

A Novel Method for Water Thermolysis and CO₂ Transformation to Hydrocarbons



Prof. Evangelos Hristoforou

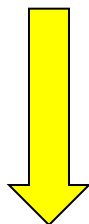
eh@metal.ntua.gr

N. Papadopoulos

National Technical University of Athens

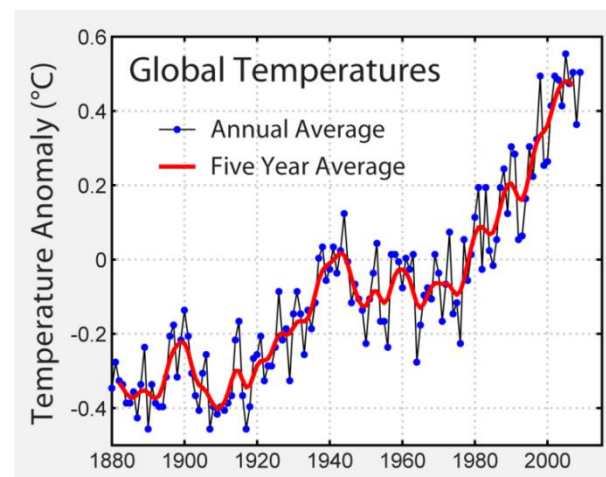
Electric Energy: Currently Limited Resources (?)

Transferring the problem to thermo-stations,
increasing the use of mineral fuels

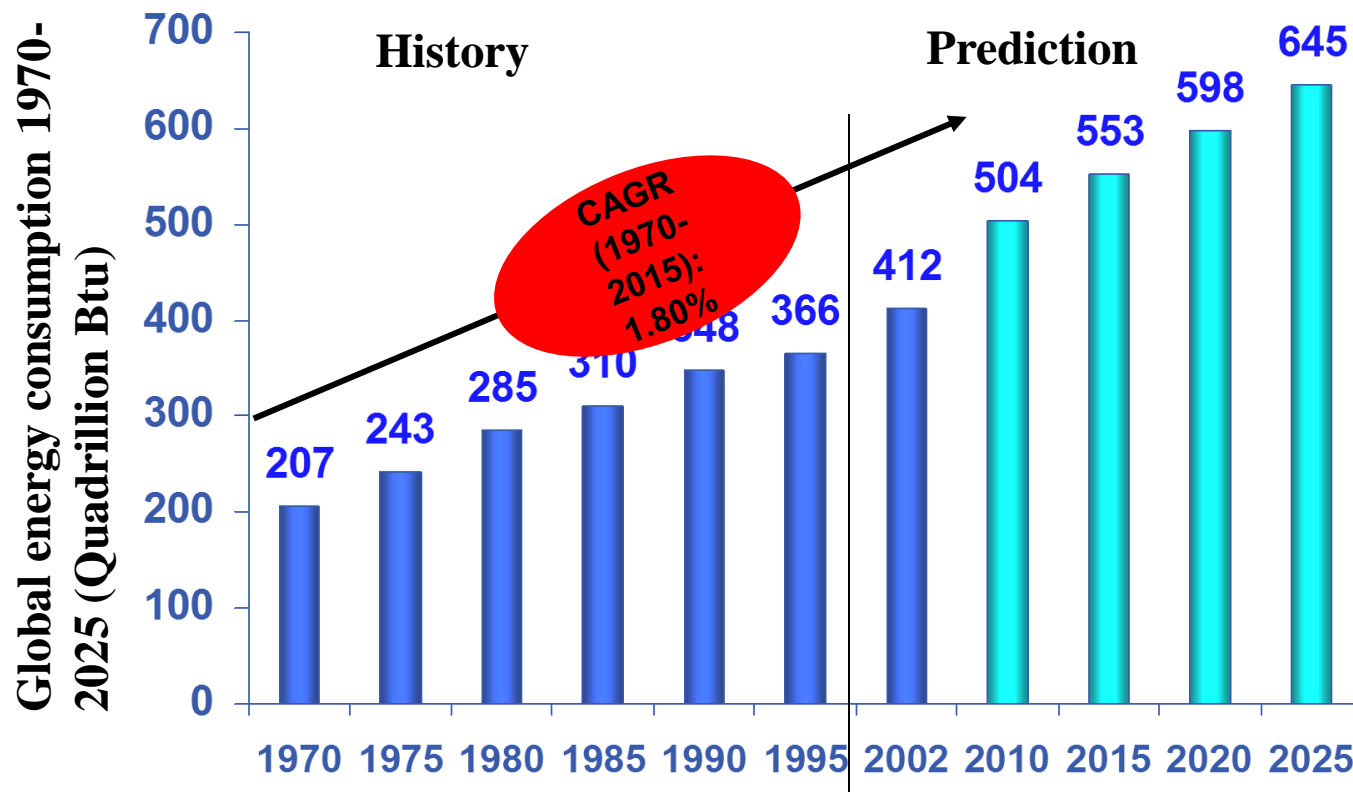


- Increase of globe's temperature up to 6.2 K till 2100
- destroying the biota
- Deceases
- Political instability
- Ressionion

(Source: Hadley Centre for Climate Prediction and Research)



Global Energy Situation



The largest increase will be realized in the developing economies

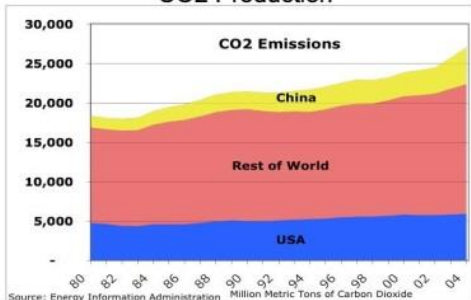
CAGR = Compounded Annual Growth Rate: Ολικός ετήσιος ρυθμός ανάπτυξης

Source: EIA International Energy Outlook (2007)

Pointless to Mention the Problems of the Classic Energy Sources

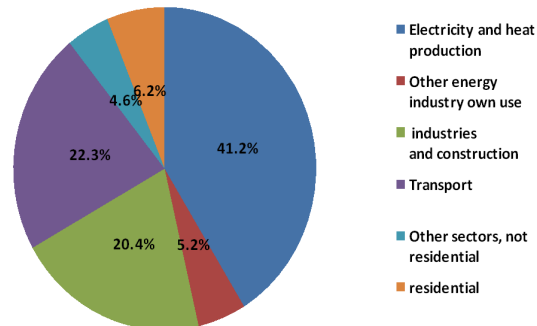


CO2 Production

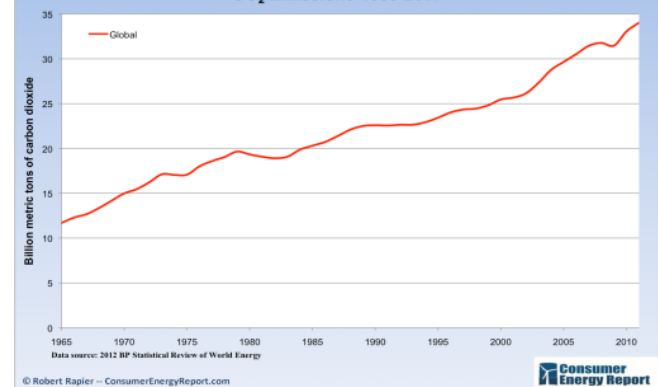


Source: Energy Information Administration
 Emissions of CO2 from developing countries is steadily rising. China CO2 emissions are up an 10% over the last five years as consumption of coal grew 9%.

CO2 Emissions by production sector

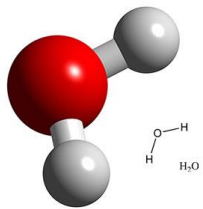
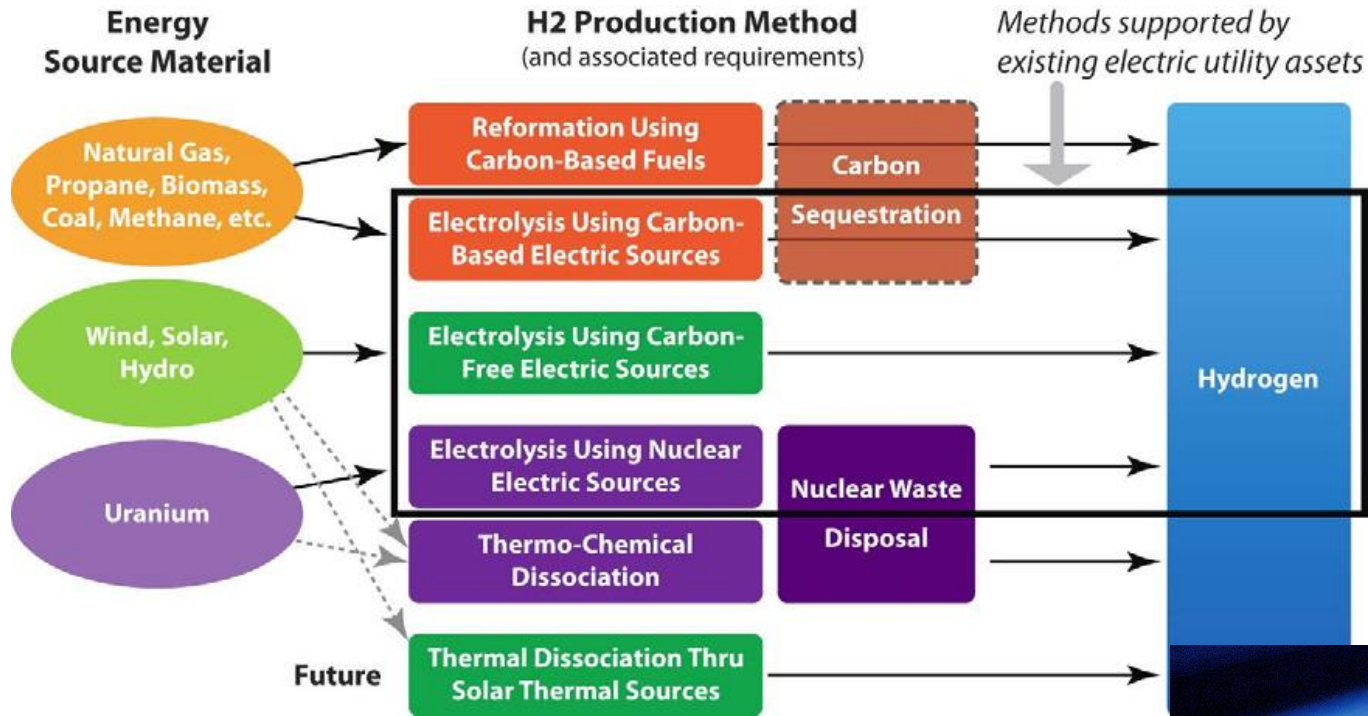


CO₂ Emissions 1965-2011



We certainly need a new generation of “fuels”

Water is THE Alternative Energy Form

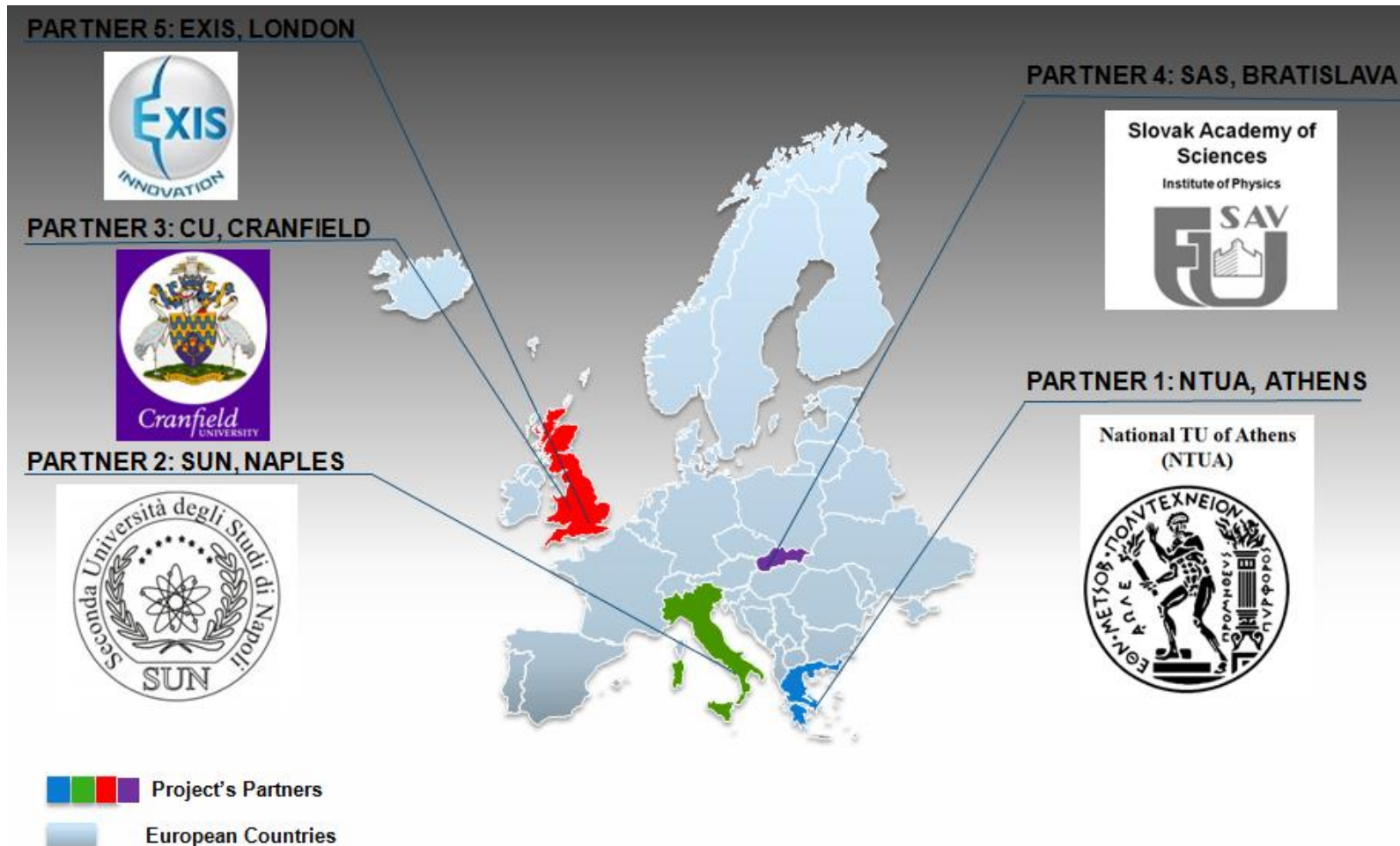


“Water will be the coal of the future.”

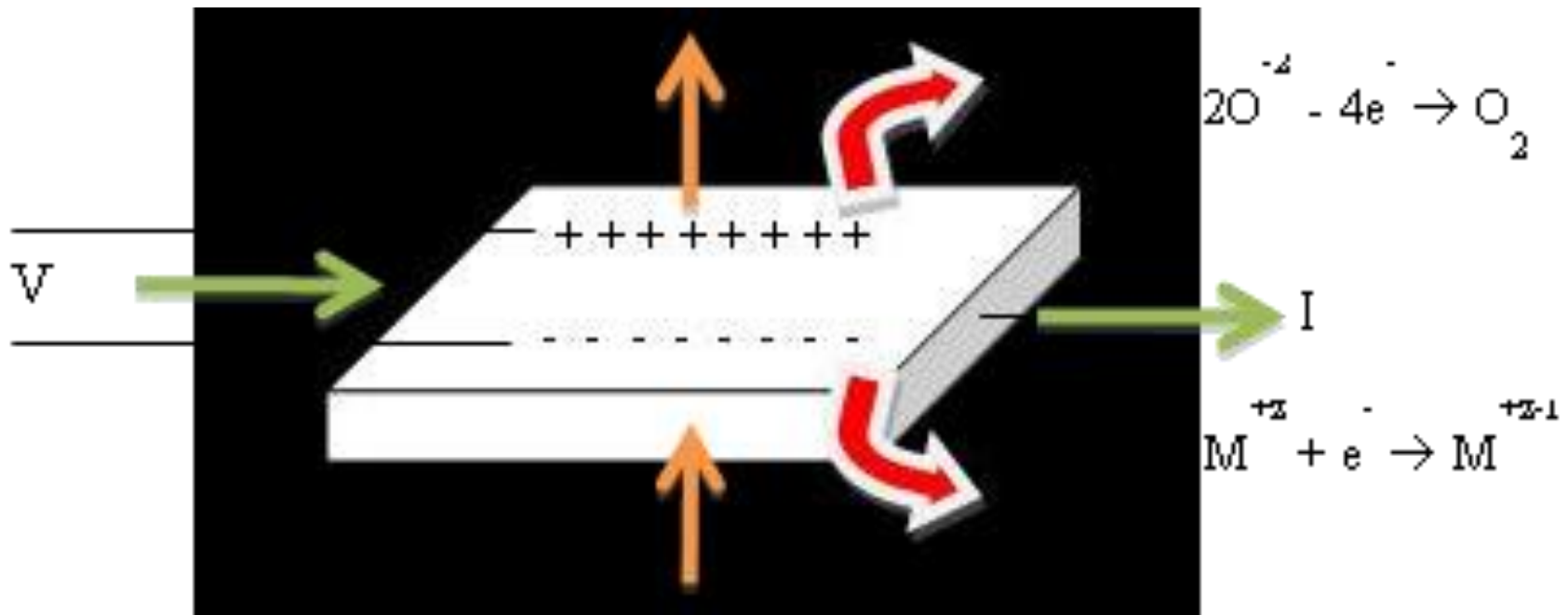
Jules Verne, 1874



NTUA is Leading the Efforts in Advancing “Renewable Fuels”

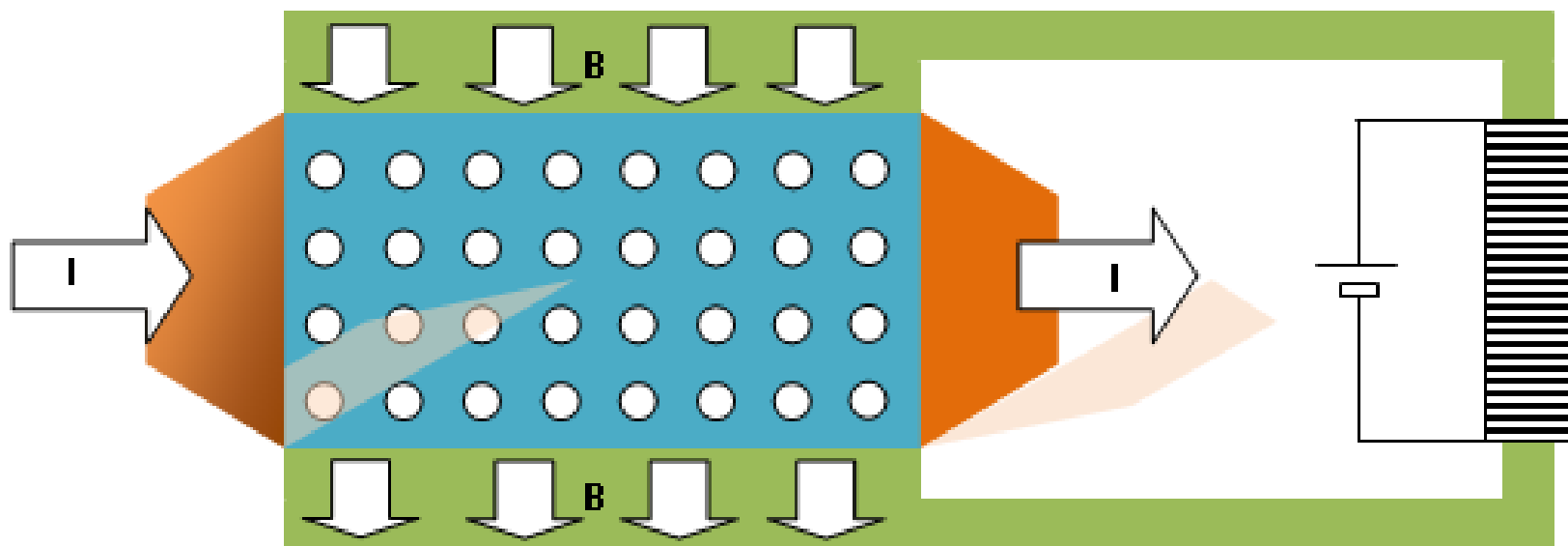


Our Advances: H₂ Production, CO₂ Transformation to Hydrocarbons and H₂ – O₂ co-production



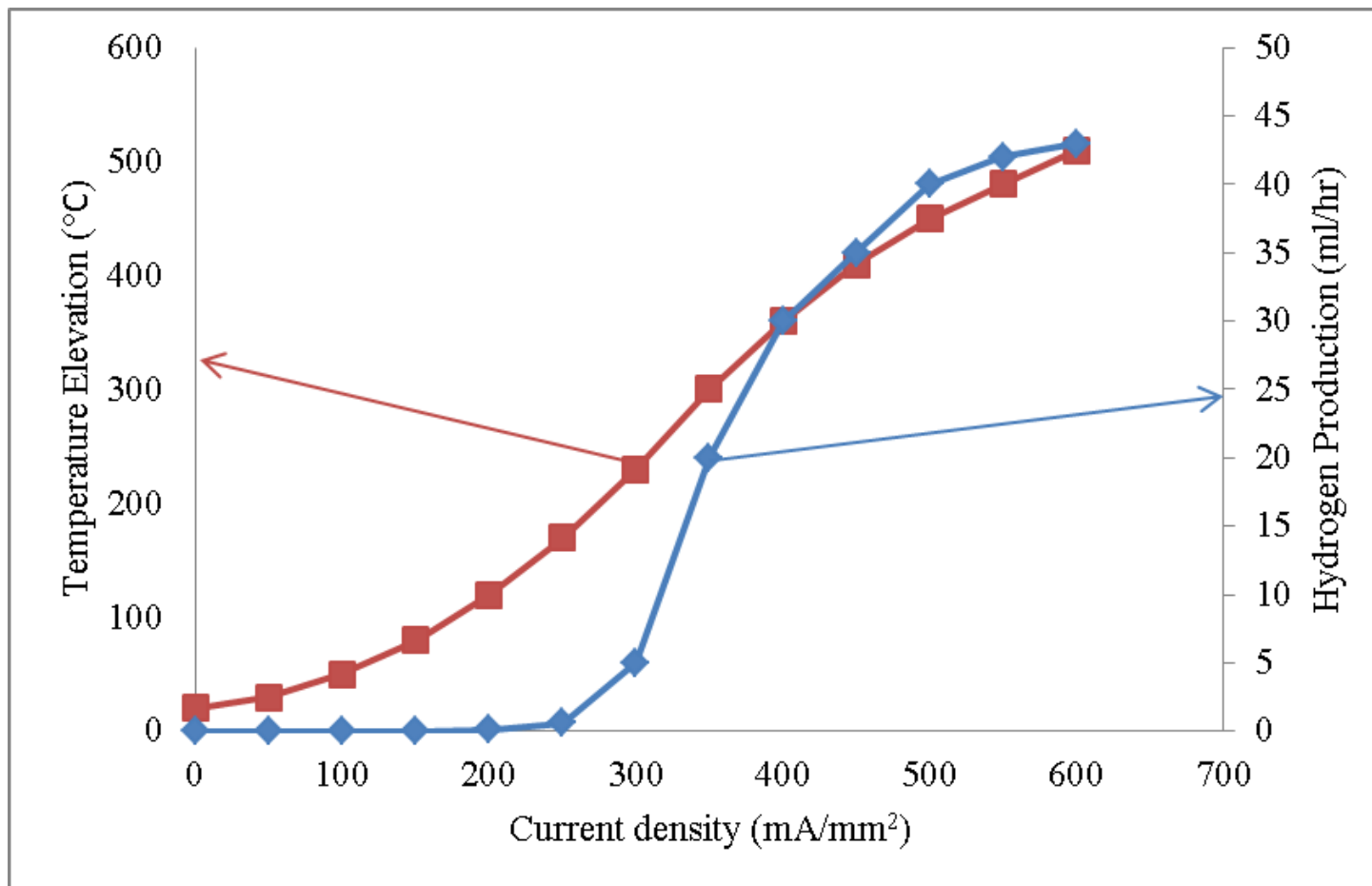
The most advanced research in our group concerning
Hybrid Electric Energy Integrated Cluster - **HELENIC**

The Commercial Prototype Implements macro-porous, meso-porous, micro-porous and nano-porous thick Fe_3O_4 films

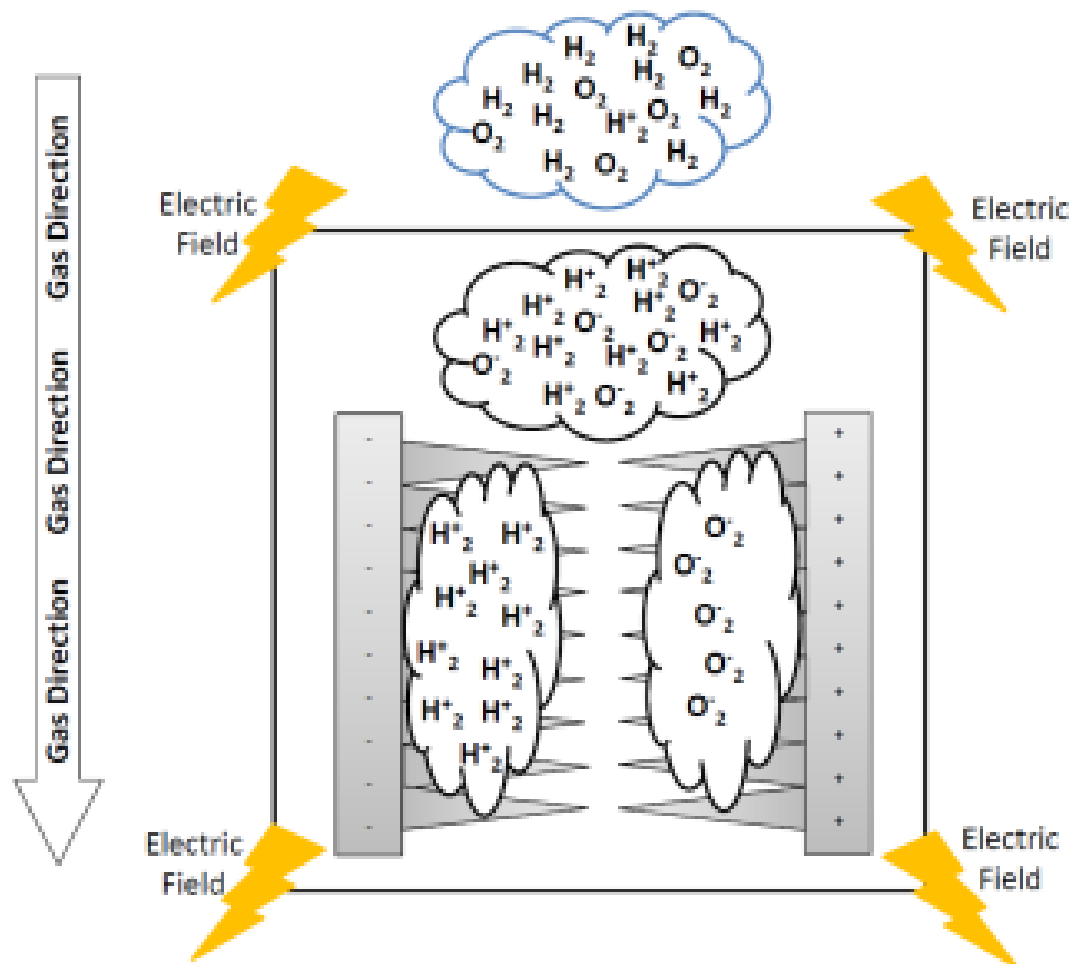


Current is heating the porous thick Fe_3O_4 catalyst: thus H_2O is thermolyzed to H_2 and O_2
Furthermore, passing CO_2 via the catalyst, it is reduced to hydrocarbons

Our Studies Indicate H₂ Release at 286 °C by Joule-Heating Ferrite Nano-porous Films



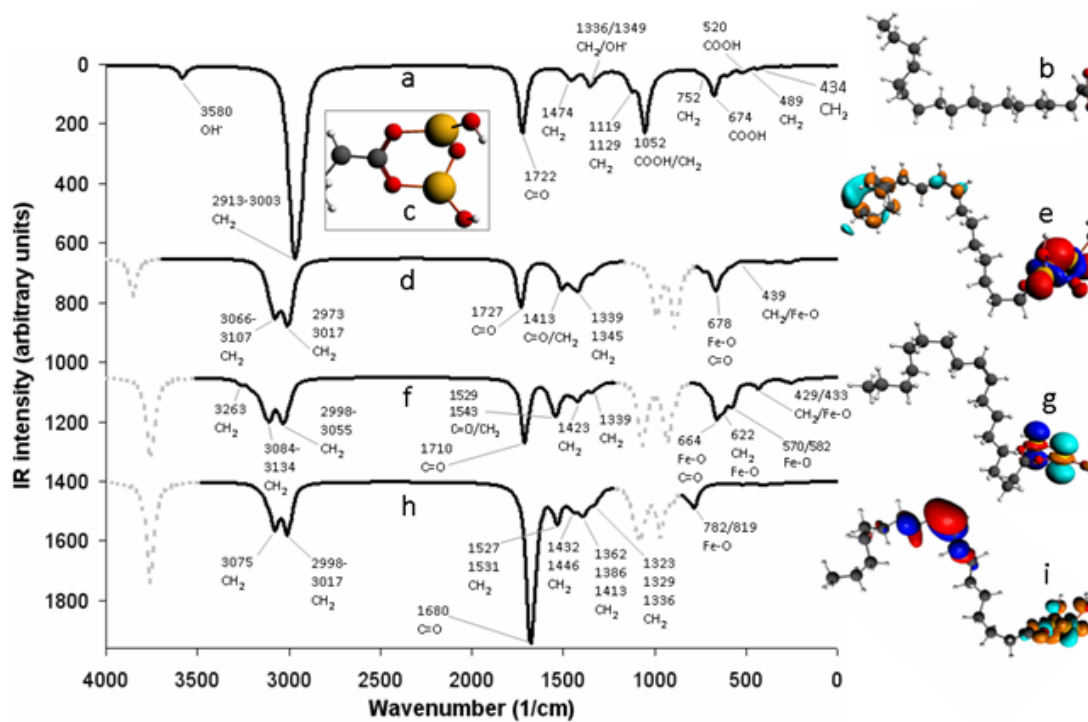
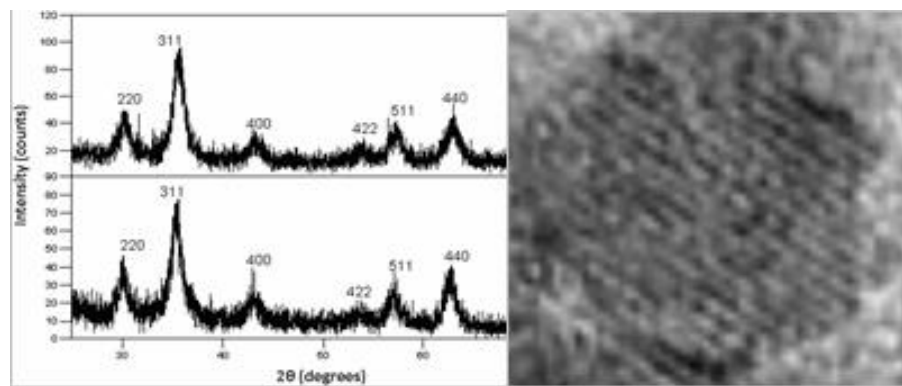
Separation of H₂ and O₂ (if needed) is Obtained by Electrophoresis



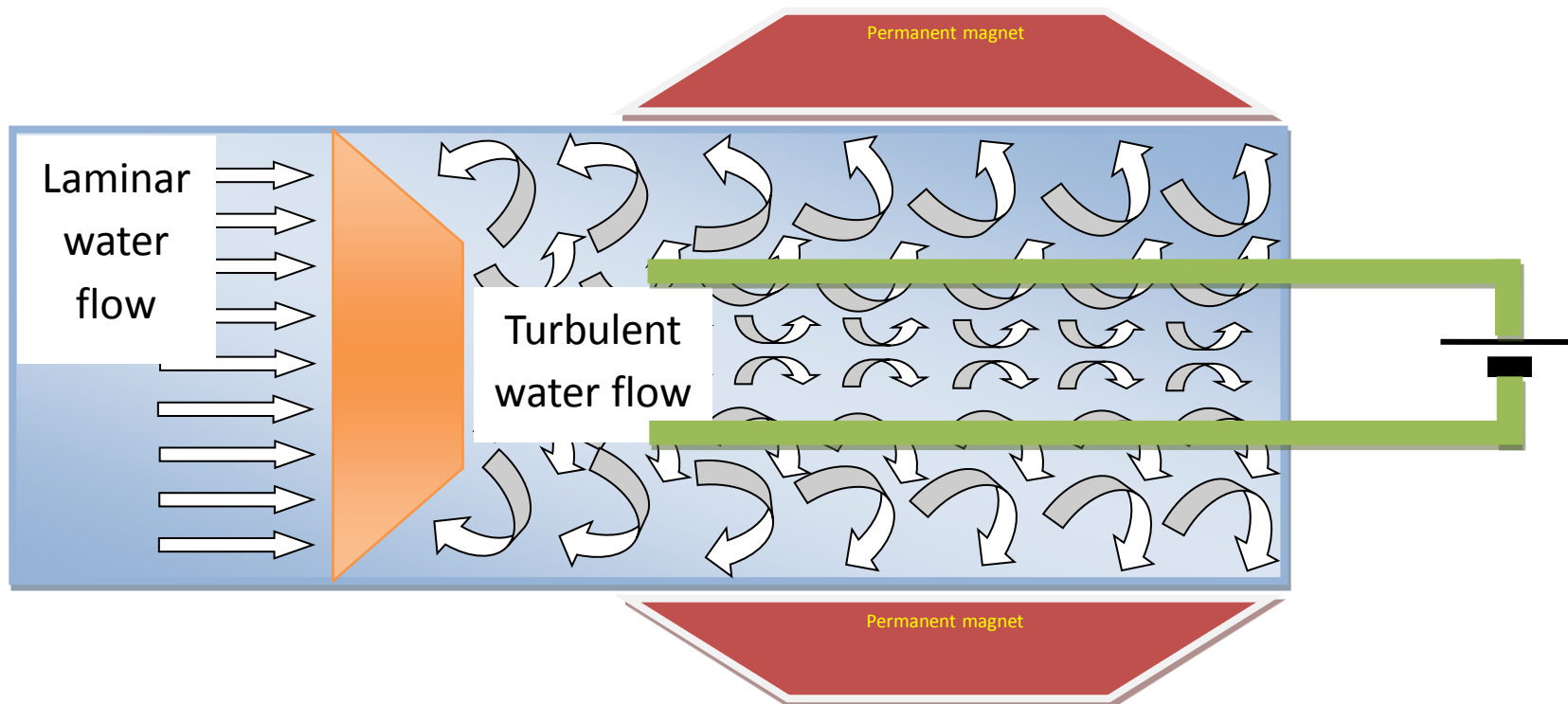
We Develop our Own Catalysts by Advanced, Home-made CVD Technology and Atomic Level Precursors



We Characterize and Model Them



Our New H₂ Production Proposal: Room Temperature H₂ Production Using Electric and Magnetic Field as Catalysts



A Novel Method for Water Thermolysis and CO₂ Transformation to Hydrocarbons

Prof. Evangelos Hristoforou

eh@metal.ntua.gr

