

# Fabrication of Solid Oxide Fuel Cell Cathode by Inexpensive Inkjet Printing

*T. Pernin, C. Gadea, and V. Esposito*

DTU Energy Conversion, Technical University of Denmark

## INTRODUCTION

Solid Oxide Fuel Cell (SOFC) is an energy conversion device consisting of porous electrodes and a dense electrolyte in-between which converts a gas fuel into electrical power with high efficiency (figure 1).

A few micron-thick (1-2  $\mu\text{m}$ ) dense yttria-stabilized zirconia (YSZ) electrolyte has been recently fabricated by inkjet printing on a  $9 \times 9 \text{ cm}^2$  green NiO/YSZ substrate in our facilities using a modified photo inkjet printer (figure 2). The resulting cells were tested and compared to those obtained on fuel cells fabricated by tape cast electrolyte, showing superior performances. With an objective of continuing improving SOFC performances, development of a cathode layer by inkjet printing is being studied in this project.

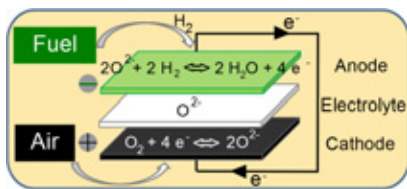


Figure 1: principle of a SOFC



Figure 2: Modified photo printer

## CHALLENGES

Inkjet printing inks developed within this project are water-based, and hence exhibit a high surface tension. When printing onto surfaces such as sintered half-cell (electrolyte + anode), covering issue might happen if the ink surface tension is not optimized, leading to poor performances of the cell.

In this project, influence of surface tension of Lanthanum Strontium Cobalt ink (LSC) on the homogeneity of the printed film has been studied. Several solvents mixtures and surfactants have been investigated in order to reduce the ink surface tension hence optimizing the covering of the substrate surface.