ΙΤΕ/ΙΕΧΜΗ

ΣΕΜΙΝΑΡΙΟ

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ΟΜΙΛΗΤΗΣ: **Μαρία Δαλέτου**, Μεταδιδακτορική Συνεργάτης
ΙΤΕ/ΙΕΧΜΗ

ΘΕΜΑ: **Ανάπτυξη Υλικών και Ηλεκτροχημικές Διεργασίες για Ενεργειακές Εφαρμογές**

Development of Materials and Electrochemical Processes for Energy Applications

ΤΟΠΟΣ: Αίθουσα Σεμιναρίων ΙΤΕ/ΙΕΧΜΗ

ΗΜΕΡΟΜΗΝΙΑ: **Δευτέρα, 20 Οκτωβρίου 2014**

ΩΡΑ: **12:30**

ΠΕΡΙΛΗΨΗ

Polymer Electrolyte Membrane Fuel Cells (PEMFCs) are the most attractive type of fuel cells for many applications since they present constructive simplicity, high efficiency and versatility. High Temperature PEMFCs, having certain advantages over the state-of-the-art low temperature FCs, constitute a key research area aiming at higher efficiencies, cost reduction and compactness. The state of the art HT PEM fuel cell technology is based on H_3PO_4 imbibed polymer electrolytes and Pt/C catalysts. Very important issues for the market penetration of fuel cells are their cost, reliability and long term stable operation. The future fuel cell technology and its cost effective implementation must reduce dependence on cost drivers. The most challenging areas towards the optimization of this technology is the development of stable long lasting polymer structures with high ionic conductivity and catalytic layers with structures and architectures that lead to more active and stable electrochemical interfaces with high Pt utilization and minimal Pt loads.

A novel combinatorial approach will be presented, at which separately developed and evaluated polymer electrolyte membranes and electrocatalysts open the way for a unique cost-effective HT PEMFC system operating well above 180^{o}C.

The herein developed crosslinked polymeric membranes are prescreened in terms of their properties and selected electrolytes are tested in single cells operating at high temperatures up to 220^{o}C. Their enhanced and stable performance demonstrates the

potential of these materials. At the same time much work has been focused on the optimization of the electrode. A series of Pt and Pt alloy (Pt/M) based catalysts have been prepared supported on carbon nanotubes functionalized with polar pyridine groups, aiming at the enhancement of the electrode/electrolyte interface. Fine and uniform distribution of Pt and M nanoparticles was achieved with different degree of alloying and sizes ranging between 2-3nm. The first screening of the catalysts' properties took place using liquid electrochemistry. In situ evaluation of the performance and utilization revealed that the new electrocatalysts posses all prerequisites for an efficient fuel cell operation.

Σύντομο Βιογραφικό Σημείωμα

Dr. Maria K. Daletou is a Research Associate at FORTH/ICE-HT. She is a Chemist with a MSc (2002) and PhD (2007) in the Interdepartmental Postgraduate Program on Polymer Science and Technology from the Departments of Chemical Engineering, Chemistry and Physics, University of Patras. She has spent several years as a post-doctoral fellow in International and National institutes (Northeastern University of Boston, MA; University of Patras; FORTH/ICE-HT). Her research activity is an interdisciplinary approach encompassing the areas of polymeric and hybrid materials of various architectures and functionalities (synthesis and characterization), electrocatalysis and liquid and solid state electrochemistry with emphasis in the field of fuel cells for the development of new materials and integrated systems. Her research is communicated through over 16 refereed publications, 2 book chapters and over 40 papers in international and national conferences, while she holds 5 International Patents on HT PEMFCs. Dr Daletou has participated in 9 European and National projects. She has been the person in charge of scientific and technical aspects in 3 EU research projects.