

Nemitsas Foundation Prize in Engineering

27 November 2012 at the Presidential Palace

Distinguished Professor Dr Kyriacos A. Athanasiou was this year's winner of the Nemitsas Prize in Engineering, for his outstanding achievements that have led to countless lives being saved and the quality of countless more being improved.

Dr Athanasiou was born in Larnaca in 1960 and is extremely proud of his Cypriot background and upbringing. Graduating top of his class from St George High School in Larnaca, and spending 26 months in the Cypriot army as an officer, Dr Athanasiou set out to the United States in 1980 to further his education.

He obtained his BS in Mechanical Engineering from New York Institute of Technology (1984), followed by an MS (1985), a PhM (1988) and a PhD (1989) all obtained from Columbia University. Upon obtaining his PhD, he went directly into a faculty position at the University of Texas Health Science Center at San Antonio and the University of Texas at Austin for the duration of 10 years. In 1999, he joined Rice University as a full professor, where he held the Hasselmann Chair, and 10

years later he joined the University of California at Davis as a Distinguished Professor.

In 1993, he started his first company (*OsteoBiologics*) in orthopaedic bioengineering, which brought its first Food and Drug Administration (FDA) product to the market in 2003. The company was acquired by Smith & Nephew in 2006. In 1998, he co-founded *Xilas* (later renamed Diabetica Solutions) to develop products for the diabetic lower extremity, while in 1999 he co-founded *VidaCare* to bring engineering technologies for emergency care to the market. In total, his companies have brought to the market 15 FDA approved products.

Currently, he is a Distinguished Professor of Biomedical Engineering and Orthopaedic Surgery, as well as Chair of Biomedical Engineering at the University of California, Davis. He is also the Editor-in-Chief of the scientific journal, *Annals of Biomedical Engineering*. Simultaneously, he founded a new company, Ariston Medical, which he currently directs by himself.



The award ceremony



Outstanding Achievements in the Area of the Prize

Exemplifying the best in applied engineering, Professor Athanasiou has single-handedly created inventions and products that have saved countless lives and have improved patients' quality of life around the globe, all based on his fundamental discoveries in biomedical engineering. Indeed, his legendary invention of the means of delivering life-saving drugs through the bone in patients who are in shock and thus have no venous access has saved thousands of lives (from infants to adults). His invention of a biodegradable implant that is used to treat early or small defects in articular cartilage of patients with cartilage injury is the first cartilage product to enter the market and is used globally. His work in identifying a mechanism by which shear can be reduced at the bottom of diabetics' feet thus predicting the risk of ulceration has reduced the number of amputations in diabetic patients.

His patents on biodegradable scaffolds resulted in the first cartilage implant used to treat focal lesions in knee injuries. His invention is used worldwide

to treat lesions in articular cartilage. His invention of a device for intraosseous infusion has won Wall Street Journal's Innovation Award. This particular device is widely and consistently used in every ambulance and emergency room in the US; it is also used as part of the teaching labs of numerous medical schools. Dr Athanasiou is further known for his tremendous service to the biomedical engineering profession, having served as President of the Biomedical Engineering Society (BMES), the professional society for all bioengineers and biomedical engineers worldwide.

Professor Athanasiou's research group was the first to engineer entire surfaces of articular cartilage, the knee meniscus, and the temporomandibular disc, and this work will eventually lead to helping people with arthritis. His laboratory was the first to fabricate functional articular cartilage from human embryonic stem cells. His group has identified a new source of stem cells from the skin that can be used to make cartilage.

Dr Athanasiou's contributions to biomedical engineering are wide ranging, profound, and singularly important, covering the entire spectrum of

Distinguished Professor Dr Kyriacos A. Athanasiou – the Cypriot who saved countless lives and improved the quality of many more

basic biomechanical research to clinical use via the development and subsequent commercialisation of engineering technologies invented by him.

Dr Athanasiou has published 260 full-length papers, written five books, edited 13 books or special issues, and obtained 28 patents. His work in biomedical engineering has been recognised, by the Thomas Edison Award, the Van C. Mow Medal and the Marshall Urist Award, among others.

Dr Kyriacos Athanasiou – the epitome of excellence in all levels of engineering: the letter of recommendation that endorses his substantial contribution

Distinguished Professor and Dean at the University of California’s College of Engineering, Enrique J. Lavernia, was the man behind Dr Athanasiou’s nomination for the Nemitsas Prize.

He explained: “Succinctly, Dr Athanasiou epitomises excellence in all levels of engineering, from basic bench work, to applied research, to translational applications of his work, to technology transfer and commercialisation of his patents. The fruits of his efforts are affecting countless people around the world.

Professor Athanasiou, since joining the University

of California, Davis, three years ago, has exhibited superb leadership and definite goals for improving the visibility of biomedical engineering at Davis as a nationally ranked programme. Equally important, Professor Athanasiou has clearly contributed major new and high impact findings in biomedical engineering, a field in which he is internationally recognised.

Dr Athanasiou is one of those very rare individuals, who combine superlative academic performance, outstanding scholarly achievement, and exceptional translational results, having invented technologies, which he has subsequently commercialised, to bring to the market bioengineering products that are widely used in patients all over the world.”

A synopsis of Dr Athanasiou’s accomplishments

Professor Lavernia explained: “(Dr Athanasiou’s) pioneering and extensive work in tissue engineering has addressed important and complex medical problems, such as cartilage healing. Professor Athanasiou was the first to publish on the use of biodegradable scaffolds as carriers of growth factors to heal cartilage. Four of his papers on identifying structure-function relationships in cartilage are the standard in the field.



Nemitsas Award Winner, Dr Kyriacos A. Athanasiou



(left to right) Dr Kyriacos A. Athanasiou, Mr Takis Nemitsas and Justice Minister Mr Loucas Louca



An array of guests - including well known personalities and politicians - at the ceremony in Nicosia

Professor Athanasiou has also directed his attention to engineering the jaw joint and the knee meniscus, sites of a multitude of debilitating problems.

His group has also demonstrated the engineering of large articular cartilage surfaces by self-assembly, without the use of any scaffolds, with properties approaching those of native cartilage.

The work of Professor Athanasiou in this field is trailblazing, and rightly recognised with five R01 grants and an R43 from the National Institutes of Health (NIH), some of the most prestigious and difficult-to-obtain grants in the U.S.”

An outstanding instructor

“In the area of teaching, Professor Athanasiou is an outstanding instructor, as evidenced by his excellent record of teaching while he was at Rice University,” says Professor Lavernia. “He was one of the most highly acclaimed instructors on the Rice campus, receiving the Presidential Award for Mentoring from President Leebron, Rice University, the Teaching and Mentoring Award from the Graduate Student Association and the Outstanding Faculty Award from the Premedical Society.

The first two are very prestigious in that they are awarded only to a single instructor each year in the University. These awards underscore the effort that Professor Athanasiou puts into his teaching (while running a very large research laboratory as well as contributing in major ways to service).

During his tenure at Rice, he mentored 116 graduate students, medical students, residents, and post-doctoral fellows, plus another 70 undergraduates and high school students. As an instructor at Rice, Professor Athanasiou taught Continuum Biomechanics at the undergraduate level, Advanced Biomechanics to graduate students, and Cellular Engineering as an elective. In support of these courses he has published four textbooks that are well subscribed both nationally and worldwide.

Professor Athanasiou is well known for his tremendous level of service to the biomedical engineering profession.

In 2003, he was elected President of the Biomedical Engineering Society (BMES), the most important professional society in the field, representing all aspects of bioengineering and biomedical engineering worldwide. During his tenure, BMES assumed accreditation responsibilities becoming a



Winner Dr Kyriacos A. Athanasiou poses with attendees

member of the Accreditation Board for Engineering and Technology (ABET). This major accomplishment positioned BMES as the lead society for the accreditation of all biomedical engineering programmes nationwide. To support these ABET-related expenses, he was successful in securing funding from the Coulter Foundation. In October 2009, Professor Athanasiou was named Editor-In-Chief for the *Annals of Biomedical Engineering*, the flagship publication of BMES.

His first company, *OsteoBiologics*, was founded based on Professor Athanasiou's patents for biodegradable scaffolds for cartilage repair and arthroscopic evaluation. This company, which developed nine FDA approved products, was acquired by Smith & Nephew in 2006.

Diabetica Solutions was founded based on Professor Athanasiou's work to alleviate stress and to provide an expedient means of identifying pathology in diabetic feet; the company has three FDA products that have been licensed to larger companies.

VidaCare, formed based on Professor Athanasiou's patents for intraosseous infusion, has brought to the market another three FDA approved products.

His newest company, *Ariston Medical*, is developing technologies to address arthritic joints. Based on his innovative inventions, he has been the recipient of some very prestigious awards (the Thomas Edison Award, the Marshall Urist Award, the V.C. Mow Medal) while his technologies have been widely recognised. It is worth mentioning that the *Wall Street Journal* in 2008 selected his intraosseous infusion approach as the most innovative technology in all fields.

Currently, Professor Athanasiou is jointly appointed in Biomedical Engineering and Orthopaedic Surgery at our University, the University of California, Davis (one of the top 20 public universities in the U.S.), at the rank of Distinguished Professor. This is the highest rank that can be attained at the University of California, reserved for the faculty members who have achieved the highest level of scholarship."

Professor Lavernia concludes: "As he exemplifies a superior level of achievement in engineering, please consider this letter to be my strongest and most enthusiastic endorsement of Professor Athanasiou for the Nemitsas Prize."

Michael Yianneskis, Chairman of the International Jury, at the awarding of the Nemitsas Foundation Prize in Engineering

“The International Jury studied applications from candidates carrying out exceptional scientific work and who are accomplished in various sectors of Engineering.

I would like to underline that during the course of its work, the Jury determined that there are many scientists of Cypriot origin around the world.

To evaluate the candidates’ applications, the Jury sought out the advice of world renowned scientists in each candidate’s field of expertise. They were asked to evaluate the scientific work and accomplishments of each candidate. Scientific personalities from the wide field of Engineering Science gave their detailed and thorough opinions on the candidates’ achievements based on internationally-accepted scientific criteria.

Following a comprehensive process and based on the evaluations received, the International Jury suggested the awarding of Professor Kyriacos Athanasiou to the Foundation’s Board of Directors. Professor Athanasiou’s contribution has been wide, deep, and extremely important. It connects basic research with clinical applications through the creation, development and application of engineering technology.

Professor Athanasiou has been internationally recognised for his work and contribution to the field of bioengineering, which is related to using mechanical science to explore and develop technologies that can be applied to the medical field. Professor’s Athanasiou’s research work has con-

tributed to the development of products and technologies which are now widely used on patients and which contribute both to the saving of lives and to improving the quality of life of many patients around the world.”

Michael Yianneskis is also Emeritus Professor at the University College London, University of London, and Emeritus Professor of Fluid Mechanics at King’s College London, University of London.

How the Nemitsas Prize winner is selected

“The Nemitsas Prize has been established as, and will remain, our country’s award and will be presented by the President of the Republic of Cyprus at the Presidential Palace every year to symbolise the important honour and distinction towards the scientists or artists chosen to be awarded,” Mr Takis Nemitsas explained on the night of the ceremony.

Mr Nemitsas went on to describe the process that is followed when choosing the candidates for the prize.

“Selecting the area of specialisation comes after the Coordinating Committee research and subsequent proposal to the Foundation’s Board of Directors. Once the choice has been approved, it is announced to the Academic Council, the head of which is based in London, and which is made up of distinguished academics from around the world.

The Academic Council chooses, from amongst its own members or from international personalities in the selected field, five judges to make up the Jury. The Jury members choose their own chairman and prepare to study the applications they will be sent.

The Coordinating Committee prepares the application forms and Andy Bargilly creates the poster. These are placed on the Foundation’s website, on the websites of many universities around the world, and on the websites of Cyprus embassies.

The Foundation President, along with the Secretary and Coordinating Committee, methodically begin to announce and promote the sector chosen for the award.

The Foundation’s management in Limassol, in cooperation with coordinator Professor Marios Mavronicolas, Vice Rector of the University of Cyprus,



Mr Takis Nemitsas

send off thousands of e-mails to universities and other scientific centres all over the world. Selecting appropriate centres is a methodical and laborious task. The experience we have already amassed has started to make this huge undertaking easier.

To achieve more effective results, we use the excellent services offered to us by the Republic's Foreign Ministry. The Ministry's Permanent Secretary instructs every ambassador to pass on the message to all the universities and scientific centres in the country they are posted in. Similar announcement assistance is provided by the Press and Information Office.

What follows is the receiving of the applications from prize candidates. Once these are checked and filed in the Foundation's archive, they are sent electronically to the chairman of the Jury where their study and evaluation begins."

Mr Nemitsas concluded: "As a result of three years of persistent and methodical work, the Nemitsas Prize has become established and is recognised as the most significant Cypriot award honouring Cypriot scientists and artists with a presence on the international scene."

Excerpt from the address by the Minister of Justice and Public Order, Mr Loucas Louca, on behalf of the President of the Republic of Cyprus, Mr Demetris Christofias

"Professor Kyriacos Athanasiou is an excellent example of a distinguished Cypriot scientist who has made a contribution to science.

Kyriacos' research has had important results and has led to medical achievements and technologies that are widely used today on patients around the world. They have, in this way, saved human lives as well as improved the quality of life of many patients.

The personal history and curriculum vitae of the man we, as a state, are honouring tonight, has been extensively referred to by other speakers tonight. I would like to focus on the human side of the scientist we are honouring today. We have amassed the best impressions of Kyriacos Athanasiou – the man – through testimonies from people we know who have travelled to the United States for medical reasons.



Minister of Justice and Public Order, Mr Loucas Louca

On his own initiative and with no personal gain, he has on many occasions helped our fellow people who have travelled to Huston for medical reasons. To me, this is the most reliable letter of credence on the morals and integrity of the man. His selfless offerings to his fellow man are the most important achievement.

This is why the scientific work of people like Kyriacos must first and foremost become a social commodity; particularly when it comes to medical science, a science that is so human-centred and with such a significant contribution to society.

For the society to progress, we must recognise that what we produce is social wealth. We must actively help obliterate social inequalities on all levels. This is even more important during times of crises in economy and society such as the one we are experiencing now. We ask our scientists to recognise their role as crucial members of the society that educated them and which provided them with ideals and incentives during their first steps.

As a country, we should work closely with people and scientists like Professor Kyriacos Athanasiou. We must provide them with all the support they need to bring their expertise and authority back to Cyprus, so that the field of research and science can really bloom; sectors that can define the future of our country, creating specialised technologies in many different areas. Cyprus does not have heavy industry. What gives the country a real advantage are its well-trained and highly educated scientists in many different spheres, particularly in the service sector."