**ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ**
**ΣΧΟΛΗ ΧΗΜΙΚΩΝ ΜΗΧΑΝΙΚΩΝ**

**ΕΠΙΤΡΟΠΗ ΣΕΜΙΝΑΡΙΩΝ, Καθηγητής Α. Κοκόσης**

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ΣΕΜΙΝΑΡΙΟ ΧΗΜΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

Τρίτη 17 Μαΐου 2011, 16:00
Αίθουσα Σεμιναρίων «Ν. Κουμούτσου»

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# Surface nanometric sulphur and carbon moieties in Ni-catalyzed steam reforming of hydrocarbons

Catalytic steam reforming is a crucial step in any process involving the use of solid oxide fuel cells (SOFC). Metallic and ceramic supported Ni catalysts are the most widely tested because of their high activity and relatively low cost. However, catalyst aging/deactivation due to the formation of surface coke and sulphur contamination is the main roadblock towards commercialization. Higher steam to carbon (S/C) ratios in the reactor feed can be used to control this carbon formation, but in commercial operations, they result in higher production costs.

In this work commercially available pristine micrometric metallic Ni is treated chemically using various carbon chains length thiols and di-sulfides and thermally under inert atmospheres. These treatments lead to nano-differentiation of the Ni surface and confer to them different local reactivity in terms of reforming and carbon deposition. SEM, TEM and XPS surface analyses combined with classical catalyst evaluation techniques (BET, TPR, TPO) show the surface details and link them to the results of the catalytic reforming tests performed in a differential fixed bed isothermal reactor connected in line with a GC and an MS analysis.

A first conclusion is that the Ni catalyst activity is a function of the carbon chain length of the thiols and di-sulfides and that thermal conditioning of such chemically treated Ni catalysts leads to the production of surface carbon species which are much more resistant than thermodynamically expected. More data will be available and presented during the conference.