

Micro Solid Oxide Fuel Cells: a New Generation of Micro-Power Sources for Portable Applications

Batteries, with inherent limited capacity, have dominated the power supply of small devices for decades. However, despite the fast evolution in the field, the energy gap between the capacity of the current battery technology and the power requirements is increasing year by year. This energy divergence brings a great challenge on portable generation that opens new opportunities for technologies beyond Li-ion. In this new scenario, a major breakthrough on the miniaturization of uninterrupted and efficient generators is crucial.

The dream of miniaturizing one of the most efficient known generators, i.e. a fuel cell, has been unsuccessfully pursued for years until recent advances in silicon integration of Solid Oxide Fuel Cells (μ SOFCs) converted this disruptive technology into a serious candidate to power next generations of portable devices. The current technology allows stable operation between 350-450 °C. However, extending this range to high temperatures (>600°C) is mandatory for portable applications based on easy-to-handle and available (liquid) hydrocarbons.

In this talk, we will present the integration in mainstream silicon technology of SOFC devices and ethanol micro-reformers able to operate at high temperatures. Micro and nanotechnology helped in reducing the size and thermal mass of the μ SOFC devices allowing quick and low energy consumption start-ups, crucial for portable applications. Full system modelling will be presented for supporting the feasibility of the whole power source into real scenarios.

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