STRATIS V. SOTIRCHOS MEMORIAL LECTURESHIP

MOTIVATION and OBJECTIVE

FORTH/ICE-HT (www.iceht.forth.gr) has created the "Stratis V. Sotirchos Lectureship" to honor the memory of one of its most distinguished Researchers, Professor Stratis V. Sotirchos, who lost his life in a tragic traffic accident in Brussels, on June 13, 2004. This Award is supported by the "Stratis V. Sotirchos Trust Fund" which has been created from donations by friends and colleagues.

DESCRIPTION AND MODALITY

The SVS Lectureship is awarded every second year to an engineer-scientist, who has produced original and fundamentally important results in some R&D field within the broader context of chemical engineering. Selection of the most deserving candidate, each time, is made on an international basis and strictly on grounds of merit. All candidates should be younger than 40 years of age on the day of the SVS Lecture. Every second year (starting in 2005) the Recipient of the SVS Lectureship is invited to present the "Stratis V. Sotirchos Lecture" at the "Pan-Hellenic Scientific Conference in Chemical Engineering", which is held every two years (in the odd numbered years) on a rotating basis in Patras, Thessaloniki, and Athens, Greece. The travel, living and lodging expenses of the Recipient along with a modest honarorium are covered in full from the proceeds of the SVS Trust Fund.

RECIPIENTS

2005: Professor Michalis Tsapatsis, University of Minnesota, USA
2007: Professor Costas Maranas, The Pennsylvania State University, USA
2009: Associate Professor Patrick S. Doyle, Massachusetts Institute of Technology, USA
2011: Associate Professor Yiannis N. Kaznessis, University of Minnesota, USA
2013: Professor Michael S. Strano, Massachusetts Institute of Technology, USA

STRATIS V. SOTIRCHOS (1956–2004)

STRATIS was born on the aegean island of Mytilene, Greece, in 1956. He grew up on the island and studied in the local primary and secondary schools. At the age of 18 he entered the Chemical Engineering Department of the National Technical University of Athens, from which he graduated in June 1979 among the top few of his class.

In September 1979 Stratis entered the graduate studies program of the ChemE Department of the University of Houston, where he earned his PhD, with Professor Neal R. Amundson as his academic advisor, in the short span of three years. His early publications with Neal on the theoretical modeling of coal gasification in fluidized bed reactors have become landmarks.

In 1982 Stratis joined the faculty of the ChemE Department of the University of Rochester, where he had a brilliant career as teacher, researcher, and academic leader, attaining the rank of Professor. He published many important papers on a broad spectrum of topics, notably, theoretical analysis of diffusion & reaction processes in porous media, multiplicity and stability in diffusion flames, adsorption and desorption processes in packed beds, mathematical modeling of multicellular tumor spheroids, predictive modeling of transport properties in media with complex pore structure, etc. In 1998 the University of Rochester gave Stratis a joint appointment as Professor in the Department of Materials Science. Stratis has been academic advisor to several PhD students, who are now leading distinguished careers in academia and industry.

In the late 90's Stratis became a Research Director at FORTH/ICE–HT, where he developed a vibrant new research program, while retaining his research ties to Rochester. His R&D work at ICE–HT produced highly important results in the areas of uniform deposition of chemical vapors in deep pores, and in the efficient production of high quality carbon nanotubes.

Stratis's remarkable life was cut short in Brussels, at about 8:30 in the morning on June 13 (Sunday), 2004, when he was hit, while standing on the pavement of a roundabout, by a car driven by a drunken driver.

RECIPIENT OF 2013 "Stratis V. Sotirchos" MEMORIAL LECTURESHIP

Michael S. Strano

Professor Michael S. Strano is currently a Professor of Chemical Engineering at the Massachusetts Institute of Technology.

He received is B.S from Polytechnic University in Brooklyn, NY and Ph.D. from the University of Delaware both in Chemical Engineering. He was a post doctoral research fellow at Rice University in the departments of Chemistry and Physics under the guidance of Nobel Laureate Richard E. Smalley. From 2003 to 2007, Michael was an Assistant Professor in the Department of Chemical and Biomolecular Engineering at the University of Illinois at Urbana-Champaign before moving to MIT.

His research focuses on biomolecule/nanoparticle interactions and the surface chemistry of low dimensional systems, nano-electronics, nanoparticle separations, and applications of vibrational spectroscopy to nanotechnology.

Michael is the recipient of numerous awards for his work, including a 2005 Presidential Early Career Award for Scientists and Engineers, a 2006 Beckman Young Investigator Award, the 2006 Coblentz Award for Molecular Spectroscopy, the Unilever Award from the American Chemical Society in 2007 for excellence in colloidal science, and the 2008 Young Investigator Award from the Materials Research Society, the 2008 Allen P. Colburn Award from the American Institute of Chemical Engineers, and recently selected as a member of Popular Science's Brilliant 10.

The Stratis V. Sotirchos Memorial Lectureship 2013 Citation is as follows:

"For pioneering advances in understanding the chemistry and engineering of low dimensional systems, including the first structure-reactivity relationships, methods of chemical manipulation, and applications as sensors and energy conversion devices.**"**

New concepts in molecular and energy transport within carbon nanotubes and graphene

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Our laboratory has been interested in how 1D and 2D electronic materials such as carbon nanotubes and graphene can be utilized to illustrate new concepts in molecular transport and energy transfer. In the first example, we predict and demonstrate the concept of thermopower waves for energy generation(1). Coupling an exothermic chemical reaction with a thermally conductive CNT creates a self-propagating reactive wave driven along its length. We realize such waves in MWNT and show that they produce concomitant electrical pulses of high specific power >7 kW/kg. Such waves of high power density may find uses as unique energy sources. In the second system, we fabricate and investigate SWNT ion channels for the first time(2) and show that the longest, highest aspect ratio, and smallest diameter synthetic nanopores examined to date demonstrate oscillations in electro-osmotic current at specific ranges of electric field, that are the signatures of coherence resonance, yielding self-generated rhythmic and frequency locked transport. The observed oscillations in the current occur due to a coupling between stochastic pore blocking and a diffusion limitation that develops at the pore mouth during proton transport. Lastly, our laboratory has been interested in how graphene and single walled carbon nanotubes (SWNTs) form covalent or non-covalent bonds via electron transfer. We have derived and validated structure-property relationships for electron transfer reaction involving quantum confined carbon nanostructures, including corrections for quantum fluctuations that are shown to be critically important for understanding how graphene is influenced by its underlying substrate. Applications to biomedical sensors(3) of various types will be discussed.

1. Choi W, Hong S, Abrahamson JT, Han JH, Song C, Nair N, Baik S, Strano MS: Chemically driven carbon-nanotube-guided thermopower waves. Nature Materials, 9 (2010) 423-429.

2. Lee, CY, Choi W, Han, JH, Strano MS: Coherence Resonance in a Single-Walled Carbon Nanotube Ion Channel. Science, 239, (2010), 1320 - 1324

3. Jin H, Heller DA, Kalbacova M, Kim JH, Zhang JQ, Boghossian AA, Maheshri N, Strano MS: Detection of single-molecule H_2O_2 signalling from epidermal growth factor receptor using fluorescent single-walled carbon nanotubes. Nature Nanotechnology, 5 (2010), 302-309.