EUROMAT 2017/ Symposia Structure/Area E

E.1

Title: Hydrogen production, conversion, and storage

Organizer	Institution	Contact email
Maria Luisa Di Vona	University of Roma Tor Vergata, Rome, Italy	divona@uniroma2.it
Bogdan Kuchta	University of Aix-Marseille, Marseille, France	bogdan.kuchta@univ-amu.fr
Ioannis Kallitsis	University of Patras, Patras, Greece	j.kallitsis@upatras.gr
Toshiyuki Mori	NIMS, Japan	MORI.Toshiyuki@nims.go.jp

Summary

This symposium is intended to make the point on current improvements in the field of the "hydrogen economy", which include hydrogen production (electrolyzers), hydrogen conversion (fuel cells), and hydrogen storage. The development of advanced materials is paramount if these technologies are to be installed at a large scale. Improved nano-architectures are also required, as well as, better durability and longer lifetime of devices. High performance water electrolyzers are an important topic for the production of hydrogen containing little impurities, such as CO, that damage the expensive electrocatalysts. Solid oxide ceramic and polymeric electrolyzer technologies are currently marketed with different temperature domains and performance targets.
In the fuel cell sector, two major types are currently developed: Solid Oxide Fuel Cells (SOFC) rely on ceramic solid electrolytes and other high temperature components, whereas Polymer Electrolyte Fuel Cells (PEFC) use polymeric conductors and work at low temperature. The development of less expensive high performance catalytic electrodes, containing less or no noble metals, is another requirement. Alternative fuel cell technologies, including Direct Alcohol Fuel Cells or Enzymatic Fuel Cells, are other hot subjects.
For the implementation of a "hydrogen economy" hydrogen storage materials include high surface area and high porosity solids (chemically modified carbons, metal organic frameworks –MOF), but also chemical storage in form of compounds (formic acid, cycloalkanes, etc.) or metal hydrides with large storage capacity. Numerical simulations methodology bring valuable input for testing and screening the performance of new materials.

Topics:

Proton exchange membrane fuel cells (PEMFC)
Anion exchange membrane fuel fells (AEMFC)
Solid Oxide Fuel Cells (SOFC)
Proton-Conducting Fuel Cells (PCFC)
Direct Alcohol Fuel Cells (DAFC)
Polymer electrolyte water electrolysis
Solid Oxide water electrolysis
Alkaline electrolysis
Photoelectrochemical water splitting
Physical and chemical hydrogen adsorption

	Numerical modeling