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ΣΕΜΙΝΑΡΙΟ

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ΘΕΜΑ: **Ανάπτυξη πολυμερικών αναπνεύσιμων υλικών καθώς και μεμβρανών καθαρισμού υδατικών αποβλήτων με ενσωμάτωση νανοσωλήνων άνθρακα.**

Development of breathable polymeric materials and waste water purification membranes by incorporation of carbon nanotubes.

ΤΟΠΟΣ: Αίθουσα Σεμιναρίων ITE/IEXMH

ΗΜΕΡΟΜΗΝΙΑ: **Δευτέρα, 12 Ιανουαρίου 2015**

ΩΡΑ: **12:30**

ΠΕΡΙΛΗΨΗ

Carbon nanotubes (CNTs) have attracted great attention for their potential use in many applications because of their intrinsic properties. Water flow through membranes composed of an array of aligned CNTs is reported to be orders of magnitude faster than that predicted from conventional fluid flow theory. That is, CNTs into “porous” polymeric membranes, potent to overcome the immanent limitation of counterbalance between flux and selectivity; a challenging issue. Two relevant examples will be presented.

A. The synthesis of polyolefin-based composites bearing breathability is of interest in applications related to products in contact with the human body. Breathability is generally associated to the ability of the membrane to allow the passage of water vapour, while preventing the penetration of water. The inclusion of inorganic fillers in polyolefins improves the breathability characteristics as well as the mechanical properties; however, the cost effective biaxial drawing is required. The incorporation of well dispersed MWCNTs in conjunction with the alteration of the porosity of the polymeric membranes improved the specific water vapor transmission rate (WVTR) of pure polyolefins in a comparable extent to the commercial ones.

B. In order to develop a new class of high efficiency membrane bioreactors (MBRs) and improve wastewater treatment & reuse, infiltration of CNTs into porous polymeric membranes was performed. This CNTs' embedment was attempted using a new/specific infiltration method to allow the CNTs to be maintained well dispersed in the aqueous suspensions and at the same time to be shoved, steered and aligned towards to the membrane pores. Even so, a relevant conversion of an Ultrafiltration membrane to a Nanofiltration one turned out to be a no easy task. Nevertheless, the importance other than the impact of the application of CNT-embedded membranes in the area of water technology development remains immense. In this context, the identification and quantification of small concentrations of multi-walled CNTs (MWCNTs) in aqueous resources during relevant water purification processes via surface enhanced Raman scattering (SERS) can be proven of high significance.
To support both efforts, a Raman spectroscopic methodology for the evaluation of the weight-fraction of MWCNTs in polymer nano-composites was also developed.

ΣΥΝΤΟΜΟ ΒΙΟΓΡΑΦΙΚΟ

Dr. George Voyiatzis, Research Director & Member of FORTH/ ICE-HT Scientific Council. PhD from the Department of Chemical Engineering, University of Patras (1992). "Maîtrise de Chimie/Physique" from the "Université Paris VII" (1983). **Expertise**: Specialty Spectroscopic Probes: Development of Flexible Spectro-Probes & Innovative On-Line Monitoring Methods; Non-Invasive Detection of Drugs in the Aqueous Humor of the Eye; Application of an Oscillating Cell and 90o Raman Scattered Light Collection Geometry in Ag/Au Nanocolloidal Solutions for Quantitative SERS Measurements; Quantification of DNA bases, of drugs in corporal fluids, of nanostructured materials in food simulants. Advanced Modified Polymers: Spectroscopic & Electrochemical study of the Acid/Base Doping Ability of High Temperature Polymer Electrolyte Membranes; Anti-microbial Polymeric Materials with Controlled Release Characteristics - the Effect of the Molecular Orientation; Dispersion of Carbon Nanotubes and Nanoparticles in Polymer Matrixes; Infiltration/Embedment of CNTs in Porous Polymer Membranes; Migration Control of Nano-Structured Materials Incorporated Biopolymer Packaging. **Co-author** of 70 refereed papers & 4 patents. **Coordinated/Participated** 16/25 European, Domestic and Industrial projects.