3D Printing 2018
2nd International Conference on
conferenceseries.com 3D Printing Technology and Innovations
March 19-20, 2018 London, UK



Universidad de La Laguna

Title: SLA-3D Printed Electrolytes for Solid Oxide Fuel Cells

Author (s) Name: Lorena Hernández-Afonso, University of La Laguna, Spain, Europe
Lucía M. Toscani, UNIDEF MINDEF CONICET,Argentina, South America
Susana A. Larrondo, UNIDEF MINDEF CONICET, Argentina, South America
Jesús Canales-Vázquez, University of Castilla-La Mancha, Spain, Europe
Albert Tarancón Rubio, Institut de Reçerca en Energia de Catalunya, Spain Europe
Pedro Esparza Ferrera, University of La Laguna, Spain, Europe

Fuel cells are one of the most reliable systems for clean energy production as heat and water are the only by-products of the electrochemical reaction between fuel (hydrogen) and oxidant (oxygen), which avoid the limitations dictated by Carnot's cycle. Additionally, these systems are robust, modular and silent and therefore may find a wide range of potential applications.

Among the different types of fuel cells, Solid Oxide Fuel Cell (SOFC) operates at high temperatures (650-950 °C) and the resulting residual heat may be harnessed which in turn gives rise to devices exhibiting the largest efficiencies. Each SOFC individual cell has three elements: a porous anode (Ni cermet), a porous cathode ($La_{0.8}Sr_{0.2}MnO_{3-\delta}$) and a dense electrolyte (yttrium-doped zirconia, YSZ) that separates both electrodes.

The performance of these cells depends closely on the so-called Triple Phase Boundary (TPB), which is an active zone where the three necessary phases coincide and hence the electrochemical occur. During the last decades, several materials processing strategies have been explored to optimise the TPB in the search for performance enhancements and also to improve extremely relevant parameters such as mechanical stability, optimization of the gas flows to minimize polarizations by concentration, and thermal and redox instability.

In this work we present the use of 3D printing technology to produce customised YSZ microstructures, their functionalisation with electrode materials and further evaluation of the electrochemical activity under both oxidizing and reducing conditions.

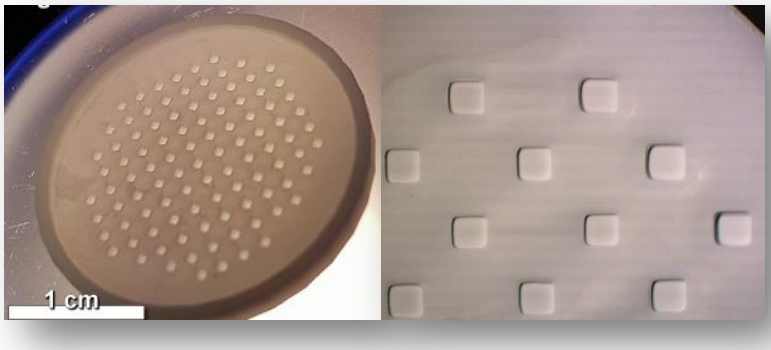


Figure 1 – Microstructured 3D printed electrolyte

Biography

Lorena Hernández Afonso is carrying out her PhD in the Inorganic Chemistry Department at the University of La Laguna. Her research is focused on 3D printing materials for Energy and environmental applications. She works in a research group, which has two project in process, one of them is national and another european about 3D printed advanced materials with energetic applications. As a result of her research work, she has co-authored five peer-reviewed articles.

Presenting author details
Full name: Lorena Hernández Afonso
Contact number: +34 608 99 15 29
Email id: lhernana@ull.edu.es
Category: Poster presentation
Session name: Track 7: 3D Printing Materials
Research interest: 3D printing with energetic applications