

5<sup>th</sup> World Congress on

# Materials Science & Engineering

June 13-15, 2016 Alicante, Spain

## Application of powder extrusion moulding technologies to fabrication of microtubes for solid oxide fuel cells

**A Várez, M E Sotomayor, T Jardiel and B Levenfeld**  
Universidad Carlos III de Madrid, Spain

**P**owder Extrusion Molding (PEM) is a technology that combine the advantages of extrusion plastic and the conventional powder technology allowing the manufacturing of ceramic and metallic 2D pieces. On the other hand, Micro-Tubular Solid Oxide Fuel Cells (MT-SOFCs) are small tubular shaped, ceramic based, that electrochemically converts fuels, mainly those containing hydrogen in the compound such as hydrocarbons, into electrical power. In this communication we present the results we have obtained by applying the PEM technology to manufacture MT-SOFCs. In particular, by using this technology we have obtained tubes of YSZ, Ni-YSZ and ferritic Stainless Steels (430L) for being used as self-supported, anode-supported and metallic-supported SOFCs respectively. The binders developed for the manufacturing process are multicomponent systems constituted by a thermoplastic polymer as high density polyethylene or polypropylene, and several kind of wax. These binders are mixed with the metallic or ceramic powder to produce the so-called feedstock. The extrusion of this feedstock allowed obtaining micro-tubes with a wall thickness ranged between 200 and 1000  $\mu\text{m}$  after sintering process. Mechanical and electrochemical properties are good enough for the final application (electrolyte, anode-support or metal-support).

[alvar@ing.uc3m.es](mailto:alvar@ing.uc3m.es)

## Surface engineering

**Carsten Gachot**  
Saarland University, Germany

**S**urface engineering means the interdisciplinary approach between materials science, manufacturing technology and characterization techniques to exploit the surface layer states induced by manufacturing processes based on process-surface layer-properties-correlations and to consider them in the design and dimensioning process. This affords knowledge on correlations between process parameters and resulting surface conditions. The surface layer states is affected due to mechanical, thermal or chemical process effects may be characterized by topography, residual stresses, workhardening state and other microstructural changes. Additionally the effects on component service properties like fatigue, corrosion or tribological resistance must be evaluated based on the mechanisms beyond. The symposium will be handling with topics dealing with such correlations and draw the attention to manufacturing processes from casting via forming, machining and removal to heat treatments and mechanical surface treatments.

[c.gachot@mx.uni-saarland.de](mailto:c.gachot@mx.uni-saarland.de)