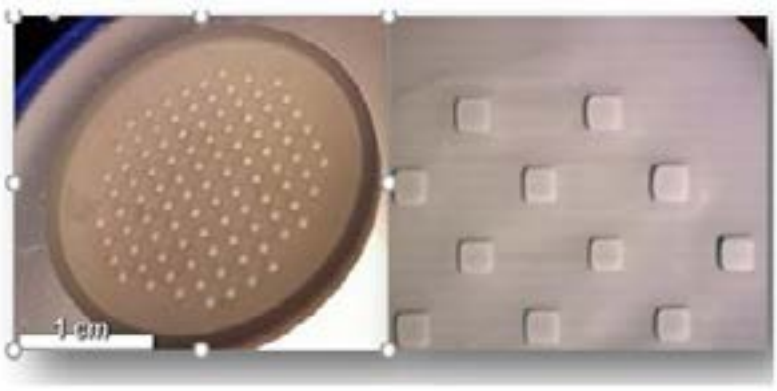
Lorena Herandez Afonso et al., Int J Adv Technol 2018, Volume 9
DOI: 10.4172/0976-4860-C1-003

SLA-3D printed electrolytes for solid oxide fuel cells

Lorena Hernandez Afonso[1], **Lucía M Toscani**[2], **Susana A Larrondo**[2], **Jesús Canales Vázquez**[3], **Albert Tarancón Rubio**[4] and **Pedro Esparza Ferrera**[1]
[1]University of La Laguna, Spain
[2]UNIDEF- MINDEF-CONICET, Argentina
[3]University of Castilla-La Mancha, Spain
[4]Catalonia Institute for Energy Research, Spain

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 customized YSZ microstructures, their functionalization with electrode materials and further evaluation of the electrochemical activity under both oxidizing and reducing conditions.



Biography

Lorena Hernandez Afonso is pursuing her PhD in the Inorganic Chemistry Department at the University of La Laguna, Spain. 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 about 3D printed advanced materials with energetic applications. She has co-authored five peer-reviewed articles.

lhernana@ull.edu.es

Notes: