

LICENSING OPPORTUNITY

Micro-solid oxide fuel cell (μ SOFC): new stress resistant PEN structure

Key Words

Solid Oxide Fuel Cell (SOFC), micro-SOFC, ceramic membranes and thin films, portable power generation, PEN membrane

Patent status

Patent pending, PCT/EP2006/069688

Licensing / collaboration

Non-exclusive licenses or partially exclusive licenses / Research collaborations

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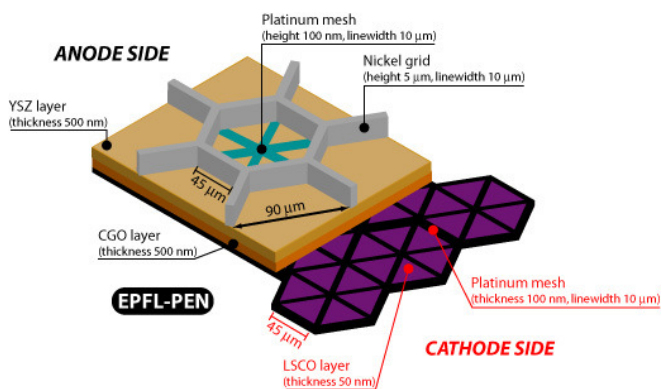


Figure 1: Schematic view of the PEN membrane comprising the nickel grid of the anode side, the bilayer electrolyte and the cathode.

Description

Miniature solid oxide fuel cells (μ SOFC) are very promising sources for portable devices.

This invention proposes a PEN (positive electrode – electrolyte -negative electrode) membrane architecture for μ SOFC, characterized by a metallic grid acting as supporting structure that is applied on top of the electrolyte film, and which comprises in addition a patterned metallic sub-layer structure supplying a fine distribution of current and increasing the density of electrolyte-electrode boundaries exposed to the fluid. The structure is useful for current generation, as well as for gas sensing.

Status of development: The large version of the current PEN is a free standing 0.5 μ m thick membrane, with a diameter of 5mm. This structure is mechanically stable up to 600°C; this cell works with an OCV of 200mV. A smaller version with 0.5 mm diameter works with an OCV of 800 mV.

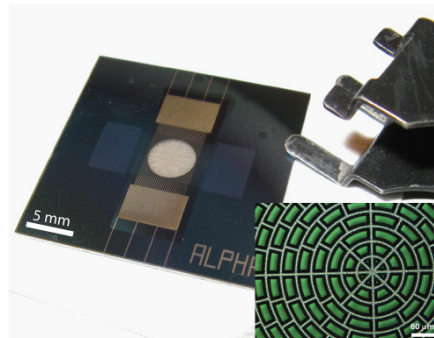


Figure 2: PEN structure

Innovative aspects

- Allows fabrication of SOFC structures by means of MEMS and thin film technology (deep silicon dry etching, reactive magnetron sputtering, etc.);
- Allows for larger free standing membranes and more porous anode structures having more TPB as compared with prior art.

Main advantages

- Fabrication process is fully compatible with microfabrication methods used for the other steps of the μ SOFC route.
- Provides stress resistant membrane having a small thickness to diameter ratio.

Potential Commercial Applications

- Batteries for portable electronic devices: phone, laptop, PDA, digital camera, power tools.