctions on both a collective and an individual level. A case in point are the very favourable evaluations by external judges for all the departments, as well as the fact that the Environmental Engineering Department was recently ranked among the top six in Greece.

A significant contribution to research comes from the funds received mainly from EU programmes. In this respect, the TUC is one of the ten leading institutions in Greece in terms of funds drawn from the 7th EU Framework Programme. Furthermore, there are cases where research has been put to commercial use, mainly through spin-off companies. One such company, Dialogos, was the first to apply voice portals in Greece, while Forth Photonics was founded in 2002 with the aim of making biophotonic

technology for diagnosing cervical pre-cancer and cancer commercially available. This technology was developed by Associate Professor Konstantinos Balas, who is participating in this year’s competition with a new innovation.

“However, given that to date, such noteworthy examples were the product of individual efforts, the goal is to foster this mentality throughout the institution, in order to eliminate any barriers posed when founding spin-off companies,” added Mr Tsichritzis. He further noted that even more so, the TUC could help these companies in their first steps, as is the case abroad.

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CUTTING-EDGE RESEARCH

With 15,000 active students and participation in leading international research programmes – such as laser-driven nuclear fusion and graphene – it constantly produces new and applicable knowledge. Thanks to the high-level scientific training of its staff and the optimal development of its infrastructure and ideas, it has been successfully meeting the challenges of the 21st century.

By Kostas Deligiannis



■ BASED IN HERAKLION, but also running departments in Chania, Rethymno, Agios Nikolaos, Ierapetra and Sitia, the Technological Educational Institute (TEI) of Crete has a rich research track record, which places it among the leading higher educational institutions in Greece. Proof of that can be found in the research publications guide of the National Documentation Centre, which shows that the TEI of Crete has published more scientific articles compared not only to all the other TEIs, but also to 8 out of the 24 universities in Greece.

“The catalyst for this extensive scientific activity has

been the fact that many of my colleagues consider research as a tool not only for advancing the interests of the Institute and their career, but also as a necessary first step towards innovation,” said Dr Evangelos Kapetanakis, Professor and President of the TEI. At the same time, a unique positive feature of this institution is that many of its scientists come from its own academic backyard, namely FORTH, the University of Crete, the Technical University of Crete and the local institutes of the National Agricultural Research Foundation. Others come from institutions in other regions



The TEI of Crete has published more scientific articles not only compared to all the other TEIs, but also to 8 out of the 24 universities in Greece.

in Greece or abroad.

“As a result, a large part of the staff has high-level scientific training. In fact, many of the 180 professors could well be included in the teaching and research staff of universities,” added Dr Kapetanakis. Furthermore, this means that in many cases, the TEI works closely and efficiently with the other academic institutions and research institutes on the island. “We draw multiple benefits from this cooperation, as Crete is the third largest research and higher education pillar in Greece,” he added.

The TEI was founded in 1983 and currently numbers about 15,000 active students. It provides technological studies in three Technical Schools, with Departments in Heraklion, Chania, Rethymno: Agricultural Technology, Electrical, Mechanical and Civil Engineering, Music Technology and Acoustics, Information Engineering, Electronic Engineering and Natural Resources and the Environment. The other two schools of the Institute, namely the schools of Management & Economics and Health & Social Welfare, cover humanities as well as management and economics, with Departments such as Accounting and Finance, Business Administration, Tourism Management, Nursing, Social Work, and Nutri-

EVANGELOS KAPETANAKIS President of the TEI of Crete

“Patents should be our first priority”

Almost 85% of the scientific and technological research in Greece is conducted by higher educational institutions, namely universities and technological educational institutes. Both play a leading role in helping the Greek economy grow. This role encompasses innovation, which includes both making laboratory discoveries and turning them into upgraded products and services with high added value.

In order to contribute to all aspects of innovation, the TEI of Crete wishes to upgrade the services it provides to enterprises via solid life-long learning programmes, as well as to place greater emphasis on putting to good use the new

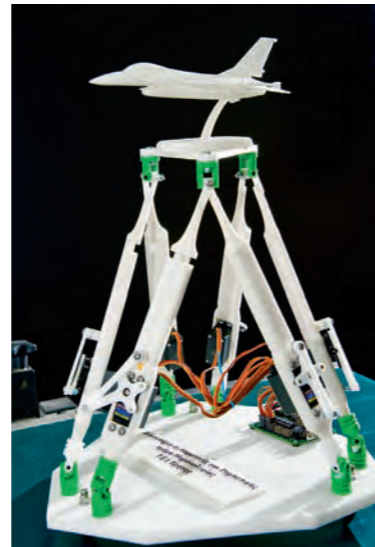


knowledge produced. We decided to fund three patents stemming from TEI Crete research results. We also plan on including such patents in the list of the criteria used for staff career advancement.

However, these initiatives will produce no substantial results unless companies become more receptive towards innovation. In this respect, the SEV and Eurobank competition has proven most helpful.



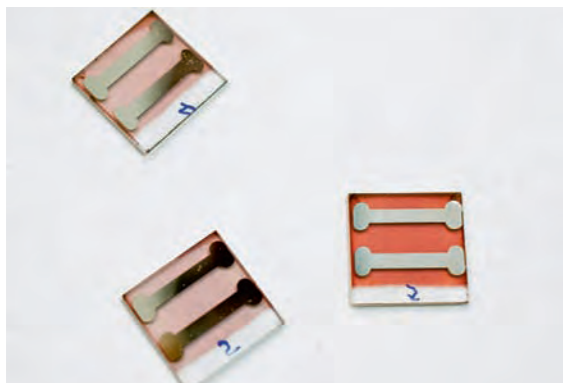
The TEI has been participating in research into graphene, the “miracle material” of the 21st century, as it has been touted in the EU.



Model construction in the Laboratory of Robotics-Automation and CNC machine tools.

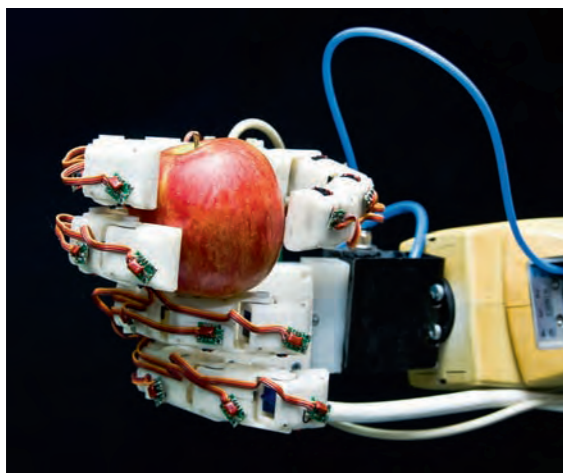


One of the most advanced laser units in the world is soon to be added to the research infrastructure of the Institute, in a building situated in the vicinity of Rethymno.



Photovoltaic elements in the Centre of Materials Technology and Photonics.

Mechanical hand that was developed in the TEI, in the context of participating in European robotics projects.



tion & Dietetics.

“By its very nature, a TEI has the comparative advantage of encompassing a limited number of focused fields, which, however, are closer to market needs and the production process,” noted Dr Manolis Tsiknakis, Associate Professor and Vice-President of the TEI on Research and Infrastructures. This means that the results of the research conducted in a TEI usually have the potential to reach the market faster. When the Technological Educational Institutes in Greece were formally included in the higher education institutions in 2001, the TEI of Crete upgraded the level of education and specialization it provides.

In this context, for example, five postgraduate programmes are already running, while another three are scheduled to start next year. “Although research mainly involves postgraduate and PhD students, we also make concrete efforts to include undergraduate students through their dissertations and internships,” noted Dr Tsiknakis.

Currently the TEI coordinates three Thales research programmes (distinction programmes for higher educational institutions) and participates in two more such programmes. “Overall, funds from research and development projects represent about one-third of our budget, covering needs in consumables or new laboratory equipment, which unfortunately are not met by state funds,” stressed the President.

On an international level, one high-profile programme in which the TEI is participating is HiPER (European High Power laser Energy Research facility), dedicated to innovative laser-driven nuclear fusion technology. With the participation of leading institutions from all over

Many TEI graduates have established successful and innovative companies – including the only company based in Crete for quality assurance and food safety, as well as a company that manufactures and exports solar energy systems throughout the world.

Europe, the aim of HiPER is to construct a pilot fusion reactor that will prove the feasibility of this technology. This would pave the way for power production using abundant fuel (hydrogen) and, what is more, without any radioactive waste.

“Thanks to our participation in HiPER, we have managed to draw funds from the EU and the General Secretariat for Research and Technology in Greece, in order to construct one of the most advanced laser units near the city of Rethymno. The unit will start operating with-

in the next months and will conduct cutting-edge research,” stressed Dr Kapetanakis. Furthermore, through the Centre of Materials Technology and Photonics, the TEI has been participating in research into graphene, a revolutionary material which, together with the study of the human brain, are considered by the EU as being amongst the most promising cutting-edge scientific and technological fields for the future.

However, the Institute also produces new and directly applicable knowledge. For example, the Agricultural Technology Department has constructed a mobile solid waste recycling unit, while the Plant Biotechnology Laboratory is developing a method that reduces the sulfuric additives in wine to one-third. At the same time, many TEI graduates have established successful and innovative companies –including the only company based in Crete for quality assurance and food safety, as well as a company that manufactures and exports solar energy systems throughout the world.

“Knowledge is just the first step. We also need to instill the spirit of innovative entrepreneurship into our students. This is why we have added courses to our curricula that will help students translate their ideas into competitive advantages for developing commercial products and services, both in our undergraduate and postgraduate courses,” concluded Dr Tsiknakis.

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EYES SET ON THE FUTURE

Displaying resourcefulness in fund hunting and extroversion in research and study opportunities, this dynamic higher-education institution of northern Greece is trying to make its mark.

By Giannis Papadimitriou



Panoramic view of the University of Ioannina facilities.

■ IN THE YEAR it was founded, other universities in Greece had already been counting 40 years of service. Although its funding was far lower compared to those institutions, it has recorded the fastest growth ever for a Greek university. The numbers speak for themselves. Within five decades, the University of Ioannina has managed to number 15 academic departments, extend its building infrastructure by 235,000 m² and create 38 postgraduate programmes,

including 17 inter-university and 2 cross-border ones. Today, with 350 hectares, it has the largest campus in Greece, while it numbers 12,365 undergraduate students, 3,943 postgraduate students and over 600 teaching and research staff members. Furthermore, it has the most up-to-date library in the Balkans, where students have access to more than 15,000 electronic journals and it has been applying an innovative laboratory waste management



Preparation for experiments requires teamwork and coordination.

system since 2003. In addition, in 2000 it created a Network of Supportive Research Labs.

Despite the fact that in 2013 it was forced to operate with 40% of the 2008 budget, i.e. €12 million less, the University of Ioannina continues to face the future with optimism. It invests in technological equipment and infrastructure, supports the creation of new research teams, expands its cooperation with international higher-education institutions, steadily attracts foreign students, provides funding to innovative ideas, and aims to instill an entrepreneurial spirit into students and professors. The latter is the most significant challenge, as many innovative ideas never become commercial products, but stay hidden in research archives.

“Having a good idea is not enough; one needs to take an entrepreneurial leap to support their idea,” stated Triantafyllos Albanis, Rector of the University of Ioannina and Professor in the Department of Chemistry. To this end, last year the University of Ioannina initiated the Innovation Odysseys programme, where students or graduates can submit their research. Moreover, it has set up a network of mentors, located both in Greece and abroad, who help students and graduates enter the business world. As soon as students complete the semi-

nars, they can submit their business proposal for assessment. Proposals deemed viable are offered space in the Science and Technology Park of Epirus for students to set up their business. Rent and operational expenses are free for the first year and reduced to half for the next two years.

“Until recently, the technological park provided services to already set-up companies that were looking for

TRIANTAFYLLOS ALBANIS Rector

“In contact with the market”

The idea of the Eurobank innovation awards is truly amazing. Not only does it help new research teams present their work, but at the same time, via the Bank, it gives them the opportunity to come into contact with entrepreneurs who might be interested in investing in innovative products.





The laboratory of the Biomedical Research Institute is where PhD students spend most of their time.



Wearing special glasses is mandatory in the Polymer Laboratory.



Microscopic observation and analysis.



Proper sampling and careful deposition of samples are necessary steps for successful experiments.

more economical housing solutions. This way, however, apart from earning some income for the University, we were not providing substantial support to primary research," noted Mr Albanis, who is clearly satisfied with



The equipment and consumables of laboratories are expensive and reduced state funding is the greatest problem of the University today.



this development. "Last year, winners were awarded funds to travel in search of investors. They went to Tokyo and Washington, where they received substantial help from our embassies in the form of setting up important meetings and covering certain expenses. We are optimistic. Now is the time to show that as a country, we are serious and produce innovative results." And how could one not be optimistic when in such a difficult economic juncture, a Greek university provides funding to students to promote their work abroad?

Of course, with reduced state funding (€7.5 million for 2013), finding additional funds for scholarships is not an easy task. Laboratories require consumables on a daily basis, buildings require maintenance and the vast outdoor area of the campus seems like a huge waste of capital. So where does the Rector find funds? "The economic crisis made us more practical and forced us to find solutions fast. For example, mowing the lawn used to translate into an annual cost of €400,000. Now it is mowed by local farmers," he said with a smile. However, "No matter how hard we try to tidy up the University in order to prevent a deterioration in the level of studies, I believe that the problems will soon become visible. Research income can only keep us afloat for a limited period."

Over the last three years, the laboratories of the University of Ioannina have been earning €6 million on average from their participation in competitive research programmes, 12% of which is channeled back to the University. In general, laboratories follow two main paths. They either seek to cooperate with foreign universities in the context of European and international programmes or provide services to multinational companies. A typical

The University has established the program "Innovation Odysseys", in which students or graduates submit their research efforts and are provided with practical and material help in order to transform them into businesses.

example is the Polymer Laboratory of the Materials Science and Engineering Department. This laboratory, which is mainly dedicated to creating polymeric materials (the raw material for plastics), has an electronic microscope that cannot be found anywhere in southwestern Europe. The 13 researchers who use it can check the nanostructure of materials and then sell the applications.

Recently, the head of the laboratory and Professor of the Department, Apostolos Avgeropoulos, contacted Intel, which is seeking to reduce the size of computer chip receptors. "It goes without saying that we can meet their size requirements," said Mr Avgeropoulos con-

fidently, adding, "Most importantly, apart from funding from the company, students will be able to work at Intel's headquarters, so as to acquire know-how and experience. New prospects are being formed, which are expected to further upgrade our laboratory." Indeed, exchanging knowledge via student mobility is vital for any laboratory. This applies not only to students who study abroad and return to their home country, but also to foreign students who come to Ioannina for studies.

On the door of the Chemical Technology Laboratory one can see the names of postgraduate and PhD students who have participated in research programmes of the laboratory. Among them, there are many foreign names. "It is a steady policy of the laboratory to encourage students from abroad to keep track of our research; whether they meet us through Erasmus and decide to continue their studies here or visit us in the context of inter-university cooperation," explained Mr Filipos Pomonis, Professor at the Department of Chemistry and Scientific Head of the laboratory. Indeed, in order to survive and advance, apart from innovation, a university requires extroversion. And what could be better than having foreign students advertise in their country the quality of studies conducted in Greece?

Info: UNIVERSITY OF IOANNINA, P.O. Box 1186, 45110, Ioannina, Tel.: +30 26510 07288, 07439, www.uoi.gr

ENTREPRENEURIAL BREEDING GROUND

As far as the knowledge produced in university laboratories is concerned, the path to practical application and financial gain is long and arduous. The Innovation and Entrepreneurship Unit (IEU) at the National Technical University of Athens (NTUA) showcases the cutting-edge research conducted onsite and supports turning it into sound business plans.

By Kostas Farmakis



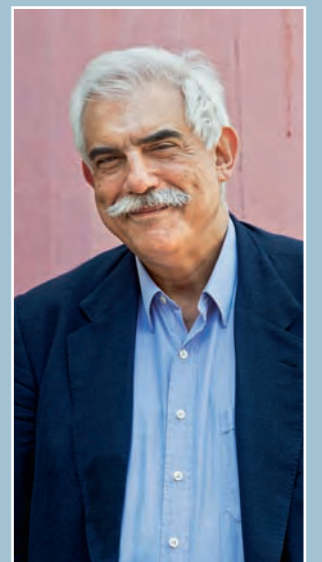
The NTUA IEU team at the university campus. From left to right: Dimitris Giakoulas, Antonis Livieratos, Yannis Caloghirou (head), Ioanna Kastelli and Paraskevas Georgiou

“HEREIN LIES a rich hidden deposit,” said NTUA Professor Yannis Caloghirou scientific Head of the IEU. “It consists of the knowledge and experience of dozens of teams that have been conducting research for years in their respective fields. And it is only sensible to capitalize on their work for production purposes.” The IEU provides institutional support to their efforts. Until recently, each team was more or less on its own and connecting research to production was a rather neglected concept in the academic world. Professor Caloghirou bears witness to this fact. “Although we had always been hearing that universities need to be connected to production, in the end, the dominant view was that research should be limited to its purely scientific aspect. In fact, many would claim that there is a risk of the universities being made subservient to private corporations. However, the NTUA has the potential to help the production system in Greece, especially in conditions of deep recession. It can create innovative products and services, and develop knowledge-intensive entrepreneurship. What we expect from a university – apart from its educational and research mission – is for it to be able to support small and medium enterprises that cannot finance a fully organized research department, to facilitate the creation of innovative enterprises, as well as to upgrade the public sector.”

YANNIS CALOHIROU
NTUA Professor, Head of the NTUA IEU

“It brought to the forefront people who produce and create”

This competition is important because both the assessment committee and the entire procedure follow international standards and specifications. Furthermore, as a member of the scientific committee, I can attest to the interest demonstrated by both central and regional universities to participate and showcase the efforts of their teams. It set scientific teams and businesses in motion, and sent out a signal to society that there are people who truly produce and create; by gaining publicity, research and innovation became part of the public agenda. It would be good if such competitions were organized in other sectors as well, following a similar methodology.





Ms Marinella Tsakalova and Mr Giorgos Lignos, members of Professor Antonis Kokosis' NTUA School of Chemical Engineering team.



Dr Magdalini Krokida, Associate Professor at the NTUA School of Chemical Engineering, and her associate Ms Sofia Papadaki.

To this end, the IEU organizes information days and conferences, invites speakers from the industrial sector and tries to set up a network of NTUA graduates who are now working as professors abroad or as executives in private companies. "This is huge untapped potential. If we could get these people on board, I believe they could help the younger people who are currently conducting research at the NTUA."

But how does the NTUA enter into the realm of business administration? "Most of us also work at the Laboratory of Industrial & Energy Economics of the NTUA and for twenty years now, we have been dealing with technological change, innovation and entrepreneurship in Europe. Moreover, every large technical university in the world – MIT, Imperial etc. – has such teams," noted Professor Caloghirou.

The IEU started out in 2010 – in its current form it has been active since 2012 – and one of the first things it realized was that scientists were hesitating to face the outside world. "Many engineers who are excellent in their work and extremely creative are afraid to take the next step," stated Dr Paraskevas Georgiou, head of the unit's documentation centre, among other duties. "However, their state of mind has been changing over time; they believe in what they do and they are able to present their work. This is the greatest benefit."

«There is only a few of us and we try to do a lot; we make use of what we can at minimal cost. Our activities by far exceed our resources. And it is we who first live by the entrepreneurial spirit we are trying to instil into our teams.» Y. Caloghirou

Dr Antonis Livieratos, establishment & growth consultant for high-tech companies, provided another angle: "NTUA researchers who succeed in the business world with an idea they developed themselves within the institution will act as role models for the next generation. It is one thing to read about someone somewhere who at some point achieved their goal and it is another thing for that someone to have been the person who used to sit next to you." Some might say that not everyone wants to become an entrepreneur and that this is not a solution that can be applied to all. "Of course not," noted Professor Caloghirou. "Some will start out, some will succeed, others will try again, but all of them will gain a far better insight into reality, the economy and the business world. This knowledge will follow them in every step they take thereafter."

Today, the IEU is working with around 30 NTUA research teams, which are encouraged to cooperate with one another. In other words, an engineer is encouraged to speak with an economist or with someone who is studying management or marketing. "It is not our intention to teach everything to everyone, but to create contacts. Perhaps later on, they can form a team and start up a business," explained Mr Georgiou. These teams participate en masse in the events held by the IEU. "In our information days, especially those on copyright laws and funding, the room is packed," noted Mr Dimitris Giakoulas, head of administrative support. "The interest shown is so great that participants even come up to us and propose issues to be addressed in subsequent events. This demonstrates that we do indeed fill an existing gap."

Despite the significant contribution of universities to knowledge and the economy, as public entities, they have been subject to fiscal measures and cutbacks. Professor Caloghirou considers that unacceptable from both a political and an economic standpoint. "As a tool to overcoming the economic crisis, research should have been left untouched by fiscal consolidation measures. In Portugal – despite the harsh austerity measures – research funding increased. Any policy intended to rationalize public expenditure should be complemented by a policy on funding of technology and innovative entrepreneurship because these are what provide momentum to the system."

Apart from tourism and primary sector products, no politician

in Greece has ever given priority to innovation and knowledge so that they could be supported. On the contrary, we turn to anything God-sent: the sun, the sea and lately oil. "One does not exclude the other," noted Dr Ioanna Kastelli, IEU coordinator. "Adding value to olive oil requires knowledge in design, production, packaging and in showcasing its unique qualities. Even tourism, which is a traditional sector, can have high-tech elements, offer multimedia content or management tools and upgrade the product offered through partnerships."

Reduced funding is just one of the many problems of research and the university. As noted Professor Caloghirou, bureaucracy continues to present a serious obstacle to this day. "The procedures for programmes such as the large-scale National Strategic Reference Framework 2007-2013 (NSRF) should be simplified. Furthermore, the reduced confidence we see these days has been leading to extreme formalism, which makes our life harder, even when it comes to simple procedures. In addition, there is a minimum number of people required for each activity in order for it to be effective. There is only a few of us and we try to do a lot; we make use of what we can at minimal cost. Our activities by far exceed our resources. And it is we who first live by the entrepreneurial spirit we are trying to instil into our teams."

Innovation in practice

Dr Konstantina Nikita, Professor at the NTUA School of Electrical and Computer Engineering, is head of the Biomedical Simulations and Imaging Laboratory. For ten years now, she has been developing an advanced computer tool that analyzes carotid ultrasounds and deduces indexes on any damages, also taking into account characteristics of the atheromatous plaque and providing objective conclusions, which lead to individualized diagnosis and treatment. This computer tool is the result of three



Dr Konstantina Nikita (left) and her associate Ms Aimilia Gastouniotti at the Biomedical Simulations and Imaging Laboratory.

Today, the IEU is working with around 30 NTUA research teams, which are encouraged to cooperate with one another. In other words, an engineer is encouraged to speak with an economist or with someone who is studying management or marketing.

doctoral and many graduate theses. “Most cerebrovascular accidents are attributed to atheromatous carotid alterations,” said Ms Nikita. “ANALYSIS_Carotid incorporates and combines effective image resolution techniques – which allow studying the composition and stability of an atheromatous alteration – with artificial intelligence tools. Apart from providing a more reliable diagnosis, it will also prevent unnecessary surgical procedures. It is estimated that the cost of such unnecessary surgical procedures in the USA exceeds \$2 billion per year.” The idea has been chosen by SEV for inclusion in the Together-to-start programme, which provides technical support and consultancy services.

Dr Magdalini Krokida, Associate Professor at the NTUA School of Chemical Engineering, has been working in the field of food mechanics. Professor Krokida, who has been awarded by UNESCO, is head of a business plan to develop multifunctional food and cosmetics additives from top-quality natural ingredients of the Greek land and sea flora. “Our aim is to put Greek nature into the food, pharmaceutical and cosmetics industry,” she noted. “To design new products containing natural additives (e.g. antioxidants, homogenizers), which will replace hazardous E ones.” Professor Krokida’s plan and her four-member scientific team have already attracted the interest of cosmetics companies.

The Industrial Systems Engineering research group at the Chemical Engineering School headed by Professor Antonis Kokosis, including his associates Marinella Tsakalova and Giorgos Lignos, has initiated two attempts to enter the business world. The first concerns industrial symbiosis and aims at creating a platform for exchanging by-products and waste between industries. In other words, the waste of one industry becoming the raw materials of another, ultimately eliminating waste. The second proposal, which is in a more advanced stage, concerns the dynamic market of renewable energy sources.



Stavros Stamatoukos (right), with Antonis Livieratos, his IEU consultant during the development stage of his company.

The aim is to provide and develop tools for the feasibility study of investments relating to new technologies in the field of bioenergy and bio-products, as well as in the management of organic waste and by-products. The idea has been chosen by SEV for inclusion in the Together-to-start programme, which provides technical support and consultancy services. With the help of the IEU, the proposal has been presented to various entities for funding purposes.

Individualized support is also among the duties of the IEU, as a service the NTUA provides to its graduates. Mr Stavros Stamatoukos, Alexis Panagiotopoulos and Dr Spyros Ioannou, all electrical and computer engineer and NTUA graduates established a software company Easykenak in 2013. They developed a unique electronic tool for energy inspectors. It is the only tool available in the market that issues building certificates on the spot and via the internet. Apart from the software itself, the innovation also lies in the business model, as clients do not have to buy the entire package, but only need to pay a few euros every time they use it. Having reached the final development stage, this year he contacted the IEU for coaching. They attended information days and seminars, and received consultancy services.

Info:

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THE 91 COMPETITION RUNNER-UPS

APPLIED RESEARCH

1. DIGITAL DIABETES MONITORING - VITAL AGENDA

ORGANIZATION: www.vitalagenda.com

TEAM REPRESENTATIVE: Georgios Passos

EMAIL: passosg@gmail.com, info@vitalagenda.com

DESCRIPTION: A multilingual application for patients suffering from diabetes mellitus. Patients will use the app to conveniently monitor their condition via mobile phone (smart phone & tablet). It is a cross platform application designed to adjust to each patient's needs. The app aspires to change the way the disease is monitored all over the world.

2. SOLAR TRACKER CONTROL

ORGANIZATION: Evangelos Golgaris, private researcher

EMAIL: golgaris@yahoo.gr

DESCRIPTION: Electronic Solar Panel Tracking System. Immediate tracking of the Sun's position with broad viewing angle sensors. Capable of driving single or dual axis units with electrical or hydraulic movement. Incorporated night parking function, which can be combined with weather protection systems.

3. FOUR-WHEEL SINGLE-SEATER ELECTRIC CITY VEHICLE

ORGANIZATION: Dimitrios Mavromatis, private researcher

EMAIL: dimitris1980@hotmail.com

DESCRIPTION: Preliminary design of a four-wheel single-seater electric vehicle powered by the grid, as well as by one steering and one solar generator. Presentation of possible manufacturing solutions and configurations, parametric calculation of energy requirements, and determination of the energy balance according to a realistic usage scenario and the estimated cost of required parts.

4. EARTHQUAKE-RESISTANT METAL MECHANISM FOR ARMED CONCRETE BEAMS

ORGANIZATION: Research Department of the Earthquake Planning and Protection Organization – former Institute of Engineering Seismology and Earthquake Engineering

TEAM REPRESENTATIVE: Triantafyllos K. Makarios, Lecturer at the Department of Civil Engineering, Aristotle University of Thessaloniki, specialized on Construction Statics and Dynamics

EMAIL: makariostr@civil.auth.gr, makariostr@ath.forthnet.gr

DESCRIPTION: Earthquake-resistant metal mechanism for armed concrete beams that requires plastic beam joints to protect against strong seismic activity. The mechanism is placed within the concrete, together with the concrete arming. This mechanism, combined with the arming of the beam, prevents the building from collapsing, even with maximum seismic activity, as it allows the development of predetermined and easily repairable failures in the beams, according to the selected designed earthquake.

5. SOLAR HOME LIFT. MOVING ON TO POWER-AUTONOMOUS MACHINES

ORGANIZATION: MEZOLIFT

TEAM REPRESENTATIVE: Ioannis Sachsamanglou

EMAIL: mezolift@yahoo.gr

DESCRIPTION: The solar home lift is a power-autonomous machine that produces and stores the energy it needs to operate. It is a 100% green product that has already received an EU award. The solar home lift represented Greece at the 2012-2013 European Campaign for Climate Change.

6. ELECTROCHEMICAL THERMOELECTRIC ELEMENTS

ORGANIZATION: Greek Energy Products

TEAM REPRESENTATIVE: Pavlos Manoloudis

EMAIL: pmanolou@auth.gr

DESCRIPTION: Power generating arrays that combine the principles of thermoelectric couples and electrochemical elements. They convert heat energy into electric and vice-versa. The arrays function with no electrochemical reactions and can be manufactured at a very low cost, using the existing know-how on electrochemical elements.

7. FRACTAL GEOMETRY APPLICATIONS IN ARCHITECTURE

ORGANIZATION: Sotirios Anastasiou Michas, private researcher

EMAIL: pspil@otenet.gr, kon.liagas@gmail.com

DESCRIPTION: The research study has been granted a patent by the Industrial Property Organization. It deals with truncated pyramid-sized complexes that can be converted into the same volume of any solid required, via topological transformations. The theoretical part of the pyramid can be solved using mathematical tools (Euclid geometry, fractal geometry, topology, differential geometry) and it can be constructed using existing techniques. Multi-usage agent for both simple and complex uses, without changing the static part.

8. ELECTROCHEMICAL METHOD FOR REMOVING NITRIC AND NITROUS SUBSTANCES FROM LOW RADIATION NUCLEAR WASTE AND DRINKING WATER

ORGANIZATION: Aristotle University of Thessaloniki, Chemical Engineering Department

TEAM REPRESENTATIVE: Georgios Kyriakou

EMAIL: kyriakou@eng.auth.gr

DESCRIPTION: An electrochemical method for removing nitric and nitrous substances from waste that cannot be biologically treated.

9. VEHICLE STOCK PROJECTION AND SCENARIO EVALUATION SOFTWARE - SIBYL

ORGANIZATION: Environmental and energy studies and software development (EMISIA SA)

TEAM REPRESENTATIVE: Georgios Mellios

EMAIL: giorgos.m@emisiasa.com

DESCRIPTION: Road transport modelling application for evaluating fleet composition, energy consumption, greenhouse gas and other emissions for scenario assessment.

10. DESIGN OF A FSAE-TYPE RACING CAR

ORGANIZATION: University of Thessaly, Mechanical Engineering Department

TEAM REPRESENTATIVE: Alexis Kermanidis, Assistant Professor

EMAIL: akermanidis@mie.uth.gr

DESCRIPTION: The Kentavros student team of the University of Thessaly Mechanical Engineering Department worked on designing a single-seater FSAE-type racing car. The main mechanical car parts designed included the chassis, the engine with the transmission system, the suspension, the steering system and the braking system. The design includes optimizing parameters, such as framework design, engine function modelling and dynamic behaviour analysis of the suspension/steering system.

11. PLACE REBRANDING

ORGANIZATION: Athens University of Economics and Business

TEAM REPRESENTATIVE: Filia Georgoudi

EMAIL: fgeorgoudi@gmail.com

DESCRIPTION: The attempt to approach Place (Re)branding as comprehensively as possible – by combining basic scientific theories from the fields of Sociology, International Relations (Political Sciences) and Marketing – has led to a single Place Rebranding formula.

12. UNDERWATER RECREATIONAL OASIS

ORGANIZATION: Institute for Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research

TEAM REPRESENTATIVE: Kostas Dounas

EMAIL: kdounas@her.hcmr.gr

DESCRIPTION: Construction of artificial habitats with the aim of creating organized underwater recreational diving oases. The artificial oases are installed close to large urban and tourist centres, in small low-depth areas with no ecological, archaeological or fishing interest. These marine tourism infrastructures have substantial advantages compared to establishing diving parks in fragile areas. Pilot applications are underway at Agios Nikolaos and Sitia in Crete.

13. AGILIS E-CRF: SOFTWARE AS A SERVICE FOR CONDUCTING LARGE-SCALE STATISTICAL CLINICAL RESEARCH

ORGANIZATION: AGILIS SA Statistics and Informatics

TEAM REPRESENTATIVE: Kyriakos A. Kassis

EMAIL: Sonia.Chalkidou@agilis-sa.gr

DESCRIPTION: Agilis e-CRF Software as a Service (SaaS) is addressed to Contract Research Organizations (CROs), pharmaceutical companies, university and research institutes and organizations, allowing for designing and organizing multicenter clinical studies, but also collecting, managing, monitoring and processing data easily, securely and reliably, while minimizing cost in relation to the typical (in writing) way of conducting a clinical study. This service complies with international standards and is installed in a data centre, meeting all data security and protection requirements.

14. SUN PROTECTION SYSTEM

ORGANIZATION: Qbase R&D (Koutlas A. – Giannakeas N. – Tspouras M. Ltd) – www.qbase.gr

TEAM REPRESENTATIVE: Markos Tspouras

EMAIL: tspouras@qbase.gr, info@qbase.gr

DESCRIPTION: System providing indications for protection against solar radiation which consists of a wristwatch-sized device and a smart phone application. The device will record solar radiation and, with the press of a button, it will connect wirelessly to the smart phone. According to the personal profile of each user (skin type, eye colour, skin condition history, etc), the phone will then assess the risk and the required protection against solar radiation.

15. WHERE DO MY TAXES GO – WWW.PUBLICSPENDING.GR

ORGANIZATION: National Technical University of Athens – Multimedia Technology Laboratory

TEAM REPRESENTATIVE: Vassileios Loumos

EMAIL: loumos@cs.ntua.gr

DESCRIPTION: Application based on Linked Open Data Web technology with the aim of promoting transparency, using open data from companies in an automated manner and improving the decision-making process regarding public spending in Greece. The application also includes an open record of companies and individuals who participate in public works projects.

16. FAILURE RELAY

ORGANIZATION: National Technical University of Athens

TEAM REPRESENTATIVE: Panagiotis Bagiokos

EMAIL: universe_pb@yahoo.com

DESCRIPTION: Digital failure relay with microprocessor for use in electrical panels.

17. INFOSCOPE

ORGANIZATION: Foundation for Research and Technology – Hellas (FORTH) – Informatics Institute

TEAM REPRESENTATIVE: Dimitris Grammenos

EMAIL: grammenos@ics.forth.gr

DESCRIPTION: Wireless portable device for reading, transmitting and reproducing digital information, which incorporates the capability of identifying RFID labels and reproducing related information, adjusted to the user profile (language, age, interests, etc). It has practical applications in various fields, such as touring systems, children knowledge exploration systems, educational medical applications, etc.

18. HYBRID BIOMASS-SOLAR ENERGY SYSTEM FOR TRIGENERATION WITH RANKINE HYPERCRITICAL ORGANIC CYCLE

ORGANIZATION: National Technical University of Athens

TEAM REPRESENTATIVE: Sotirios Karellas

EMAIL: sotokar@mail.ntua.gr

DESCRIPTION: Small-scale system for combined trigeneration based on a 40 kWth biomass boiler. The suggested system is based on the Rankine hypercritical organic cycle and includes two operational modes: heating (in winter) and cooling (in summer).

19. INACTIVATING WASTE AND INDUSTRIAL SLUDGE USING NATURAL ZEOLITH

ORGANIZATION: Aristotle University of Thessaloniki

TEAM REPRESENTATIVE: Savas Filipidis

EMAIL: sawas@ad.auth.gr

DESCRIPTION: The research concerns mixing sewage sludge, industrial sludge and calcined industrial sludge with high-quality natural zeolith to produce odourless and cohesive zeo-sludge, suitable for safe disposal, thus preserving the quality of the soil, surface waters and underground waters.

20. BRIDGE OSCILLATION MEASURING TECHNOLOGY

ORGANIZATION: University of Patras

TEAM REPRESENTATIVE: Stathis Stiros

EMAIL: stiros@upatras.gr

DESCRIPTION: Bridge oscillation measuring technology with the aim of checking the specifications, durability and safety of bridges. The method is based on oscillation measurements of flexible and relatively inflexible bridges, caused by coordinated jumps of pedestrians, passing-through vehicles, trains, etc. The measurements are recorded by one or usually more geodesic instruments, mainly GPS and robotic theodolites, preferably combined with an accelerometer. Processing measurements according to various digital signal processing techniques allows assessing dynamic shifts of the various bridge elements compared to a stable (independent) reference system, even down to the millimetre. Shifts are a main element in designing new and checking existing constructions and until recently there was no way of measuring them, as existing technology and methodologies allowed measuring only relative shifts between neighbouring points of a bridge.

21. COMPOSING BIOCOMPATIBLE INTRA-LAYER IMPLANTS FOR MECHANICALLY SUPPORTING A PATHOLOGICAL CONDITION IN THE HUMAN CORNEA

ORGANIZATION: University of Crete – Institute of Vision and Optics

TEAM REPRESENTATIVE: Alexandros-Valentinos Pennos

EMAIL: pennos@um.es

DESCRIPTION: Method for mechanically supporting the human cornea using biocompatible implants. The method describes a way of creating a gap within the corneal layer and filling this gap with suitable material, which can then be fashioned and stabilized in a way that gives the outer corneal surface an ideal and symmetrical shape.

22. THERMOSOLAR ENERGY GENERATION

ORGANIZATION: Georgios Kourtis, Individual enterprise

EMAIL: gkourtis@freemail.gr

DESCRIPTION: Construction of a large- or medium-sized thermosolar park. Sub-products of this technology include pressurized air motors for use in vehicles, as well as energy generation and storage systems using pressurized air.

23. ONLINE QUALITY CONTROL AND OPTIMIZATION OF LASER WELDING FOR HEAT EXCHANGERS AND SOLAR ENERGY ABSORBERS

ORGANIZATION: PRIME LASER TECHNOLOGY SA

TEAM REPRESENTATIVE: Konstantinos Travasaros

EMAIL: ctravasaros@primelasertech.gr

DESCRIPTION: Online quality control of laser welding for solar absorbers and monitoring of welding conditions with the aim of optimizing the technology.

1. IMMUNONUTRITION EFFECT WITH PHARMACEUTICAL MUSHROOMS ON PATIENTS WITH CERVICAL DYSPLASIAS (LSIL, HPV+)

ORGANIZATION: National Agricultural Research Foundation

RESEARCH TEAM REPRESENTATIVE: Cleanthis Israilides

EMAIL: cisrailides@yahoo.gr

DESCRIPTION: Development of dietary medicinal preparations from the species Lentinula edodes and Pleurotus ostreatus, aiming to affect the immunonutrition of patients with cervical intraepithelial dysplasias using extracts from the aforementioned mushrooms species (dried powder).

2. DEVELOPMENT OF METHODOLOGY FOR OBJECTIVE ASSESSMENT OF MECHANICAL PROPERTIES OF THE PROSTATE GLAND

ORGANIZATION: Department of Mechanical Engineering and Aeronautics, University of Patras

RESEARCH TEAM REPRESENTATIVE: Sofia Panteliou

EMAIL: panteliu@mech.upatras.gr

DESCRIPTION: Method for geometrical and stiffness mapping of the prostate gland by means of an anoscope tube with an inflatable balloon of regulated air pressure, to calculate the surface of the gland and identify points of increased stiffness. An original measuring device was designed and constructed to fit these specifications, which has none of the disadvantages of conventional methods. Clinical application has already been performed with promising results in comparison to every other conventional method. This method allows assessment of the effect of pharmaceutical treatment in the case of hyperplasia of the prostate through geometric mapping of the gland. Moreover, through the mapping of stiffness, physicians are capable of collecting 1-2 biopsy samples compared to the 21 specified in the relevant medical protocol, with an extra advantage being the very high resolution in nodule imaging.

3. PHAZE WALL – COLLABORATIVE ARCHIVE FOR SEMANTIC WEB IMAGES

ORGANIZATION: Localhost Ltd

RESEARCH TEAM REPRESENTATIVE: George Delaportas

EMAIL: g.delaportas@gmail.com

DESCRIPTION: Phaze Wall is an innovation that combines the tendency of internet users to work together and create content in a visual / graphical interaction. (<http://phazewall.com>)

4. DENTAL CLEANING, DISINFECTING AND WHITENING DEVICE

ORGANIZATION: Ilias Xanthopoulos, private researcher

EMAIL: hlias_xanth@hotmail.com

DESCRIPTION: A product for oral hygiene to cover everyone's daily dental care needs. It offers significant benefits to the user, removing dental plaque, strengthening the gums, whitening the teeth and offering fresh breath. All these are performed by a device requiring minimal effort by the user. It can be used by everyone, regardless of gender or age. It will be especially beneficial to people with mobility impairments or other disabilities who cannot meet their dental needs using conventional methods.

5. E-ON RIX (RETAIL INTERNET EXCHANGE)

ORGANIZATION: E-On Integration SA

RESEARCH TEAM REPRESENTATIVE: Panagiotis Christidis

EMAIL: ekaterini@e-on.gr

DESCRIPTION: E-ON RIX is a modern cloud-based application platform/portal that covers the Financial, Commercial and CRM activities of businesses, as well as Project Management activities, in an integrated manner. Furthermore, it provides vertical solutions in specialized fields. It is offered via the internet and uses a Software-as-a-Service (SaaS) solution, with a monthly subscription per user. The E-ON RIX suite is accessible anywhere, anytime (24/7) via a web browser-based interface.

6. WAVE WINCH

ORGANIZATION: Control Systems Lab, School of Mechanical Engineering, National Technical University of Athens

RESEARCH TEAM REPRESENTATIVE: Nikolaos Leventakis

EMAIL: nikoslev@gmail.com

DESCRIPTION: A type of winch, based on the structure of the nautical winch, specially designed to absorb the energy from the oscillations of a boat or other floating body. The mechanism is designed in such a way so as to limit the oscillations of the boat while it is moored, absorbing part of the mechanical energy transferred to it by the waves and converting it into usable electrical energy.

7. SOLAR TREE

ORGANIZATION: Dimitris Tousiakis, private researcher

EMAIL: dtousiakis@yahoo.gr

DESCRIPTION: A solar-powered system to be installed in public places (such as town squares, parks, malls, etc) so as to provide free services to the general public, including mobile phone charging, WiFi hotspot and free information / advertisements (information point). It is a construction used to support the solar panels, but has been designed to resemble a tree.

8. AUTONOMOUS ELECTRONIC INSECTICIDE

ORGANIZATION: Ioannis Pissas, private researcher

EMAIL: J_pissas@yahoo.com

DESCRIPTION: The benefits of repelling mosquitoes and other harmful insects without the use of chemicals are obvious. The proposed autonomous electronic insecticide consists of the following elements:

Electronic insecticide

Insect attractant elements (e.g. mosquito attractant lamps)

Solar panel

Batteries

Panel board

Support base

The end product is installed outdoors as an autonomous device, near potential insect habitats (e.g. stagnant water, waste disposal locations etc.), to eliminate insects before their exponential multiplication. It can also be installed in farms and greenhouses to combat insects harmful to the crops. The density of the installed system is decided after studying each individual case.

9. GLOBALXBOOK – SOCIAL NETWORKING FOR LOCATIONS

ORGANIZATION: www.globalxbook.com

RESEARCH TEAM REPRESENTATIVE: Nikolaos Flitris

EMAIL: info@globalxbook.com

DESCRIPTION: GlobalXbook is an innovative social networking system for actual locations and their features. It is based on the premise that each place on the globe is unique. It embraces an entirely different concept, which connects locations via social networking, and suggests that we think globally, act locally and perceive globalization not just as a singular entity, but as a functional set of distinct identities.

The GlobalXbook platform offers its users the opportunity to:

check if their region already exists

become members of the society where they live

add the places they have visited

subscribe to places they like

find places added by others that they would like to visit

upload photos and write comments

share their inspirations about a place

find and interact with other users who have subscribed to a place

get informed on any activities in a region they can participate in or publish their own info

participate in the forum of a place

promote their activity in a place or get informed about activities published by other users

10. SIMULATION OF INCLINED PLANE BUOYANT JETS

ORGANIZATION: Environmental Engineering Laboratory, Department of Civil Engineering, University of Patras

RESEARCH TEAM REPRESENTATIVE: Panayotis Yannopoulos

EMAIL: yannop@upatras.gr

DESCRIPTION: A model to predict the mean flow and mixing properties of inclined plane and round turbulent buoyant jets in a motionless environment of uniform density. These can then be used in the more efficient design of systems for disposal of liquid waste in liquid systems or of emitted gas in the atmosphere, in environmental impact assessment studies and, therefore, in environmental protection.

11. ERGOQUBE

ORGANIZATION: ErgoQ (S. Kouzof & Co)

RESEARCH TEAM REPRESENTATIVE: Stefanos Kouzof

EMAIL: s.kouzof@ergoq.gr

DESCRIPTION: ErgoQube is a competitive solution to transform any Greek enterprise into an e-business, by fully automating sales, customer support, case management, approvals and office administration. It is certified as a paperless management system (ISO 9001, ISO 27001 etc.) with software used even by multinational corporations. The ErgoQube server is ready to use from the very first day of installation and can be accessed via desktop PC, laptop, tablet or mobile phone.

12. PORTABLE TEST KIT FOR BROMIDE ION DETERMINATION IN DRINKING WATER

ORGANIZATION: School of Chemical Engineering of Aristotle University of Thessaloniki and IE2 Environmental Solutions SA

RESEARCH TEAM REPRESENTATIVE: Mitrakas Manasis

EMAIL: manasis@eng.auth.gr

DESCRIPTION: Bromide ions found in water react with ozone to produce bromate, which is undesirable as a suspected carcinogen. Therefore, the European Union and USEPA, have established 10µg/L as the maximum contaminant level in drinking water and undertake testing in water reservoirs. This project presents a portable tool for analyzing samples of drinking water and determining the exact bromate concentration quickly and inexpensively, in concentrations up to 2µg/L. The method is based on the oxidation of phenothiazines by bromate in an acidic environment, which subsequently forms stable, coloured cations. To adapt this method of chemical analysis to a portable test kit, a large number of modifications was required to allow the reagents to be added in a way that would not require the equipment of a chemistry lab, and in a form that would not change over time. Based on the advantageous features of this new chemical analysis test kit – namely that it is unique in the world, cheap, portable and operates without the need for electricity or extra laboratory equipment – it was awarded with Patent No. 1006958/2010 from the National Patent Registry of Greece.

13. INTEGRATED LOW-COST PRINT MANAGEMENT AND ACCOUNTING SYSTEM

ORGANIZATION: University of Crete

RESEARCH TEAM REPRESENTATIVE: Michalis Kalochristianakis

EMAIL: kalohr@gmail.com

DESCRIPTION: The system automates tasks related to crediting, using and charging for printing and photocopying services in any environment that deals with information, and at the same time minimizes the acquisition cost, by minimizing interaction with hardware. Users add credits to their account in the parent organization, use the printing facilities and get charged with full transparency. They can generate user reports, while administrators can monitor and manage the system, e.g. the charging services. The project was brought to life to cover the needs of the Library of the University of Crete, as existing products were not comparable in terms of either features or cost.

14. VIVAWALLET – DIGITAL WALLET AND ALTERNATIVE PAYMENT SERVICES NETWORK

ORGANIZATION: Viva Payments SA - REALIZE SA - Viva Ltd.

RESEARCH TEAM REPRESENTATIVE: Charalambos Karonis

EMAIL: info@vivapayments.com

DESCRIPTION: Mobile phone app to cover all daily online payments in a convenient and secure manner. The innovation and distinction lie in the ability to make transactions anywhere, either via a mobile phone or by using a wide alternative network of physical locations throughout Greece.

15. SYSTEM FOR MULTIDIMENSIONAL AND PATIENT-SPECIFIC DIAGNOSIS AND PROGNOSIS OF ATHEROSCLEROTIC PLAQUE FORMATION (OF HEART ARTERIES)

ORGANIZATION: Unit of Medical Technology and Intelligent Information Systems, Dept. of Computer Science, University of Ioannina

RESEARCH TEAM REPRESENTATIVE: Dimitrios Fotiadis

EMAIL: exarchos@cc.uoi.gr

DESCRIPTION: Patient-specific computational and modelling tool used to improve the quality of prognosis for atherosclerosis and its progression in terminal cases. The system provides a model of the patient in three levels to describe the structure of the 3D artery tree, the blood flow, the dynamics of the particles in the blood and the biological processes that lead to the formation and development of atherosclerotic plaque.

16. LED SPOT TO REPLACE MR16/GU10 LIGHT BULBS

ORGANIZATION: GEYER HELLAS SA

RESEARCH TEAM REPRESENTATIVE: Dimitrios Kyriazopoulos

EMAIL: dkiriasopoulos@geyer.gr

DESCRIPTION: This innovation pertains to lighting applications using LED technology. Specifically, it relates to the capability of replacing traditional 50-watt MR16 and GU10 halogen bulbs with LED spots of equal lighting performance. They are more efficient in terms of power saving and lifespan (70 lumens per watt, 40,000 hours) than lights that use halogen bulbs (15 lumens per watt, 1,000 hours) as well as lights that use economical CFLs (30 lumens per watt, 8,000 hours). These LED spots differ from other LEDs used as replacements for MR16 and GU10 lamps in that the others do not produce light more than 350 lumens and are far from the output of 600 lumens produced by traditional MR16/GU10 halogen bulbs. The industry was unable to offer such a product so far due to the high temperatures that develop inside an LED during its operation, which destroy the semiconductors in a very short time. Therefore very low power LEDs were used, with respectively low brightness potential. This core problem is what the innovation has combated: 1. The LED driver is wholly separated from the LED's light emitting component. 2. Two cylinders parallel to each other are used to allow more air flow around the components and semiconductors. 3. The air flows from the inside to the environment.

17. PRODUCTION OF ACTIVATED CARBON WATER FILTERS FROM END-OF-LIFE VEHICLE TIRES FOR ENVIRONMENTAL PURPOSES

ORGANIZATION: School of Chemical Engineering, Aristotle University of Thessaloniki

RESEARCH TEAM REPRESENTATIVE: Anastasia Zampaniotou, Associate Professor

EMAIL: azampani@gmail.com

DESCRIPTION: Using end-of-life scrap tires from vehicles to produce high value-added carbonaceous materials, such as activated carbon, with properties that make it suitable to adsorb specific contaminants (pesticides) in agricultural wastewater. The production of active carbons is achieved by pyrolysis of the tires and subsequently by activating the solid residues with natural methods. The production process is environmentally safe.

18. NEW LARGE SURFACE AREA SORBENT MATERIALS FROM AGRICULTURAL WASTE FOR ENVIRONMENTAL APPLICATIONS

ORGANIZATION: University of Patras

RESEARCH TEAM REPRESENTATIVE: Chrysi K. Karapanagioti, Ioannis D. Manariotis

EMAIL: karapanagioti@upatras.gr; idman@upatras.gr

DESCRIPTION: Solid agro-industry waste (e.g. olive mills, breweries and wineries) can be used to develop new materials that can be put to use in environmental applications, mainly in water and liquid waste decontamination. These materials exhibit a high percentage of organic carbon, have a large surface area and are microporous. They are good sorbents for organic and

inorganic compounds. The production process is simple and can be directly applicable on an industrial scale.

19. "I LOVE DYSLEXIA": INNOVATIVE ENVIRONMENT FOR DIFFERENTIATED ENGLISH LANGUAGE TEACHING TO STUDENTS WITH DYSLEXIA AND SPECIAL EDUCATIONAL NEEDS

ORGANIZATION: I LOVE DYSLEXIA

RESEARCH TEAM REPRESENTATIVE: Aggeliki Pappa

EMAIL: info@ilovedyslexia.gr

DESCRIPTION: "I love dyslexia" is the first and only interface in Greece, and one of the very few in Europe, for experiential English language teaching to students (children, adolescents, adults) with dyslexia and special educational needs. It is a model holistic education interface, which can be renewed and adapted as quickly and diversely as the real world around it. It poses a major challenge to the conventional industrial educational model. ILD was founded by specialist educator Ms Aggeliki Pappa. Its team members share principles and a mentality that stem from the respect for the individuality of every person, and take into account the mental, psychological and physical needs of each student. The innovative curriculum is based on experiential, multi-sensory and differentiated teaching techniques, implemented through material that is exclusive to "I love dyslexia", examples of which were published by the Department of Special Education, University of Thessaly, in February 2013. The activities of "I love dyslexia" extend to training teachers from Greece and abroad on holistic approaches in teaching English to students with special educational needs.

20. HYBRID BICYCLE

ORGANIZATION: Democritus University of Thrace, Polytechnic School

RESEARCH TEAM REPRESENTATIVE: Konstantinos Kalaitzidis

EMAIL: kkalaitzidis96@gmail.com

DESCRIPTION: Equipment to convert a bicycle to an electric one, with a microcomputer to calculate the ground inclination, manage the charging of the power sources and control the motors, converting them to generators during pedalling or downhill movement. Moreover, it converts the oscillating motion of the suspensions and saddle to electric power, and includes static and rotating solar panels on the wheels to provide controlled charging to the battery with steady output, regardless of available sunlight.

21. PROTECTIVE STRIP FOR SAFE REMOVAL OF PLASTER SPLINTS

ORGANIZATION: Ioannis Zogos, private physician-orthopaedic specialist

EMAIL: johnzogos@gmail.com

DESCRIPTION: Protection during the removal of plaster splints must be established as a rule on an international level. As the cast is cut using a vibrating electric saw, the temperature of the blade reaches very high levels, which results in burns – rupturing injuries along the cutting path. Protection against this also minimizes the fear that is inherent to using the saw. Internationally, incidents of fractured lower limbs will increase due to population ageing and the increase in the number of athletes. According to statistical reports of the International Osteoporosis Foundation, the estimated number of fracture incidents for upper and lower limbs annually in Europe and the United States is 7,000,000. If these statistics are projected on a global level, the numbers will obviously be much higher.

22. GNOSTIX – SOCIAL NETWORKING MONITORING TOOL

ORGANIZATION: Gnostix

RESEARCH TEAM REPRESENTATIVE: Alexandros Pappas

EMAIL: apappas@gnostix.gr

DESCRIPTION: Gnostix is a business intelligence platform that combines social monitoring, analytics, reporting and much more to enable businesses to listen, measure, monitor and analyze the social web, in order to plan their social strategy and measure the effectiveness of their decisions. Online Marketing, Branding, Community Building, Crisis Management and Customer Support are all possible with this user-friendliest, all-in-one, online business intelligence solution.

23. CREATING SPLIT COMPARTMENTS IN A SINGLE-COMPARTMENT PETROLEUM PRODUCT STORAGE TANK

ORGANIZATION: EKME SA Metalworking, Technical, Industrial and Trading Company

RESEARCH TEAM REPRESENTATIVE: Ioannis Kariotis

EMAIL: ikariotis@ekme.gr

DESCRIPTION: The method of creating split compartments pertains to vertically installing separate compartments inside an existing or new cylindrical, aboveground steel storage tank, which will allow multiple fuel storage and transportation. It can be used at the facilities of companies that deal with storing, trading and transporting petroleum products, where it will help to better utilize the available space and avoid the need for expansion. The application study and the execution of such a project took place for the first time in Greece, and was carried through by EKME SA, staffed exclusively by Greeks.

24. AMINO 16 – GREEN SOLUTION FOR GREEN GROWTH

ORGANIZATION: EVYP LLP – IOANNIS MICHAELIDES TRADING & INDUSTRIAL COMPANIES SA & CO.

RESEARCH TEAM REPRESENTATIVE: Aikaterini Michailidou

EMAIL: evie@the.forthnet.gr

DESCRIPTION: Amino 16 is produced through the hydrolysis of plant-based raw materials, rich in proteins, in the facilities of EVYP LLP, at the Industrial Area of Thessaloniki. Amino 16 is unique in its kind as a plant growth/nutrition booster and bio-stimulator, suitable for use in both conventional and organic farming. Composed of 100% plant-based raw materials, it can significantly contribute in the reduction of eutrophication (a hazard to lentic aquatic ecosystems), since it does not pollute the environment, leaves no residues, is fully absorbed by the plants, and at the same time increases the vitamin C and antioxidant content of the end products. Amino 16 increases farm productivity, with the producer having more financial benefits due to high yield, uniformity, strength and improvement in the quality and succulence of the end products. It is wholly compatible with plant physiology and is totally decomposable, having no effect on the environment (while granular nitrogen fertilizers decompose in a period of 5 to 10 years). During its production, the soil and the surface water are not affected, and no types of pollutants are released in the air.

The Hellenic Ministry of Rural Development has applied for its inclusion in Annex I of Regulation (EC) No. 889/2008 with the list of products suitable for organic farming. Its composition consists of 16 L-Aminoacids in a fixed mixing ratio:

L-Glutamic acid, L-Phenylalanine, L-Threonine, L-Glycine, L-Serine, L-Isoleucine, L-Aspartic acid, L-Leucine, L-Proline, L-Tyrosine, L-Alanine, L-Lysine, L-Isoleucine, L-Histidine, L-Methionine, L-Arginine.

These aminoacids form the basic building material of all organisms.

The efficiency of the product has been certified through experiments undertaken by the School of Agriculture of the Aristotle University of Thessaloniki. Continuous experiments for its application are being conducted and have resulted in improving its use. It is an ambitious effort that aims to convert the way plants are fertilized and to grow safer and better products. A medium-term goal is to supply Amino 16 to the local and also the international market, and contribute to the effort of reducing the contamination of the soil, groundwater and surface water, and fill in the ecological gap in the agricultural products industry.

25. GREEN SHIPS AS A STRATEGIC CHOICE IN SHIPPING

ORGANIZATION: Ielion

RESEARCH TEAM REPRESENTATIVE: Adam Pavlopoulos

EMAIL: adamis@ielion.com

DESCRIPTION: A method that employs electrolysis to treat the ballast water of ships, with the aim of minimizing and eventually eliminating the transfer of harmful marine organisms and various pathogens.

26. SOLAREYE – ADVANCED MANAGEMENT PLATFORM FOR PHOTOVOLTAIC INSTALLATIONS THAT EMPLOYS ARTIFICIAL INTELLIGENCE

ORGANIZATION: Neuron Energy Solutions - Katertsidis, Khoury & CO

RESEARCH TEAM REPRESENTATIVE: Nikolaos Katertsidis

EMAIL: info@neuronenergy.com

DESCRIPTION: The SolarEye platform (<http://SolarEye.eu>) is an advanced system for remote monitoring and management of solar parks that is based on artificial intelligence techniques, through which it is possible to perform the most immediate diagnosis of multiple types of faults and malfunctions. It acts as the ideal e-mechanic, which continuously monitors the status of parks, accurately

recognizes the location and nature of every fault, and sends the appropriate reports to the users concerned.

27. VIRTUAL EXHIBITIONS

ORGANIZATION: KORNEL Industrial and Commercial SA – Kornilios Kyriakidis & CO

RESEARCH TEAM REPRESENTATIVE: Dimitrios Kyriakidis

EMAIL: kyriakidisd@gmail.com

DESCRIPTION: KORNEL company, led by Mr Dimitrios Kyriakidis, offers a virtual platform to house exhibitions and conferences. The platform integrates all the aspects of exhibitions in the physical world, and at the same time offers the potential of flexibility and lower cost. Virtual exhibitions represent the future of product and service promotion, mainly because they can appeal to a very wide audience and can accommodate an unlimited number of companies. Exhibitions and conferences thus gain a significant boost. An HTML5 version will soon be available, for better graphical and operational performance.

28. INFISENSIS – AUTONOMOUS SECURITY & ALARM SYSTEM

ORGANIZATION: INFITHEON Technologies Ltd

RESEARCH TEAM REPRESENTATIVE: Nikolaos Tsampieris

EMAIL: marketing@infitheon.com

DESCRIPTION: An alarm system that uses infrasound technology. It operates as autonomous portable security system to protect residential and commercial premises, and is able to cover closed spaces ranging up to 200 square meters, across one or more floors.

29. ARCHEPOLIS THEME PARK

ORGANIZATION: Archepolis Project

RESEARCH TEAM REPRESENTATIVE: Apostolis Lianos

EMAIL: archepolis@gmail.com

DESCRIPTION: A theme park based on ancient Greece, where the habits, activities, everyday life and society of the classical period will be recreated and where visitors will take part in a real-life role-playing experience. The goal is to realistically render and create the environment through a dynamic interface that will simulate the conditions of that era. Visitors will be given the chance to become one with the society, entering the role of a citizen of the ancient world and experiencing concepts such as philosophy, art, harmony and elegance. Upon entering the park, visitors will be supplied with the appropriate attire for the classical era (togas, sandals), in order to blend in. The park offers visitors the opportunity to freely participate in activities, which can be chosen according to their personal inclinations and preferences, such as: sports, military education, arts, sciences, role-playing games, puzzle solving/quests, viewing events (battles, ceremonies, contests etc). Other activities: Baths (spa), meditation, theatrical performances by various troupes, catering and accommodation services, and shopping. The entire park has been already designed in a 3D environment, under the architectural supervision of Faidonas Nikolakainas.

30. ELECTRONIC ANTIFOULING SYSTEM FOR SHIP HULLS

ORGANIZATION: Orange Automation

RESEARCH TEAM REPRESENTATIVE: Stylianos Efstratiadis

EMAIL: mail@orangeautomation.gr

DESCRIPTION: Biofouling by marine organisms on the hulls of ships is a matter of particular importance from an economic point of view, since high levels of fouling reduce the overall performance of the vessel and increase its fuel consumption, at an annual cost of over 60 billion dollars worldwide. Anti-fouling is the process of removing biofouling and preventing its accumulation by using coating that contains biocidal substances (anti-fouling paint), which, however, pose a significant problem regarding marine pollution. The international maritime community has recognized this problem and a directive is already in place for phasing out toxic biocides from maritime coatings. This has created a major challenge to develop alternative technologies. The basic idea is to create an alternative chemical-free electronic anti-fouling system, which will prevent marine organisms from accumulating on the hulls of ships for a very long time and eliminate the extremely costly maintenance cycle of vessel hulls, while at the same time preventing marine pollution, especially in

enclosed seas, such as the Mediterranean. So far, the method has been tested a number of times under real conditions, and involves applying electrical current pulses on conductible surfaces of the ship hull. The conductible coating consists of a special epoxy resin found in the market and used as antiosmosis protection for plastic vessels against GRP. It is a two compound resin that is mixed with conductible material. Conductibility is enhanced by using a thin AISI 316 stainless mesh. The electronic device is smaller than a VHF radio. It operates with 12VDC from the battery of the vessel and produces the appropriate pulse series. Due to its NaCl content, seawater electrolytically preserves a molecular surface layer of chlorine ions on the ship hull that repels microorganism cell membranes most effectively. The idea is innovative and has been tested on berthed ships in actual marine conditions with impressive results.

31. ECOKTIMA – WHERE THE PHYSICAL WORLD MEETS THE DIGITAL WORLD

ORGANIZATION: ecoKTIMA (Maria Filipi – Ioannis Grigoriadis Ltd) and the University Research Institute of Applied Communication of the University of Athens

TEAM REPRESENTATIVE: Maria Filipi

EMAIL: info@ecoktima.com

DESCRIPTION: EcoKTIMA is a place where the physical world meets the digital world. A web portal with digital learning games and subscription services that provides the capability of interacting with the natural environment and the facilities of an estate or farm. The project is implemented in cooperation with the University Research Institute of Applied Communication (URIAC) of the University of Athens, which develops innovative know-how on hybrid learning.

32. BECOME A FARMER

ORGANIZATION: D. Koutsolioutsos – Giannoukou Ltd

TEAM REPRESENTATIVE: Dimitris Koutsolioutsos

EMAIL: dk@gineagrotis.gr

DESCRIPTION: Platform for direct networking between consumers and producers in Greece. It creates economies of scale and strengthens the two poles in the context of Fair Trade and Social Offering, while it promotes safe and healthy Greek foods with sustainable development elements.

33. SYMBIOSIS

ORGANIZATION: Aristotle University of Thessaloniki, School of Electrical and Computer Engineering

TEAM REPRESENTATIVE: Leontios Chatzileontiadis

EMAIL: leontios@auth.gr

DESCRIPTION: Integrated software system that incorporates various cutting-edge technology applications with the aim of facilitating, understanding and satisfying the needs of the entire community that is affected by Alzheimer's disease (patients, treating physicians). The system supports the smooth symbiosis of the Alzheimer's community in an innovative way, hence its name.

34. WWW.MADEIN-GREECE.COM

ORGANIZATION: Vlachos – Papalexi Ltd

TEAM REPRESENTATIVE: Georgios Vlachos

EMAIL: info@madein-greece.com

DESCRIPTION: www.madein-greece.com is a B2B web portal for promoting Greek companies and products both abroad and in Greece.

35. INTELLIGENT BUILDING WITH COMPREHENSIVE CONTROL

ORGANIZATION: FYES

TEAM REPRESENTATIVE: Efsthathios Ioannidis

EMAIL: info@fyes.gr

DESCRIPTION: FYES is an innovative comprehensive control system for private and professional premises. It connects all subsystems (heating, cooling, ventilation, water, gas, electricity, lighting, sockets, devices, irrigation, security systems, audiovisual systems, networks, etc.) under a single management system. It offers high intelligence, which allows it to process the information gathered from the sensors and make decisions reliably, offering economy, protection, convenience, comfort and management via the internet.

36. CONSUMERS CREATING

ORGANIZATION: Nikos Zervos, Photographer

EMAIL: nizervos@gmail.com

DESCRIPTION: Company collecting digital audiovisual material via the internet and managing it with a view to producing and distributing advertising and commercial material, and offering services and information.

37. REDUCING THE CONSUMPTION OF A HYDRAULIC LIFT

ORGANIZATION: Konstantinos Raptis, private researcher

EMAIL: krcmmd@yahoo.gr

DESCRIPTION: A hydraulic lift that converts dynamic energy into electric when descending. This energy is transformed and synchronized with that of the grid by an inverter and is returned to the lift or stored in batteries to be reused in the next ascension.

38. WEB PROMOTION PORTAL

ORGANIZATION: MTC GROUP

TEAM REPRESENTATIVE: Panagiotis-Faidon Martakis

EMAIL: nmartakis@mtcgroup.gr

DESCRIPTION: Creation of a Web Portal / Search Engine for tourist promotion synergies.

39. MARVIN THE MARTIAN – HYBRID RECREATIONAL BOAT

ORGANIZATION: MALVI ARCHITECTS

TEAM REPRESENTATIVE: Maria Malindretou-Vika

EMAIL: m.malindretou@gmail.com

DESCRIPTION: Marvin the Martian is a 50' eco-sustainable fibreglass cruising catamaran. The need for going green has become a pressing matter in boating during recent years. This project's goal was to create a boat capable of being autonomous and self-sufficient from an energy standpoint. This type of boat is placed right between sailing and motor boating. Since sailing has always been the most eco-friendly way to cruise the seas, this project suggests the creation of a third category of boating that includes features found in both sailing and motor boats. This necessity derives from the market needs; in fact, only 10% of the international boating market corresponds to the sale of sailing boats. The low percentage can be explained by numerous factors, not least of which is the need for very specific training in order to sail a vessel. The remaining 90% prefers to experience sea life in a more indirect way. Therefore, the idea of offering a cruise yacht that does not require particular abilities or training, while at the same time remaining eco-sustainable – providing low-fuel consumption and silent navigation – could become an intriguing alternative.

40. FEREIKOS HELIX – OPEN SNAIL FARMS

ORGANIZATION: P. Vlachou – M. Vlachou Ltd

TEAM REPRESENTATIVE: Panagiota Vlachou

EMAIL: info@fereikos-helix.gr

DESCRIPTION: Fereikos Helix develops open snail farms. It is the first time that open-type snail farms (integrated biological cycle) operate in Greece.

41. FLEXIBLE SHELVES

ORGANIZATION: Konstantinos Angelis

EMAIL: kostas.angelis@windowslive.com

DESCRIPTION: Wood surface support system that can be used as a bookcase, a partition (home, office, etc) or a Lego-type game if constructed at a small scale.

42. PRODUCING WINE IN THE CONSUMER'S FRIDGE

ORGANIZATION: University of Patras

TEAM REPRESENTATIVE: Athanasios Koutinas

EMAIL: a.a.koutinas@upatras.gr

DESCRIPTION: Winemaking in the consumer's fridge with packaging that contains dried grape juice and sugar fungi immobilized within nano/tubular cellulose. This technology facilitates fermentation at low temperatures and provides wines of improved quality, due to the extremely low fermentation temperature and the increase in fermentation capability caused by the nano/tubular cellulose.

43. THIRD GENERATION WBWE REVERSE OSMOSIS DESALINATION DEVICE

ORGANIZATION: WATERA HELLAS SA

TEAM REPRESENTATIVE: Michalis Metaxas

EMAIL: m.metaxas@watera-int.com

DESCRIPTION: Water desalination device using 3rd generation WBWE reverse osmosis technology, providing the capability of interactive communication with the operation control centre. The WBWE device incorporates new technologies regarding its construction, membranes, high pressure achievement. It is also equipped with all the necessary measuring instruments for remote monitoring and control.

44. SQUASACTER: A SACCHAROMYCES CEREVISIAE PRODUCT, RICH IN BIOACTIVE SQUALENE LIPID

ORGANIZATION: Aristotle University of Thessaloniki

TEAM REPRESENTATIVE: Maria Tsimidou

EMAIL: tsimidou@chem.auth.gr

DESCRIPTION: Production of squalene with a microorganism (Saccharomyces cerevisiae) already used in bread, wine and beer making. Specific know-how was developed for its production so as to optimize selectivity, efficiency and process productivity, as squalene is an intermediate product and not the end-product (ergosterol). Its production process is competitive compared to other sources suggested in international literature (oil mill waste, amaranth seeds, olive leaves).

45. SMART PHONE AND TABLET APPLICATION FOR MANAGING CONSTRUCTION SITE INFORMATION

ORGANIZATION: Aristotle University of Thessaloniki

TEAM REPRESENTATIVE: Evangelos Efthymiou

EMAIL: vefth@civil.auth.gr

DESCRIPTION: This proposal aims to develop a smart phone and tablet application for managing construction site information.

46. ELECTRIC AND THERMAL ENERGY CO-GENERATION UNIT FROM NATURAL GAS, LIQUID GAS AND BIOGAS VIA HYDROGEN WITH 5 KW FUEL CELLS

ORGANIZATION: TROPICAL SA

TEAM REPRESENTATIVE: Giorgos Kaplanis

EMAIL: gkaplanis@tropical.gr

DESCRIPTION: The objective of this proposal is the final construction, the required certification and the availability of a fully automated unit/production line for GreenGenNG-5 co-generation generators. By achieving these objectives and making strategic partnerships, the company will soon claim its rightful position in the global market, gaining a greater market share.

47. EFARMER

ORGANIZATION: Foodstandard SA

TEAM REPRESENTATIVE: Michalis Manousos

EMAIL: ampoulou@foodstandard.gr

DESCRIPTION: Application to replace the journal where all agriculture processes are manually recorded (farming care, fertilization, spraying, harvesting, etc.) with real-time electronic recording.

48. INNOVATIVE SERVICES FOR COLLECTING, MANAGING AND INTERPRETING ENVIRONMENTAL DATA TO SUPPORT MANAGEMENT DECISION-MAKING

ORGANIZATION: Interbalkan Environment Centre

TEAM REPRESENTATIVE: Stamatios Tsiakiris

EMAIL: vtakavakoglou@yahoo.gr

DESCRIPTION: Environmental data management services, adjusted to the operational needs of the end user. Services include collecting and analyzing data, deducing environmental indexes, operating web applications for classified data diffusion, and offering electronic consultation.

49. STRATEGIC PLANNING OF A STEVIA MANUFACTURING AND PROCESSING UNIT (SWEET BREATH OF LIFE FOR DIABETICS – NEW IMPETUS FOR FARMERS)

ORGANIZATION: Postgraduate Business Administration Department – MBA, University of the Aegean

TEAM REPRESENTATIVE: Nikolaos Avramidis

EMAIL: avramidis.nikos@hotmail.com

DESCRIPTION: Establishment of a stevia processing unit on the border of the Pella and Imathia prefectures for manufacturing and promoting the first natural sugar substitute.

50. MOBILE PHONE APPLICATION WITH THE AIM OF CLASSIFYING THE GRAVITY OF ASTHMA ATTACKS

ORGANIZATION: University of Thessaly

TEAM REPRESENTATIVE: Sotirios Zarogiannis

EMAIL: szarog@med.uth.gr

DESCRIPTION: Method for classifying the gravity of asthma attacks, by assessing speech rhythm and breathing sounds using voice analysis tools in the context of a mobile phone application.

51. METHOD FOR LIFTING FLOATING TOP OIL TANKS

ORGANIZATION: EKME Mechanical Engineering & Construction Contractors

TEAM REPRESENTATIVE: Anastasios Teneketzi

EMAIL: bpavlidis73@gmail.com

DESCRIPTION: Method for lifting oil tanks with simultaneous lifting of their floating top. It is a new method for overall restoration of both the individual parts of the tank (top – shell – bottom) that have been distorted due to ground subsidence and its structural sub-base (ground – underground – foundation).

52. DOCTORANYTIME.GR

ORGANIZATION: ADD MARKETING

TEAM REPRESENTATIVE: Eleftheria Zourou

EMAIL: ezourou@doctoranytime.gr

DESCRIPTION: Doctoranytime creates a better health society, providing upgraded services to patients and physicians. Through the online service, patients can find the appropriate physician, taking into account the evaluation given by other patients, the physician's CV, the cost per consultation, the associated insurance funds and a range of other interesting information. After finding the appropriate physician, patients can easily schedule an appointment online at any given moment. Finally, the system keeps a record of the patients' medical history (which doctors they visited and when, with the respective expert opinions and prescriptions), offering optimal control over their health history in a convenient and organized manner. On the other hand, physicians can use doctoranytime to showcase their services, open a communication channel with patients and accept appointments at any given moment. Doctoranytime changes the health scene and everything concerning its organization, offering health management services as they should actually be.

53. LABORATORY APPARATUS FOR STUDYING THE LONG-TERM CEMENTATION OF EARTH-DAM FILTERS MADE OF BROKEN LIMESTONE

ORGANIZATION: Edafos Engineering Consultants SA

TEAM REPRESENTATIVE: Michael Bardanis

EMAIL: mbardanis@hotmail.com

DESCRIPTION: A new laboratory device for studying the long-term cementation of earth-dam filters made of broken limestone. The new device consists of a chamber where the filter material is placed and compacted. A vertical load is applied on the compacted specimen in the chamber from the open top side. After leaving the load for a time deemed necessary, part of the bottom of the chamber suddenly opens, much like a trap-door. This sudden opening of the trap-door leads to the formation of a cavity in the sample, as part of it drops down from the bottom of the sample. The geometrical shape of this cavity is recorded by a photograph taken through

the front of the chamber, which is made of a transparent high-strength acrylic material. Recording the shape of this cavity will allow the simulation of the problem by means of the finite element method (FEM), in order to back calculate the shear strength parameters of the sample material at the time of the trap-door opening. If the test is performed on samples of the same material prepared with the same initial properties, immediately after compaction, and at a time sufficiently long after compaction, then the anticipated decrease in the size of the cavity will be indicative of the change in the shear strength properties of the material and especially its cohesion in the case of filter from broken limestone, due to its long-term cementation. Cohesion is an undesirable property for filters. Therefore, if found for the particular material, then the material can be rejected for use as a filter. If not found, however, then the material can be accepted.

54. HYBRID SLIDING BENCH

ORGANIZATION: University of Patras

TEAM REPRESENTATIVE: Christos Papadopoulos

EMAIL: chris.papadopoulos@upatras.gr

DESCRIPTION: Hybrid sliding bench (international patent) with the capability of operating simultaneously or selectively as hydrodynamic, electromagnetic or both. The hydrodynamic and electromagnetic fields of the hybrid sliding bench operate within a single shell and, with the appropriate control system, it can operate either as a hydrodynamic, as an electromagnetic, or as a hybrid (electromagnetic and hydrodynamic at the same time) system.

55. GREECE INSIDERS

ORGANIZATION: Greece Insiders

TEAM REPRESENTATIVE: Konstantinos Leimonis

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DESCRIPTION: By bringing travellers into contact with Insiders, visitors can experience unique quality moments with the aim of getting a taste of the local culture.

56. TIME TRAVEL

ORGANIZATION: E. Iliopoulos & Co, FRESH COMMUNICATIONS

TEAM REPRESENTATIVE: Elias Iliopoulos

EMAIL: eiliopoulos@hotmail.com

DESCRIPTION: Time travel via creating special hosting units that provide a faithful representation/reproduction of life at a different period in the past.

57. ALZMINDER: SUPPORTING CARETAKERS AND PATIENTS SUFFERING FROM ALZHEIMER'S DISEASE VIA SMART PHONE

ORGANIZATION: www.alzminder.com

TEAM REPRESENTATIVE: Christos Xenakidis

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DESCRIPTION: Alzminder mobile application offers caretakers the possibility to create individualized cognitive enhancement exercises with multimedia, organize everyday life and activate patients with sound recalls and prompts. It also has a list of contacts with photographs, a photo album with sound narratives, a music and message player, and an SOS button with the capability of sending an SMS that displays the geographical location of the patient on a digital map.

58. USING AN ERGONOMIC BASE IN SLEEPING SYSTEMS

ORGANIZATION: MAXI SA COCO-MAT

TEAM REPRESENTATIVE: Evgenia Lianou

EMAIL: elianou@coco-mat.com

DESCRIPTION: Ergonomic mattress base (ergobase) consisting of beech planks and pieces of solid natural rubber. It is placed within the mattress and multiplies material elasticity, making the bed bottomless and preventing anybody, regardless of weight, from reaching the base of the bed. Thus, the bed-to-body resistance is eliminated, creating ideal conditions for a perfect sleep.

59. DEVELOPING PRECISION AGRICULTURE VIA USING AGRO-WSN

ORGANIZATION: ONEX HELLENIC – PRIVATE CONSULTANCY COMPANY

TEAM REPRESENTATIVE: Vasilis Pasiadis

EMAIL: evaiou@onexcompany.com

DESCRIPTION: Special integrated system application for automatic collection and wireless transfer of data for regularly monitoring many different environmental and soil parameters at a local level. The system has been specially designed to support Precision Agriculture, offering significant benefits with regard to assessing desertification risk, monitoring climate conditions, dealing with extreme weather conditions etc.

60. TEAM QUALITY MANAGEMENT ASSESSMENT - TQMA

ORGANIZATION: PROMOSPORT SA

TEAM REPRESENTATIVE: Giorgos Giamanis

EMAIL: info@tqma.eu

DESCRIPTION: TQMA is a multifaceted, user-friendly, powerful web application which can manage a large volume of data, including locations, teams, organizations, countries and users. It allows any sports club to conduct self-assessments according to UEFA, FIFA, Hellenic Football Federation and Superleague requirements and standards. It records quantitative indexes and assesses the team. Regular self-assessments ensure constant improvement of the internal club organization. Each team will be called upon to conduct self-assessments by answering questions and filling in specific information. The TQMA application has been divided into two parts: the first part is the user environment (front-end) for users such as clubs, auditors, referee assistants, championship representatives, football federations, government sports and recreation agencies. Furthermore, TQMA provides a platform that helps club owners assess the effectiveness of their own management system, offering information regarding industry standards, advantages and weaknesses, as well as performance assessment for stronger growth in the future. Moreover, it offers clubs, federations and organizations all over the world the possibility to exchange information.

61. COOPERATIVE VIDEO CRITERIA ANALYSIS IN SPORTS

ORGANIZATION: Nikolaos Sfingos & Co - SportScout

TEAM REPRESENTATIVE: Nikolaos Sfingos

EMAIL: sfingos@sportscout.gr

DESCRIPTION: Creation of a web platform hosting a large number of videos and athlete data concerning anthropometric features and performances. These data can be combined with the respective videos, which will display the audiovisual material interactively in the form of a video summary after a targeted search. The platform can be applied to every sport and at every level.

62. BIOLOGICAL METHOD FOR REMOVING CHROMIUM FROM UNDERGROUND WATER (BIOMAX)

ORGANIZATION: Department of Water Resources and Environmental Engineering, School of Civil Engineering, National Technical University of Athens

TEAM REPRESENTATIVE: Daniil Mamais

EMAIL: mamais@central.ntua.gr

DESCRIPTION: Simple and low cost biological method for removing chromium from underground water. The method is based on developing bacteria with the addition of a small quantity of organic food in underground water (e.g. milk or glucose). Under the anaerobic conditions created, bacteria have the ability to convert hexavalent chromium into insoluble trivalent chromium, which is then adsorbed by biological solid materials and removed via ground subsidence or water refinement.

63. SOCIABLE – INTEGRATED COGNITIVE ENHANCEMENT SERVICE

ORGANIZATION: Diagnostic and Therapeutic Centre of Athens HYGEIA SA

TEAM REPRESENTATIVE: Paraskevi Sakka

EMAIL: spantelopoulou@singularlogic.eu

DESCRIPTION: Cognitive enhancement service offered in the form of cognitive exercise software to people over 65 experiencing memory problems. It is already provided as a service by HYGEIA Hospital, with the support of Singular Logic SA. Elderly individuals who have completed the programme (mentally

healthy patients, and patients with mild mental disorder or mild to medium Alzheimer's disease) showed an improvement in their cognitive functions, mood and functionality.

64. PERSONAL RETAIL AGENT

ORGANIZATION: Practical Innovations Private Capital Company

TEAM REPRESENTATIVE: Efthymios Mpothos

EMAIL: mpthimios@gmail.com

DESCRIPTION: Product pricing and quality recording system to facilitate consumer access to relevant information in an individualized manner.

65. PIZZA OVEN

ORGANIZATION: ALPHA INOX – MARINA PENIDOU & Co

TEAM REPRESENTATIVE: Marina Penidou

EMAIL: sales@alphainox.gr

DESCRIPTION: Innovative electric pizza oven. It bakes six pizzas simultaneously, each separately at the desired time. Its advantages compared to other pizza ovens available in the market include:

1. Low electricity consumption (4.4 KW for preheating and 2.5W for operation).
2. Strong insulation.
3. Zero thermal loss (only the small door at the lower part is used).
4. No need to hire experienced personnel.
5. Stainless steel construction.
6. Fireproof panoramic insulating double crystal on the main door.
7. European immediate efficiency ceramic resistances
8. Easily accessible and replaceable operating parts.

66. USING DNA TECHNOLOGY IN FOOD INDUSTRY QUALITY CONTROL

ORGANIZATION: DELTA FOODS SA

TEAM REPRESENTATIVE: Kalliopi Kalantzi

EMAIL: kelkal@delta.gr

DESCRIPTION: Use of molecular biology applications and techniques incorporated into a food industry quality assurance system. The proposal analyzes the molecular biology applications routinely implemented, the benefits for the company as well as the overall results relating to product and hence consumer safety, the company's financial data, the environment and Greece's extroversion.

67. PROMETHEUS: THE NEW MEDICAL TOOL AND ITS ROLE IN THE FIELD OF ORGAN TRANSPLANTS

ORGANIZATION: Dr Konstantinos Mammias, MD, MSc, PhD physician-surgeon

EMAIL: csmammias@med.uoa.gr

DESCRIPTION: PROMETHEUS is a new digital medical tool with a special photographic scanning device, other peripheral accessories and internet access capability, complemented by expert-guided medical protocols, for supporting electronic medical files. The electronic working environment of PROMETHEUS supports telecommunication, tele-radiation and tele-pathoanatomy of organ transplants during the processes of coordination, receipt, preparation and preservation of grafts with a view to: a. minimizing the extent of ruined organs, b. preventing the dispatch of inappropriate grafts from the donor hospital to the recipient hospital, c. performing pre-operative decision-making and graft planning. The expansion of PROMETHEUS to include remote primary, secondary and tertiary prevention is also under investigation for future applications

68. INFANT NIGHT MONITORING SYSTEM WITH TELENOTIFICATION CAPABILITIES (MAIA SMART CRIB)

ORGANIZATION: Laboratory of Medical Informatics, School of Medicine, Aristotle University of Thessaloniki

TEAM REPRESENTATIVE: Alexandros Astaras

EMAIL: alexander.astaras@gmail.com

DESCRIPTION: Devices for monitoring infants during sleep. The devices collect data from sensors, process them and record them in a digital sleep calendar. Then, special algorithms further process physiological measurement data and deduce smart conclusions concerning the state of the baby's health and the potential need to urgently notify parents or caretakers.



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