

Solid Oxide Fuel Cells: Point of view on the French policy and presentation of the recent scientific developments at the University of Bourgogne (Dijon, France).

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Abstract:

Analyzing Energy Mix is a crucial step to foresee industrial development, either to provide energy, to save energy and to control commercial balance for fossil fuels. This exercise is certainly a political issue in the sense that it depends on the existing situation, on the investments reasonably acceptable, on the perception by the public of the different options. As such, the definition of an energy mix is loaded with inertia of the existing system, through former decisions, historical and sociological habits. In addition, these investigations have to be performed in the light of the coming climate change resulting from greenhouse gases emission.

By considering all of these aspects, the first part of this seminar will present general aspects on energy consumption and the impact on our environment and our way of life. It will give author's point of view on the French energy policy. A special section will be dedicated to the developments of Fuel Cell and Electrolyser. A comparison on the effort made on this sector, by Japan and France, will be exposed.

Hydrogen can be considered as a way to store electrical energy under chemical form in order to produce a clean, safe and efficient energy with a carbon-free energy production. Thus, the second part of this seminar will be dedicated to the recent developments, at the University of Bourgogne, on Solid Oxide Fuel Cells (SOFC) and Solid Oxide Electrolyser Cell (SOEC). Figure 1 gives an overview on the studied systems. Special attention will be given on

- cell shaping: realization of cathode/electrolyte/anode cell in a single step process;
- behavior of ferritic stainless steels as interconnects in SOFC and SOEC atmospheres.

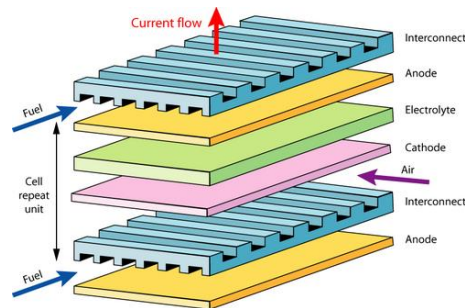


Figure 1: Scheme of a planar Solid Oxide Fuel Cell.

Author presentation:

After a PhD (2002 - 2005) in the field of ceramic fuel cells (SOFC = Solid Oxide Fuel Cells) and a post-doctorate on the synthesis of nanostructured ceramics, L. Combemale was recruited as associate Professor, in 2008, to provide a new approach in the field of non-conventional energy. His research activities are focused on the study of SOFC, IT-SOFC (Intermediate-Temperature SOFC) and HTE (High Temperature Electrolyser) systems around three major axes:

- realization of IT-SOFC systems and study of aging under real conditions (stack);
- electrochemical studies on cells;
- establishment of a system with dual atmosphere for HTE applications.